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Anthropometric

101 Underweight (Women)

Definition/Cut-off Value

Underweight for women is defined as follows:

Category	BMI
Pregnant Women	Prepregnancy Body Mass Index (BMI) <18.5.
Non-Breastfeeding Women	Prepregnancy or current Body Mass Index (BMI) <18.5.
Breastfeeding Women less than 6 Months Postpartum	Prepregnancy or current Body Mass Index (BMI) <18.5.
Breastfeeding Women 6 Months Postpartum or More	Current Body Mass Index (BMI) <18.5.
Note: A BMI table is attached to assist in determining weight classification. Also, until research supports the use of different BMI cut-offs to determine weight status categories for adolescent pregnancies, the same BMI cut-offs will be used for all women, regardless of age, when determining WIC eligibility (1). (See Justification for a more detailed explanation.)	

Participant Category and Priority Level

Category	Priority
Pregnant Women	I
Breastfeeding Women	I
Non-Breastfeeding Women	III, IV, V or VI

Justification

Underweight women who become pregnant are at a higher risk for delivery of low birth weight (LBW) infants, retarded fetal growth, and perinatal mortality. Prepregnancy underweight is also associated with a higher incidence of various pregnancy complications, such as antepartum hemorrhage, premature rupture of membranes, anemia, endometriosis, and cesarean delivery (2).

The goal in prenatal nutritional counseling provided by WIC is to achieve recommended weight gain by emphasizing food choices of high nutritional quality; and for the underweight woman, by encouraging increased consumption and/or the inclusion of some calorically dense foods.

The 2009 Institute of Medicine (IOM) report: *Weight Gain During Pregnancy: Reexamining the Guidelines* (1) updated the pregnancy weight categories to conform to the categories developed by the World Health Organization and adopted by the National Heart, Lung and Blood Institute in 1998 (3). The reexamination of the guidelines consisted of a review of the determinants of a wide range of short-and long-term consequences of variation in weight gain during pregnancy for both the mother and her infant. The IOM

prenatal weight gain recommendations based on prepregnancy weight status categories are associated with improved maternal and child health outcomes (1).

Included in the 2009 IOM guidelines is the recommendation that the BMI weight categories used for adult women be used for pregnant adolescents as well. More research is needed to determine whether special categories are needed for adolescents.

It is recognized that both the IOM cut-offs for defining weight categories will classify some adolescents differently than the CDC BMI-for-age charts. For the purpose of WIC eligibility determination, the IOM cut-offs will be used for all women regardless of age. However, due to the lack of research on relevant BMI cut-offs for pregnant and postpartum adolescents, professionals should use all of the tools available to them to assess these applicants' anthropometric status and tailor nutrition counseling accordingly.

Weight during the early postpartum period, when most WIC certifications occur, is very unstable. During the first 4-6 weeks fluid shifts and tissue changes cause fluctuations in weight. After 6 weeks, weight loss varies among women. Prepregnancy weight, amount of weight gain during pregnancy, race, age, parity and lactation all influence the rate of postpartum weight loss. By 6 months postpartum, body weight is more stable and should be close to the prepregnancy weight. In most cases therefore, prepregnancy weight is a better indicator of weight status than postpartum weight in the first 6 months after delivery. The one exception is the woman with a BMI of <18.5 during the immediate 6 months after delivery. Underweight at this stage may indicate inadequate weight gain during pregnancy, depression, an eating disorder or disease, any or all of which need to be addressed (4).

While being on the lean side of normal weight is generally considered healthy, being underweight can be indicative of poor nutritional status, inadequate food consumption, and/or an underlying medical condition. Underweight women who are breastfeeding may be further impacting their own nutritional status. Should she become pregnant again, an underweight woman is at a higher risk for delivery of low birth weight (LBW) infant(s), retarded fetal growth, and perinatal mortality. The role of the WIC Program is to assist underweight women in the achievement of a healthy dietary intake and body mass index.

References

1. Institute of Medicine. Weight gain during pregnancy: reexamining the guidelines (Prepublication Copy). National Academy Press, Washington, D.C.; 2009. www.nap.edu. Accessed June 2009.
2. Institute of Medicine. WIC nutrition risk criteria: a scientific assessment. National Academy Press, Washington, D.C.; 1996.
3. National Heart, Lung, and Blood Institute (NHLBI), National Institutes of Health (NIH). Clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults. NIH Publication No. 98-4083, 1998. www.nih.gov. Accessed June 2009.
4. Crowel DT. Weight changes in the postpartum period: a review of the literature. Journal of Nurse-Midwifery. Vol. 40, No. 5, September/October 1995; pgs 418-423.

Additional References

1. Parker JD, Abrams B. Prenatal weight gain advice: an examination of the recent prenatal weight gain recommendations of the Institute of Medicine. Obstet Gynecol, 1992; 79:664-9.

2. Siega-Riz AM, Adair LS, Hobel CJ. Institute of Medicine maternal weight gain recommendations and pregnancy outcomes in a predominately Hispanic population. Obstet Gynecol, 1994; 84:565-73.

3. Suitor CW, editor. Maternal weight gain: a report of an expert work group. Arlington, Virginia: National Center for Education in Maternal and Child Health; 1997. Sponsored by Maternal and Child Health Bureau, Health Resources and Services Administration, Public Health Service, U.S. Department of Health and Human Services.

BMI Table for Determining Weight Classification for Women (1)

Height (Inches)	Underweight BMI <18.5	Normal Weight BMI 18.5-24.9	Overweight BMI 25.0-29.9	Obese BMI ≥30.0
58”	<89 lbs	89-118 lbs	119-142 lbs	>142 lbs
59”	<92 lbs	92-123 lbs	124-147 lbs	>147 lbs
60”	<95 lbs	95-127 lbs	128-152 lbs	>152 lbs
61”	<98 lbs	98-131 lbs	132-157 lbs	>157 lbs
62”	<101 lbs	101-135 lbs	136-163 lbs	>163 lbs
63”	<105 lbs	105-140 lbs	141-168 lbs	>168 lbs
64”	<108 lbs	108-144 lbs	145-173 lbs	>173 lbs
65”	<111 lbs	111-149 lbs	150-179 lbs	>179 lbs
66”	<115 lbs	115-154 lbs	155-185 lbs	>185 lbs
67”	<118 lbs	118-158 lbs	159-190 lbs	>190 lbs
68”	<122 lbs	122-163 lbs	164-196 lbs	>196 lbs
69”	<125 lbs	125-168 lbs	169-202 lbs	>202 lbs
70”	<129 lbs	129-173 lbs	174-208 lbs	>208 lbs
71”	<133 lbs	133-178 lbs	179-214 lbs	>214 lbs
72”	<137 lbs	137-183 lbs	184-220 lbs	>220 lbs

(1) Adapted from the Clinical Guidelines on the Identification, Evaluation and Treatment of Overweight and Obesity in Adults. National Heart, Lung and Blood Institute (NHLBI), National Institutes of Health (NIH). NIH Publication No. 98-4083.

103 Underweight or At Risk of Underweight (Infants and Children)

Definition/Cut-off Value

Underweight and at risk of underweight are defined as follows:

Weight Classification	Age	Cut-off Value
Underweight	Birth to < 24 months	≤2.3rd percentile weight-for-length as plotted on the Centers for Disease Control and Prevention (CDC) Birth to 24 months gender specific growth charts (1).*
	2-5 years	≤5th percentile Body Mass Index (BMI)-for-age as plotted on the 2000 CDC age/gender specific growth charts (2).
At Risk of Underweight	Birth to < 24 months	>2.3rd percentile and ≤5th percentile weight-for-length as plotted on the CDC Birth to 24 months gender specific growth charts (1).*
	2-5 years	>5th percentile and ≤10th percentile BMI-for-age as plotted on the 2000 CDC age/gender specific growth charts (2).

**Based on 2006 World Health Organization international growth standards (3). For the Birth to <24 months "underweight" definition, CDC labels the 2.3rd percentile as the 2nd percentile on the Birth to 24 months gender specific growth charts. For more information about the percentile cut-off, please see Clarification.*

Note: The Birth to 24 months and the 2000 CDC growth charts are available at: www.cdc.gov/growthcharts.

Participant Category and Priority Level

Category	Priority
Infants	I
Children	III

Justification

The CDC uses the 2.3rd percentile weight-for-length (for birth to 24 months of age) and the 5th percentile BMI-for-age (for 2-5 years of age), as the cut-offs to define underweight in its Pediatric Nutrition Surveillance System (1, 2). However, CDC does not have a position regarding the cut-off percentile, which should be used to determine at risk of underweight as a nutrition risk in the WIC Program. At risk of underweight is included in this criterion to reflect the preventative emphasis of the WIC Program.

A review of literature on weight-for-length or stature cut-off percentiles indicates that: a) many children at or below the 5th percentile for weight are in need of nutritional intervention, and b) those at or below the 10th percentile may be at nutritional risk and in need of preventative nutritional intervention, or at least further evaluation (4).

Weight-for-length/stature describes body proportionality and is sensitive to acute undernutrition, but can also reflect long-term status (5). Physical growth delay is used as a proxy for the deleterious effects undernutrition can have on immune function, organ development, hormonal function and brain development (6).

Implications for WIC Nutrition Services

Participation in WIC has been associated with improved growth in both weight and height in children (7). An infant or child determined to be underweight at WIC certification should be monitored at regular intervals during the certification period, as appropriate. Through client-centered counseling, WIC staff can assist families in making nutritionally balanced food choices to promote adequate weight gain. Also, the foods provided by the WIC Program are scientifically-based and intended to address the supplemental nutritional needs of the Program's target population, and can be tailored to meet the needs of individual participants.

In addition, WIC staff can greatly assist families by providing referrals to medical providers and other services, in available, in their community. Such resources may provide the recommended medical assessments, in order to rule out or confirm medical conditions, and offer treatment when necessary and/or in cases where growth improvement is slow to respond to dietary interventions.

References

1. Centers for Disease Control and Prevention. Use of World Health Organization and CDC growth charts for children aged 0-59 months in the United States. MMWR 2010; 59(No. RR-9). Available at: http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5909a1.htm?s_cid=rr5909a1_w. Accessed September 2010.
2. Kuczmarski RJ, Ogden CL, Grummer-Strawn LM, et al. GDC growth charts: United States. Advance data from vital and health statistics; no. 314. Hyattsville, Maryland: National Center for Health Statistics. 2000.
3. World Health Organization. WHO child growth standards: Length/height-for-age, weight-for-age, weight for height and body mad index-for-age: Methods and development. Geneva, Switzerland: World Health Organization; 2006. Available at: http://www.who.int/childgrowth/publications/technical_report_pub/en/index.html. Accessed September 2010.

4. Food and Nutrition Information Center, National Agriculture Library. Update of analysis of literature regarding cut-off percentiles for low weight for length in infants. Washington, D.C.; February 5, 1991.

5. Sherry B. Epidemiology of inadequate growth. In: Kessler DB, Dawson P, editors. Failure to thrive and pediatric undernutrition: A transdisciplinary approach. Baltimore: Paul H. Brooks Publishing Company, Inc.; 1999.

6. Metallinos-Katsaras E, Gorman KS. Effects of undernutrition on growth and development. In: Kessler DB, Dawson P, editors. Failure to thrive and pediatric undernutrition: A transdiciplinary approach. Baltimore: Paul H. Brooks Publishing Company, Inc.; 1999. p. 38.

7. Disbrow DD. The costs of benefits of nutrition services: a literature review. J Am Diet Assoc. 1989; 89:S3-66.

Clarification

The cut-off for underweight for infants and children <24 months is 2.3; however, for ease of use, CDC labels it as the 2nd percentile on the hard copy Birth to 24 months growth charts. Electronic charts should use the 2.3rd percentile as the cut-off.

111 Overweight (Women)

Definition/Cut-off Value

Overweight for women is defined as follows:

Category	Cut-off Value
Pregnant Women	Prepregnancy Body Mass Index (BMI) ≥ 25
Non-Breastfeeding Women	Prepregnancy Body Mass Index (BMI) ≥ 25
Breastfeeding Women less than 6 Months Postpartum	Prepregnancy Body Mass Index (BMI) ≥ 25
Breastfeeding Women 6 Months Postpartum or more	Current Body Mass Index (BMI) ≥ 25
Note: A BMI table is attached to assist in determining weight classifications. Also, until research supports the use of different BMI cut-offs for adolescent pregnancies, the same BMI cut-offs will be used for all women, regardless of age, when determining WIC eligibility (1). (See Justification for a more detailed explanation.)	

Participant Category and Priority Level

Category	Priority
Pregnant Women	I
Breastfeeding Women	I
Non-Breastfeeding Women	III, IV, V or VI

Justification

Maternal overweight and obesity are associated with higher rates of cesarean delivery, gestational diabetes mellitus, preeclampsia and other pregnancy-induced hypertensive disorders, as well as postpartum anemia (2). Several studies have established an association between obesity and an increased risk for hypertension, dyslipidemia, diabetes mellitus, cholelithiasis, coronary heart disease, osteoarthritis, sleep apnea, stroke and certain cancers (1).

One goal of prenatal nutritional counseling is to achieve recommended weight gain during pregnancy. For the overweight woman, emphasis should be on selecting food choices of high nutritional quality and avoiding calorie-rich foods, thereby minimizing further risks associated with increased overweight and obesity.

The 2009 Institute of Medicine (IOM) report: *Weight Gain During Pregnancy: Reexamining the Guidelines* (1) updated the pregnancy weight categories to conform to the categories developed by the World Health Organization and adopted by the National Heart, Lung and Blood Institute in 1998 (3). The reexamination of the guidelines consisted of a review of the determinants of a wide range of short-and long-term

consequences of variation in weight gain during pregnancy for both the mother and her infant. The IOM prenatal weight gain recommendations based on prepregnancy weight status categories are associated with improved maternal and child health outcomes (1).

Included in the 2009 IOM guidelines is the recommendation that the BMI weight categories used for adult women be used for pregnant adolescents as well. More research is needed to determine whether special categories are needed for adolescents. It is recognized that the IOM cut-offs for defining weight categories will classify some adolescents differently than the CDC BMI-for-age charts. For the purpose of WIC eligibility determination, the IOM cut-offs will be used for all women regardless of age. However, due to the lack of research on relevant BMI cut-offs for pregnant and postpartum adolescents, professionals should use all of the tools available to them to assess these applicants' anthropometric status and tailor nutrition counseling accordingly.

Weight during the early postpartum period, when most WIC certifications occur, is very unstable. During the first 4-6 weeks fluid shifts and tissue changes cause fluctuations in weight. After 6 weeks, weight loss varies among women. Prepregnancy weight, amount of weight gain during pregnancy, race, age, parity and lactation all influence the rate of postpartum weight loss. By 6 months postpartum, body weight is more stable and should be close to the prepregnancy weight. In most cases, therefore, prepregnancy weight is a better indicator of weight status than postpartum weight in the first 6 months after delivery (4).

The percentage of adolescents who are overweight has increased rapidly and more than 60% of adults in the US are overweight. Due to the significant impact that overweight and obesity have on morbidity and mortality, it is imperative that every effort be made to identify individuals who are overweight and to assist them in achieving a more healthful weight. The WIC Program is in a position to play an important role in helping to reduce the prevalence of overweight not only by working with postpartum women on improving their own weight status, but also by helping them to see their role in assisting their children to learn healthful eating and physical activity behaviors.

References

1. Institute of Medicine. Weight gain during pregnancy: reexamining the guidelines (Prepublication Copy). National Academy Press; Washington D.C.; 2009. www.nap.edu. Accessed June 2009.
2. Bodnar LM, Catov JM, Klbanoff MA, Ness RB, Roberts JM. Prepregnancy body mass index and the occurrence of severe hypertensive disorders of pregnancy. Epidemiology 2007; 18(2):234-239.
3. National Heart, Lung, and Blood Institute (NHLBI), National Institutes of Health (NIH). Clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults. NIH Publication No. 98-4083, 1998. www.nhlbi.nih.gov. Accessed June 2009.
4. Crowell DT. Weight changes in the postpartum period: a review of the literature. Journal of Nurse-Midwifery. Vol. 40, No. 5, September/October 1995; pgs 418-423.

Additional References

1. Naye, R.L. Maternal body weight and pregnancy outcome. American Journal Clinical Nutrition; 1990; 52:273-279.
2. Parker JD, Abrams B. Prenatal weight gain advice: an examination of the recent prenatal weight gain recommendations of the Institute of Medicine. Obstet Gynecol, 1992; 79:664-9.

3. Siega-Riz AM, Adair LS, Hobel CJ. Institute of Medicine maternal weight gain recommendations and pregnancy outcomes in a predominately Hispanic population. Obstet Gynecol, 1994; 84:565-73.

4. Suitor CW, editor. Maternal weight gain: a report of an expert work group. Arlington, Virginia: National Center for Education in Maternal and Child Health; 1997. Sponsored by Maternal and Child Health Bureau, Health Resources and Services Administration, Public Health Service, U.S. Department of Health and Human Services.

BMI Table for Determining Weight Classification for Women (1)

Height (Inches)	Underweight BMI < 18.5	Normal Weight BMI 18.5-24.9	Overweight BMI 25.0-29.9	Obese BMI ≥ 30.0
58"	< 89 lbs	89-118 lbs	119-142 lbs	> 142 lbs
59"	< 92 lbs	92-123 lbs	124-147 lbs	> 147 lbs
60"	< 95 lbs	95-127 lbs	128-152 lbs	> 152 lbs
61"	< 98 lbs	98-131 lbs	132-157 lbs	> 157 lbs
62"	< 101 lbs	101-135 lbs	136-163 lbs	> 163 lbs
63"	< 105 lbs	105-140 lbs	141-168 lbs	> 168 lbs
64"	< 108 lbs	108-144 lbs	145-173 lbs	> 173 lbs
65"	< 111 lbs	111-149 lbs	150-179 lbs	> 179 lbs
66"	< 115 lbs	115-154 lbs	155-185 lbs	> 185 lbs
67"	< 118 lbs	118-158 lbs	159-190 lbs	> 190 lbs
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69"	< 125 lbs	125-168 lbs	169-202 lbs	> 202 lbs
70"	< 129 lbs	129-173 lbs	174-208 lbs	> 208 lbs
71"	< 133 lbs	133-178 lbs	179-214 lbs	> 214 lbs
72"	< 137 lbs	137-183 lbs	184-220 lbs	>220 lbs

(1) Adapted from the Clinical Guidelines on the Identification, Evaluation and Treatment of Overweight and Obesity in Adults. National Heart, Lung and Blood Institute (NHLBI), National Institutes of Health (NIH). NIH Publication No. 98-4083.

113 Obese (Children 2-5 Years of Age)

Definition/Cut-off Value

Obesity for children 2-5 years of age is defined as follows:

Age	Cut-Off Value
2-5 years	≥ 95th percentile Body Mass Index (BMI) or weight-for-stature as plotted on the 2000 Centers for Disease Control and Prevention (CDC) 2-20 years gender specific growth charts (1,2) (available at: www.cdc.gov/growthcharts).*
*The cut off is based on standing height measurements. Therefore, recumbent length measurements may not be used to determine this risk. See Clarification for more information.	

Participant Category and Priority Level

Category	Priority
Children (2-5 years of age)	III

Justification

The rapid rise in the prevalence of obesity in children and adolescents is one of the most important public health issues in the United States today. The National Health and Nutrition Examination Survey (NHANES) from the mid-1960s to the early 2000s document a significant increase in obesity among children from preschool age through adolescence. These trends parallel a concurrent increase in obesity among adults, suggesting that fundamental shifts occurring in dietary and/or physical activity behaviors are having an adverse effect on overall energy balance (3).

The causes of increased obesity rates in the United States are complex. Both genetic make-up and environmental factors contribute to the obesity risk. Important contributors include a large and growing abundance of calorically dense foods and an increased sedentary lifestyle for all ages. Although obesity tends to run in families, a genetic predisposition does not inevitably result in obesity. Environmental and behavioral factors can influence the development of obesity in genetically at-risk people (3).

BMI is a measure of body weight adjusted for height. While not a direct measure of body fatness, BMI is a useful screening tool to assess adiposity (3). Children ≥2 years of age, with a BMI-for-age ≥85th and <95th percentile are considered *overweight* and those at or above the 95th percentile, *obese* (4). Research on BMI and body fatness shows that the majority of children with BMI-for-age at or above the 95th percentile have high adiposity and less than one-half of the children in the 85th to <95th percentiles have high adiposity (4). Although an imperfect tool, elevated BMI among children most often indicates increased risk for future adverse health outcomes and/or development of diseases (5). BMI should serve as the initial screen and as the starting point for classification of health risks (3).

Use of the 95th percentile to define obesity identifies those children with a greater likelihood of being obese as adolescents and adults, with increased risk of obesity-related disease and mortality. It is recommended

that an obese child (≥ 95th percentile) undergo a medical assessment and careful evaluation to identify any underlying health risks or secondary complications (3). Obesity can result from excessive energy intake, decreased energy expenditure, or a medical condition that impairs the regulation of energy metabolism. In addition, obesity in early childhood may signify problematic feeding practices or evolving family behaviors that, if continued, may contribute to health risks in adulthood related to diet and inactivity.

Implications for WIC Nutrition Services

The WIC Program plays an important role in public health efforts to reduce the prevalence of obesity by actively identifying and enrolling young children who may be obese or at risk of overweight/obesity in later childhood or adolescence. When identifying this risk, it is important to communicate with parents/caregivers in a way that is supportive and nonjudgmental, and with a careful choice of words that convey an empathetic attitude and minimize embarrassment or harm to a child's self-esteem (4). In recognition of the importance of language, the 2007 American Medical Association Expert Committee Report recommends the use of the terms *overweight* and *obese* for documentation and risk assessment **only** and the use of more neutral terms (e.g., *weight disproportional to height, excess weight, BMI*) when discussing a child's weight with a parent/caregiver (3) .

BMI is calculated and plotted on growth charts at each WIC certification. However, growth charts are meant to be used as a screening tool and comprise only one aspect of the overall growth assessment. A clinical assessment to determine if a child is at a healthy weight is more complex. Weight classification (derived from the growth chart) should be integrated with the growth pattern, familial obesity, medical risks, and dietary and physical activity habits to determine the child's obesity risk (1, 5).

The goal in WIC nutrition counseling is to help the child achieve recommended rates of growth and development. WIC staff can frame the discussion to make achieving normal growth a shared goal of the WIC Program and the parent/caregiver and make clear that obesity is a medical condition that can be addressed (4). Parents/caregivers of children may need education on recognition of satiety cues and other physiological needs that lead to crying, and ways to comfort a child (holding, reading, rocking) other than by feeding. The foods provided by the WIC Program are scientifically-based and intended to address the supplemental nutritional needs of the Program's target population and can be tailored to meet the needs of individual participants. Emphasis can be placed on promoting food choices of high nutritional quality while avoiding unnecessary or excessive amounts of calorie rich foods and beverages, and reducing inactivity (like decreasing sedentary TV viewing).

Beliefs about what is an attractive or healthy weight, the importance of physical activity, what foods are desirable or appropriate for parents to provide to children, family mealtime routines, and many other lifestyle habits are influenced by different cultures, and should be considered during the nutrition assessment and counseling (6). The following resources for obesity prevention can be found at:

- Fit WIC Materials: http://www.nal.usda.gov/wicworks/Sharing_Center/gallery/foodfunfamilies.htm.
- MyPryramid for Preschoolers: http://www.mypyramid.gov/preschoolers/index.html

In addition, WIC staff can greatly assist families by providing referrals to medical providers and other services, if available, in their community. Such resources may provide the recommended medical assessments, in order to rule out or confirm medical conditions, and offer treatment when necessary and/or in cases where growth improvement is slow to respond to dietary interventions.

References

1. Kuczmarski RJ, Ogden CL, Grummer-Strawn LM, et al. CDC growth charts: United States. Advance data from vital and health statistics; no. 314. Hyattsville (MD): National Center for Health Statistics. 2000.
2. Grummer-Strawn LM, Reinold C, Krebs NF. Use of World Health Organization and CDC growth charts for children aged 0-59 Months in the United States. CDC Morbidity and Mortality Weekly Report (September 2010); no 59(rr09); 1-15. Available at: http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5909a1.htm?s_cid=rr5909a1_w. Accessed September 2010.
3. Barlow SE, Expert Committee. Expert committee recommendations regarding the prevention, assessment, and treatment of child and adolescent overweight and obesity: Summary report. Pediatrics. 2007; 120; S164-S192.
4. Ogden CL, Flegal KM. Changes in Terminology for childhood overweight and obesity. National health statistics reports; no. 25. Hyattsville (MD): National Center for Health Statistics. 2010.
5. U.S. Department of Health and Human Services. The Surgeon General's vision for a healthy and fit nation. Rockville (MD): U.S. Department of Health and Human Services, Office of the Surgeon General. 2010.
6. Krebs NF, Himes JH, Jacobson D, Nicklas TA, Guilday P, Styne D. Assessment of child and adolescent overweight and obesity. Pediatrics 2007; 120 Suppl 4:S103-S228.

Clarification

The 2000 CDC Birth to 36 months growth charts cannot be used as a screening tool for the purpose of assigning this risk because these charts are based on recumbent length rather than standing height data. However, these charts may be used as an assessment tool for evaluating growth in children aged 24-36 months who are not able to be measured for the standing height required for the 2000 CDC 2-20 years growth charts.

114 Overweight or At Risk of Overweight (Infants and Children)

Definition/Cut-Off Value

Weight Classification	Age	Definition/Cut-off value
Overweight	2 - 5 years	≥85th and < 95th percentile Body Mass Index (BMI)-for-age or weight-for-stature as plotted on the 2000 Centers for Disease Control and Prevention (CDC) 2-20 years gender specific growth charts (1,2).*
At Risk of Overweight	< 12 months (infant of obese mother)	Biological mother with a BMI ≥ 30 at the time of conception or at any point in the first trimester of pregnancy.**
	≥12 months (child of obese mother)	Biological mother with a BMI ≥ 30 at the time of certification.** (If the mother is pregnant or has had a baby within the past 6 months, use her preconceptual weight to assess for obesity since her current weight will be influenced by pregnancy-related weight gain.)
	Birth to 5 years (infant or child of obese father)	Biological father with a BMI ≥ 30 at the time of certification.**

** The cut off is based on standing height measurements. Therefore, recumbent length measurements may not be used to determine this risk. See Clarification for more information.*

*** BMI must be based on self-reported weight and height by the parent in attendance (i.e., one parent may not "self report" for the other parent) or weight and height measurements taken by staff at the time of certification.*

Note: The 2000 CDC 2 – 20 years growth charts are available at: www.cdc.gov/growthcharts.

Participant Category and Priority Level

Category	Priority
Infants	I
Children	III

Justification

The rise in the prevalence of overweight and obesity in children and adolescents is one of the most important public health issues in the United States today. The National Health and Nutrition Examination Survey (NHANES) from the mid-1960s to the early 2000s document a significant increase in overweight among children from preschool age through adolescence. These trends parallel a concurrent increase in obesity among adults, suggesting that fundamental shifts in dietary and/or physical activity behaviors are having an adverse effect on overall energy balance (3).

BMI is a measure of body weight adjusted for height. While not a direct measure of body fatness, BMI is a useful screening tool to assess adiposity (3). Children ≥ 2 years of age, with a BMI-for-age ≥ 85th and < 95th percentile are considered *overweight* and those at or above the 95th percentile, *obese* (4). Research on BMI and body fatness shows that the majority of children with BMI-for-age at or above the 95th percentile have high adiposity and less than one-half of the children in the 85th to < 95th percentiles have high adiposity (4). Although an imperfect tool, elevated BMI among children most often indicates increased risk for future adverse health outcomes and/or development of diseases (5). BMI should serve as the initial screen and as the starting point for classification of health risks (3).

Increasingly, attention is being focused on the need for comprehensive strategies that focus on preventing overweight/obesity and a sedentary lifestyle for all ages. Scientific evidence suggests that the presence of obesity in a parent greatly increases the risk of overweight in preschoolers, even when no other overt signs of increasing body mass are present (6). The presence of parental obesity should lead to greater efforts by nutrition services staff to assist families in establishing or improving healthy behaviors (3).

Implications for WIC Nutrition Services

The WIC Program plays an important role in public health efforts to reduce the prevalence of obesity by actively identifying and enrolling infants and children who may be overweight or at risk of overweight in childhood or adolescence. When identifying this risk, it is important to communicate it in a way that is supportive, nonjudgmental, and with a careful choice of words to convey an empathetic attitude and to minimize embarrassment or harm to a child's self-esteem (4). In recognition of the importance of language, the 2007 American Medical Association expert committee report recommends the use of the terms *overweight* and *obese* for documentation and risk assessment **only** and the use of more neutral terms (e.g., *weight disproportional to height, excess weight, BMI*) when discussing a child's weight with a parent/caregiver (3) .

BMI is calculated and plotted on growth charts at each WIC certification. However, growth charts are meant to be used as a screening tool and comprise only one aspect of the overall growth assessment. A clinical assessment to determine if a child is at a healthy weight is more complex. Weight classification (derived from the growth chart) should be integrated with the growth pattern, familial obesity, medical risks, and dietary and physical activity habits to determine the child's obesity risk (1,5).

The goal in WIC nutrition counseling is to help the child achieve recommended rates of growth and development. WIC staff can frame the discussion to make achieving normal growth a shared goal of the WIC Program and the parent/caregiver. Studies have shown that the early childhood eating environment provides a great opportunity for preventive intervention (7). Parents/caregivers of infants and toddlers may need education on recognition of satiety cues and other physiological needs that lead to crying, and ways to comfort a child (holding, reading, rocking) other than by feeding. Young children look upon their parents as role models for eating behaviors. Through client-centered counseling, WIC staff can emphasize

the importance of prevention and can assist families in making changes that improve parenting skills that promote healthy eating, and physical activity behaviors and a healthy weight in children. Also, the foods provided by the WIC Program are scientifically-based and intended to address the supplemental nutritional needs of the Program's target population and can be tailored to meet the needs of individual participants.

Beliefs about what is an attractive or healthy weight, the importance of physical activity, what foods are desirable or appropriate for parents to provide to children, family mealtime routines, and many other lifestyle habits are influenced by different cultures, and should be considered during the nutrition assessment and counseling (8). The following resources for obesity prevention can be found at:

- Fit WIC Materials: http://www.nal.usda.gov/wicworks/Sharing_Center/gallery/foodfunfamilies.htm.
- MyPryramid for Preschoolers: http://www.mypyramid.gov/preschoolers/index.html

In addition, WIC staff can greatly assist families by providing referrals to medical providers and other services, if available, in their community. Such resources may provide the recommended medical assessments, in order to rule out or confirm medical conditions, and offer treatment when necessary and/or in cases where growth improvement is slow to respond to dietary interventions.

References

1. Kuczmarski RJ, Ogden CL, Grummer-Strawn LM, et al. CDC growth charts: United States. Advance data from vital and health statistics; no. 314. Hyattsville, Maryland: National Center for Health Statistics. 2000.
2. Grummer-Strawn LM, Reinold C, Krebs NF. Use of World Health Organization and CDC growth charts for children aged 0-59 Months in the United States. CDC Morbidity and Mortality Weekly Report (September 2010); no 59(rr09); 1-15. Available at: http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5909a1.htm?s_cid=rr5909a1_w. Accessed September 2010.
3. Barlow SE, Expert Committee. Expert committee recommendations regarding the prevention, assessment, and treatment of child and adolescent overweight and obesity: Summary report. Pediatrics. 2007; 120; S164-S192.
4. Ogden CL, Flegal KM. Changes in Terminology for childhood overweight and obesity. National health statistics reports; no. 25. Hyattsville (MD): National Center for Health Statistics. 2010.
5. U.S. Department of Health and Human Services. The Surgeon General's vision for a healthy and fit nation. Rockville (MD): U.S. Department of Health and Human Services, Office of the Surgeon General. 2010.
6. Whitaker RC, Wright JA, Pepe MS, Seidel KD, Dietz WH. Predicting obesity in young adulthood from childhood and parental obesity. NEJM, Vol 337, No 13, September 25, 1997. pgs 869-873.
7. Anzman SL, Rolllins BY, Birch LL. Parental influence on children's early eating environments and obesity risk: implications for prevention. International Journal of Obesity 34, 1116-1124 (July 2010).
8. Krebs NF, Himes JH, Jacobson D, Nicklas TA, Guilday P, Styne D. Assessment of child and adolescent overweight and obesity. Pediatrics 2007; 120 Suppl 4:S103-S228.

Clarification

The 2000 CDC Birth to 36 months growth charts cannot be used as a screening tool for the purpose of assigning this risk because these charts are based on recumbent length rather than standing height data. However, these charts may be used as an assessment tool for evaluating growth in children aged 24-36 months who are not able to be measured for the standing height required for the 2000 CDC 2-20 years growth charts.

Abbreviated Body Mass Index (BMI) Table*

Height	Inches	Weight (lbs) equal to BMI 30
4' 10"	58	143
4' 11"	59	148
5' 0"	60	153
5' 1"	61	158
5' 2"	62	164
5' 3"	63	169
5' 4"	64	174
5' 5"	65	180
5' 6"	66	186
5' 7"	67	191
5' 8"	68	197
5' 9"	69	203
5' 10"	70	209
5' 11"	71	215
5' 12"	72	221
6' 1"	73	227
6' 2"	74	233
6' 3"	75	240
This table may be used to determine parental (male or female) obesity (BMI > 30).		

Source

Evidence Report of Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults, 1998. National Institutes of Health/National Heart, Lung, and Blood Institute (NHLBI). Note: A complete BMI table is available on the NHLBI website: www.nhlbi.gov/guidelines/obesity/ob_home.htm.

115 High Weight-for Length (Infants and Children < 24 Months of Age)

Definition/Cut-Off Value

High weight-for-length for infants and children < 24 months of age is defined as follows:

Age	Cut-Off Value
Birth to < 24 months	≥ 97.7th percentile weight-for-length as plotted on the Centers for Disease Control and Prevention (CDC), Birth to 24 months gender specific growth charts (1) (available at: www.cdc.gov/growthcharts).*
**Based on the 2006 World Health Organization (WHO) international growth standards (2). CDC labels the 97.7th percentile as the 98th percentile on the Birth to 24 months gender specific growth charts. For more information about the percentile cut-off, please see Clarification.*	

Participant Category and Priority Level

Category	Priority
Infants	I
Children (< 24 months of age)	III

Justification

In 2006, WHO released international growth standards for infants and children aged 0-59 months (2), similar to the 2000 CDC growth references. Since then, the CDC has developed Birth to 24 months growth charts, based on the WHO growth standards, and recommends their use in the United States (1). For persons 2-20 years, the 2000 CDC growth charts will continue to be used (1).

The WHO and CDC growth charts are similar in that both describe weight-for-age, length (or stature)-for-age, weight-for-length (or stature) and body mass index (BMI) for age. However, they differ in the approach taken to create the growth charts. The WHO growth charts are growth standards that describe how healthy children grow under optimal environmental and health conditions. The 2000 CDC charts are a growth reference, not a standard, and describe how certain children grew in a particular place and time (2).

The WHO growth standards for children < 24 months are based on data collected from 1997-2003 in 6 countries (including the U.S.), from children who were born between 37 and 42 weeks gestation, breastfed for at least 12 months, and introduced to complementary food by at least 6 months but not before 4 months. Infants and children of low-income mothers and/or mothers who smoked were not included in the data sample (2).

The 2000 CDC charts for infants and children < 36 months are based on birth weight (from 1968 to 1980 and from 1985 to 1994) and birth length data (from 1989 to1994) obtained from U.S. birth certificates; National Health and Nutrition Examination Survey (NHANES) data; and, measurements from infants who had been breastfed and formula fed (approximately 50% ever breastfed and approximately 33% who were

still breastfeeding at 3 months). Very low birth weight infants were not included in the sample population. This was the only exclusion criterion applied to the sample population (2, 3).

Prior to making its recommendation, CDC convened an Expert Panel with the National Institutes of Health and the American Academy of Pediatrics to review the scientific evidence and discuss the potential use of the WHO growth standards in the U.S. The recommendation to use WHO growth standards for infants and children < 24 months was made on the basis of input from the Expert Panel. In addition, CDC concluded that the WHO growth standards are based on a high quality study and, since breastfeeding is the recommended infant feeding practice, it is appropriate to use the breastfed infant as the standard against which all other infants are compared (2).

The WHO growth standards use values of 2 standard deviations away from the median to identify children whose growth might be indicative of adverse health conditions (1). The CDC Birth to 24 months growth charts (based on the WHO growth standards) labels 2 standard deviations above the median as the 97.7th percentile. Thus, an infant or child (< 24 months) is categorized as high weight-for-length when plotted at or above the 97.7th percentile, labeled as the 98th percentile on the CDC Birth to 24 months growth charts. The CDC recommends that all infants and children < 24 months be assessed using the CDC Birth to 24 months growth charts regardless of type of feeding (formula or breastfed) (2). (See Clarification for information about standard deviations and the cut-off used to determine high weight-for-length.)

Implications for WIC Nutrition Services

The WIC Program plays an important role in public health efforts to reduce the prevalence of obesity by actively identifying and enrolling infants and young children who may be at risk of overweight/obesity in later childhood or adolescence. When identifying this risk, it is important to communicate with parents/caregivers in a way that is supportive and nonjudgmental, and with a careful choice of words that convey an empathetic attitude and minimize embarrassment or harm to a child's self-esteem (4). In recognition of the importance of language, the 2007 American Medical Association Expert Committee Report recommends the use of more neutral terms such as *weight disproportional to height, excess weight*, and *high weight-for-length* when communicating with a parent/caregiver (5).

Height and weight measurements are plotted on growth charts at each WIC certification. However, growth charts are meant to be used as a screening tool and comprise only one aspect of the overall growth assessment. A clinical assessment to determine if a child is at a healthy weight is more complex. Weight classification (derived from the growth chart) should be integrated with the growth pattern, familial obesity, medical risks, and dietary and physical activity habits to determine the child's obesity risk (3, 6).

The goal in WIC nutrition counseling is to help the child achieve recommended rates of growth and development. WIC staff can frame the discussion to make achieving normal growth a shared goal of the WIC Program and the parent/caregiver. Studies have shown that the early childhood eating environment provides a great opportunity for preventive intervention (7). Parents/caregivers of infants and toddlers may need education on recognition of satiety cues and other physiological needs that lead to crying, and ways to comfort a child (holding, reading, rocking) other than by feeding. Young children look upon their parents as role models for eating behaviors. Through client-centered counseling, WIC staff can emphasize the importance of prevention and can assist families in making changes that improve parenting skills that promote healthy eating, physical activity behaviors and a healthy weight in children. Also, the foods provided by the WIC Program are scientifically-based and intended to address the supplemental nutritional needs of the Program's target population and can be tailored to meet the needs of individual participants.

Beliefs about what is an attractive or healthy weight, the importance of physical activity, what foods are desirable or appropriate for parents to provide to children, family mealtime routines, and many other lifestyle habits are influenced by different cultures, and should be considered during the nutrition assessment and counseling (8). The following resources for obesity prevention can be found at:

- Fit WIC Materials: http://www.nal.usda.gov/wicworks/Sharing_Center/gallery/foodfunfamilies.htm.
- MyPyramid for Preschoolers: http://www.mypyramid.gov/preschoolers/index.html.

In addition, WIC staff can greatly assist families by providing referrals to medical providers and other services, if available, in their community. Such resources may provide the recommended medical assessments, in order to rule out or confirm medical conditions, and offer treatment when necessary and/or in cases where growth improvement is slow to respond to dietary interventions.

References

1. Centers for Disease Control and Prevention. Use of World Health Organization and CDC growth charts for children aged 0-59 months in the United States. MMWR 2010; 59(No. RR-9). Available at: http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5909a1.htm?s_cid=rr5909a1_w. Accessed September 2010.
2. World Health Organization. WHO child growth standards: Length/height-for-age, weight-for-age, weight for height and body mass index-for-age: Methods and development. Geneva, Switzerland: World Health Organization; 2006. Available at http://www.who.int/childgrowth/publications/technical_report_pub/en/index.html. Accessed September 2010.
3. Kuczmarski RJ, Ogden CL, Grummer-Strawn LM, et al. CDC growth charts: United States. Advance data from vital and health statistics; no. 314. Hyattsville, Maryland: National Center for Health Statistics. 2000.
4. Ogden CL, Flegal KM. Changes in Terminology for childhood overweight and obesity. National health statistics reports; no. 25. Hyattsville (MD): National Center for Health Statistics. 2010.
5. Barlow SE, Expert Committee. Expert committee recommendations regarding the prevention, assessment, and treatment of child and adolescent overweight and obesity: Summary report. Pediatrics. 2007; 120; S164-S192.
6. U.S. Department of Health and Human Services. The Surgeon General's vision for a healthy and fit nation. Rockville (MD): U.S. Department of Health and Human Services, Office of the Surgeon General. 2010.
7. Anzman SL, Rolllins BY, Birch LL. Parental influence on children's early eating environments and obesity risk: implications for prevention. International Journal of Obesity 34, 1116-1124 (July 2010).
8. Krebs NF, Himes JH, Jacobson D, Nicklas TA, Guilday P, Styne D. Assessment of child and adolescent overweight and obesity. Pediatrics 2007; 120 Suppl 4:S103-S228.

Clarification

Standard deviation is a measurement widely used in statistical analysis. It shows how much variation there is from the median. The WHO growth charts use standard deviations to illustrate the proximity of a given child's growth from that of the average child of the same age and gender. For infants and children < 24 months of age, 2 standard deviations above the median indicates high weight-for-length. A measurement of 2 standard deviations below the median indicates underweight. Since most health care providers in the U.S. are more familiar with percentiles, the CDC developed growth charts based on the WHO growth standards, but converted standard deviations into percentile readings. Two standard deviations above the median is the 97.7th percentile; however, for ease of use, CDC labels it as the 98th percentile on the hard copy Birth to 24 months growth charts. Electronic charts should use the 97.7th percentile as the cut-off.

121 Short Stature or At Risk of Short Stature (Infants and Children)

Definition/Cut-Off Value

Short Stature and at risk of short stature are defined as follows:

Height Classification	Age	Cut-off value
Short Stature	Birth to < 24 months	≤ 2.3rd percentile length-for-age as plotted on the Centers for Disease Control and Prevention (CDC) Birth to 24 months gender specific growth charts (1).*
	2 – 5 years	≤ 5th percentile stature-for-age as plotted on the 2000 CDC age/gender specific growth charts (2).
At Risk of Short Stature	Birth to < 24 months	> 2.3rd percentile and ≤ 5th percentile length-for-age as plotted on the CDC Birth to 24 months gender specific growth charts (1).*
	2 – 5 years	> 5th percentile and ≤ 10th percentile stature-for-age as plotted on the 2000 CDC age/gender specific growth charts (2).

**Based on 2006 World Health Organization international growth standards (3). CDC labels the 2.3rd percentile as the 2nd percentile on the Birth to 24 months gender specific growth charts. For more information about the percentile cut-off, please see Clarification.*

Notes:

1. The Birth to 24 months and the 2000 CDC growth charts are available at: www.cdc.gov/growthcharts.
2. For premature infants and children (with a history of prematurity) up to 2 years of age, assignment of this risk criterion will be based on adjusted gestational age. For information about adjusting for gestational age see: Guidelines for Growth Charts and Gestational Age Adjustment for Low Birth Weight and Very Low Birth Weight Infants.

Participant Category and Priority Level

Category	Priority
Infants	I
Children	III

Justification

The CDC uses the 2.3rd percentile (for birth to 24 months of age) and the 5th percentile (for 2-5 years of age) stature-for-age, as the cut-offs to define short stature in its Pediatric Nutrition Surveillance System (1, 2). However, CDC does not have a position regarding the cut-off percentile which should be used to determine *at risk of short stature* as a nutritional risk in the WIC Program. *At risk of short stature* is included in this criterion to reflect the preventive emphasis of the WIC Program.

Abnormally short stature in infants and children is widely recognized as a response to an inadequate nutrient supply at the cellular level (4). This indicator can help identify children whose growth is stunted due to prolonged undernutrition or repeated illness (3). Short stature is related to a lack of total dietary energy and to poor dietary quality that provides inadequate protein, particularly animal protein, and inadequate amounts of micronutrients such as zinc, vitamin A, iron, copper, iodine, calcium, and phosphorus (4). In these circumstances, maintenance of basic metabolic functions takes precedence, and thus resources are diverted from linear growth.

Demonstrable differences in stature exist among children of different ethnic and racial groups. However, racial and ethnic differences are relatively minor compared with environmental factors (1). Growth patterns of children of racial groups whose short stature has traditionally been attributed to genetics have been observed to increase in rate and in final height under conditions of improved nutrition (5, 6).

Short stature may also result from disease conditions such as endocrine disturbances, inborn errors of metabolism, intrinsic bone diseases, chromosomal defects, fetal alcohol syndrome, and chronic systemic diseases (4).

Implications for WIC Nutrition Services

Participation in WIC has been associated with improved growth in both weight and height in children (7). A more in-depth dietary assessment and/or referral to a health care provider may be necessary to determine if short stature is a result of dietary inadequacy or a disease condition. Also, more frequent follow-up to monitor growth is appropriate for children in these categories. Through client-centered counseling WIC staff can assist families in improving dietary intake to promote healthy growth and development. In addition, the foods provided by the WIC Program are scientifically-based and intended to address the supplemental nutritional needs of the Program's target population, and can be tailored to meet the needs of individual participants.

In addition, WIC staff can greatly assist families by providing referrals to medical providers and other services, if available, in their community. Such resources may provide the recommended medical assessments, in order to rule out or confirm medical conditions, and offer treatment when necessary and/or in cases where growth improvement is slow to respond to dietary interventions.

References

3. Centers for Disease Control and Prevention. Use of World Health Organization and CDC growth charts for children aged 0-59 months in the United States. MMWR 2010; 59(No. RR-9). Available at: http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5909a1.htm?s_cid=rr5909a1_w. Accessed September 2010.
4. Kuczmarski RJ, Ogden CL, Grummer-Strawn LM, et al. CDC growth charts: United States. Advance data from vital and health statistics; no. 314. Hyattsville, Maryland: National Center for Health Statistics. 2000.
5. World Health Organization. WHO child growth standards: Length/height-for-age, weight-for-age, weight for height and body mass index-for-age: Methods and development. Geneva, Switzerland: World Health Organization; 2006. Available at: http://www.who.int/childgrowth/publications/technical_report_pub/en/index.html. Accessed September 2010.
6. Institute of Medicine. WIC nutrition risk criteria a scientific assessment. Washington (DC): National Academy Press; 1996. p. 104-109.
7. Pipes PL, Trahms CM. Nutrition in infancy and childhood, 6th edition. Seattle (WA): WCB/McGraw-Hill; 1997. p. 2.
8. Berhane R, Dietz WH. Clinical assessment of growth. In: Kessler DB, Dawson P., editors. Failure to thrive and pediatric undernutrition: A transdisciplinary approach. Baltimore (MD): Paul H. Brooks Publishing Company, Inc.; 1999. p. 199.
9. Disbrow DD. The costs and benefits of nutrition services: a literature review. J Am Diet Assoc. 1989; 89:S3-66.

Clarification

The cut-off for short stature for infants and children > 24 months is 2.3; however, for ease of use, CDC labels it as the 2nd percentile on the Birth to 24 months hard copy growth charts. Electronic charts should use the 2.3rd percentile as the cut-off.

131 Low Maternal Weight Gain

Definition/Cut-off Value

Low maternal weight gain is defined as follows:

1. A low rate of weight gain, such that in the 2nd and 3rd trimesters, for singleton pregnancies (1,2):

Prepregnancy Weight Classification	BMI	Total Weight Gain (lbs.)/Week
Underweight	< 18.5	< 1
Normal Weight	18.5 to 24.9	< 0.8
Overweight	25.0 to 29.9	< 0.5
Obese	≥ 30.0	< 0.4
Multi-fetal Pregnancies	See Justification for more information.	
Note: A BMI table is attached to assist in determining weight classifications. Also, until research supports the use of different BMI cut-offs to determine weight categories for adolescent pregnancies, the same BMI cut-offs will be used for all women, regardless of age, when determining WIC eligibility. (See Justification for a more detailed explanation.)		

2. Low weight gain at any point in pregnancy, such that using a National Academies of Sciences, Medicine, and Engineering (NASEM - formerly known as the Institute of Medicine)-based weight gain grid, a pregnant woman's weight plots at any point beneath the bottom line of the appropriate weight gain range for her respective prepregnancy weight category as follows (1,2):

Prepregnancy Weight Classification	BMI	Total Weight Gain Range (lbs.)
Underweight	< 18.5	28-40
Normal Weight	18.5 to 24.9	25-35
Overweight	25.0 to 29.9	15-25
Obese	≥ 30.0	11-20
Multi-fetal Pregnancies	See Justification for more information.	
Note: A BMI table is attached to assist in determining weight classifications. Also, until research supports the use of different BMI cut-offs to determine weight categories for adolescent pregnancies, the same BMI cut-offs will be used for all women, regardless of age, when determining WIC eligibility. (See Justification for a more detailed explanation.)		

Participant Category and Priority Level

Category	Priority
Pregnant	I

Justification

The amount of weight gained during pregnancy has both immediate and long term implications for both mother and infant. In the short term, maternal weight gain during the 2nd and 3rd trimesters is an important determinant of fetal growth. In fact, low maternal weight gain is associated with an increased risk of small for gestational age (SGA) infants especially in underweight and normal-weight women. Moreover, it is associated with preterm birth among underweight women and, to a lesser extent, normal weight women. Low maternal weight gain is also associated with failure to initiate breastfeeding. (1)

In the long term, evidence shows that poor maternal nutrition during pregnancy can have permanent, detrimental effects on the child's health in later years. These effects include an increased risk for obesity, impaired glucose tolerance, and cardiovascular disease. Research suggests that early gestation may be a particularly sensitive period wherein inadequate weight gain can have long term impacts on the cardiometabolic health of the child later in life. This most likely results from suboptimal maternal nutrition that affects developing fetal organs thereby leading to permanent alterations. (3)

Nationally representative data indicates that inadequate gestational weight gain is most prevalent among Asian, Hispanic, and black mothers. Furthermore, a multivariable-adjusted analysis of >52,000 women who participated in the 2004–2005 Pregnancy Risk Assessment Monitoring System confirmed that Hispanic, black, and women who identified as "other" regarding race gain significantly less weight than white women after adjusting for pre-pregnancy BMI, age, parity, and education (4). Reports of multivariable-adjusted analyses of both national studies and smaller cohorts since 1980 confirm that black and Hispanic women compared to white women are more likely to have inadequate weight gain as opposed to excessive gestational weight gain (4). Research shows that black women in the U.S. are more likely to gain less than the recommended amount of weight during pregnancy and more likely to lose weight during pregnancy compared to white women (5). Contributing factors include the decreased access that socioeconomically disadvantaged neighborhoods have to vital resources that help ensure the good health of the mother prior to and during pregnancy. Additionally, place of work and exposure to other harmful environments are also factors (6).

The 2009 NASEM prenatal weight gain recommendations based on prepregnancy weight status categories are associated with improved maternal and child health outcomes (1). Included in these guidelines is the recommendation that the BMI weight categories used for adult women be used for pregnant adolescents as well. More research is needed to determine whether special categories are needed for adolescents. It is recognized that the NASEM cut-offs for defining weight categories will classify some adolescents differently than the CDC BMI-for-age charts. For the purpose of WIC eligibility determination, the NASEM cut-offs will be used for all women regardless of age. However, due to the lack of research on relevant BMI cut-offs for pregnant and postpartum adolescents, professionals should use all of the tools available to them to assess an individual's anthropometric status and tailor nutrition counseling accordingly.

Multi-fetal Pregnancies

For twin gestations, the NASEM recommendations provide provisional guidelines as follows: normal weight women should gain 37-54 pounds; overweight women, 31-50 pounds; and obese women, 25-42 pounds. There was insufficient information for the NASEM committee to develop even provisional guidelines for underweight women with multiple fetuses (1). However, a consistent rate of weight gain is advisable. A gain of 1.5 pounds per week during the second and third trimesters has been associated with a reduced risk of preterm and low-birth weight delivery in twin pregnancy (7). In triplet pregnancies, the overall gain should be around 50 pounds with a steady rate of gain of approximately 1.5 pounds per week throughout the pregnancy (7). Education by the WIC nutritionist should address a steady rate of weight gain that is higher than for singleton pregnancies. For WIC nutrition risk assignment, multi-fetal pregnancies are considered a nutrition risk in and of themselves (see Risk 335 - *Multi-Fetal Gestation*), aside from weight gain.

Weight Loss during Pregnancy

Weight loss during pregnancy can result in SGA infants, stillbirth, and neonatal death (8). In addition, surviving children are at risk for poor growth and infection during infancy. Weight loss during pregnancy may indicate underlying dietary or health practices. It may also indicate underlying health or social conditions associated with poor pregnancy outcomes. Common causes of unintended weight loss during pregnancy include food insecurity, substance misuse, housing insecurity, infection, food-borne illness, and symptoms associated with pregnancy such as hyperemesis gravidarum (9). Please refer to Risk 301 - *Hyperemesis Gravidarum* for additional information.

Weight Loss during Pregnancy in Obese Women

The recommended amount of weight gain in obese women during pregnancy remains controversial (10). Research demonstrates that it may be beneficial for the mother, and not harmful for the infant, to lose weight during pregnancy. The benefits of weight loss among obese pregnant women include decreased rates of caesarian delivery, large-for-gestational-age infants, and postpartum weight retention (11). As a result, some scientists are now suggesting that the NASEM recommendations for weight gain in obese pregnant women be re-evaluated (12).

Although controversy remains regarding weight loss during pregnancy among obese women, if a pregnant woman was obese prior to pregnancy, she should follow the advice of her health care provider regarding weight recommendations. For WIC nutrition risk assignments, WIC staff should follow the NASEM recommendations.

Implications for WIC Nutrition Services

WIC services can improve the birth outcomes for women who experience low maternal weight gain during pregnancy. These outcomes can be improved by the supplemental food, nutrition education, and referrals provided to participants by the WIC Program. The WIC food prescription helps provide pregnant women with foods that reflect their nutritional needs during pregnancy. The tailored nutrition education given to pregnant women helps ensure that they receive nutrition support that is relevant to their concerns and lifestyle factors. Staff can assist pregnant women in the following ways:

- Carefully assessing the health status, dietary intake, and concerns of the woman in a participant-centered manner to find out possible factors contributing to low weight gain.

- Encouraging women to eat smaller, more frequent meals with snacks if they are struggling with appetite or nausea.
- Discussing healthy, high calorie snack options, if appropriate. To include nutrition tailoring of the food package for higher caloric WIC foods, e.g., peanut butter instead of legumes.
- Educating pregnant women on the importance of appropriate weight gain during pregnancy.
- If allowable, providing pregnant women with medical foods as prescribed by their medical provider to support appropriate weight gain.
- Referring to the health care provider if the pregnant woman has been diagnosed with, or is suspected of having, hyperemesis gravidarum.
- Providing additional referrals to health care providers and/or other services based on interests and concerns of the woman.

References

1. Institute of Medicine. Weight gain during pregnancy: reexamining the guidelines. National Academy Press; 2009 [cited 2017 Dec 1]. Available from: https://www.nap.edu/search/?term=Weight+Gain+During+Pregnancy%3A+Reexamining+the+Guidelines.
2. National Heart, Lung, and Blood Institute (NHLBI), National Institutes of Health (NIH). Clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults. NIH Publication No. 98-4083; 1998 [cited 2017 Dec 1]. Available from: www.nhlbi.nih.gov.
3. Van der Post JAM, Painter RC, Grooten IJ, Roseboom TJ, Pontesilli M, Mol BWJ, van Eijsden M, Vrikjkotte Bodnar TGM. Weight loss in pregnancy and cardiometabolic profile in childhood: findings from a longitudinal birth cohort. Maternal & Child Health Journal. 2014.
4. Headen IE, Davis EM, Mujahid MS, Abrams B. Racial-ethnic differences in pregnancy-related weight. Advances in Nutrition an International Review Journal. 2012.
5. Mendez D, Doebler DA, Kim KH, Amutah NN, Fabio A, Lisa M. Neighborhood socioeconomic disadvantage and gestational weight gain and loss. Maternal & Child Health Journal. 2014.
6. Culhane, JF, Elo IT. Neighborhood context and reproductive health. American Journal of Obstetrics and Gynecology. 2005. 192(5 Suppl), S22-S29.
7. Brown JE and Carlson M. Nutrition and multifetal pregnancy. J Am Diet Assoc. 2000; 100:343-348.
8. Davis R, Edmond S, Hofferth S. Gestational weight gain and risk of infant death in the United States. American Journal of Public Health. 2014. 104 (1 Suppl), S90 – S95.
9. Institute of Medicine (IOM); Committee on Scientific Evaluation of WIC Nutrition Risk Criteria. WIC nutrition risk criteria: A scientific assessment. Washington, DC: National Academy Press; 1996.
10. Kapadia MZ, Park CK, Beyene J, Giglia L, Maxwell C, McDonald SD. Weight loss instead of weight gain within the guidelines in obese women during pregnancy: a systematic review and meta-analysis of maternal and infant outcomes. 2015. PLoS ONE 10(7): e0132650. Doi:10.1371/journal.pone.0132650.

11. Committee on Obstetric Practice. Weight gain during pregnancy. The American College of Obstetricians and Gynecologists. 2013.

12. Bauer Cox CM, Merrill DC, Bernhard KA, Greer DM. Maternal and neonatal outcomes in obese women who lose weight during pregnancy. Journal of Perinatology. 2016. 36, 278 – 283.

Additional References

- Brown JE, Schloesser PT. Pregnancy weight status, prenatal weight gain, and the outcome of term twin gestation. Am. J. Obstet. Gynecol. 1990; 162:182-6.
- Parker JD, Abrams B. Prenatal weight gain advice: an examination of the recent prenatal weight gain recommendations of the Institute of Medicine. Obstet Gynecol, 1992; 79:664-9.
- Siega-Riz AM, Adair LS, Hobel CJ. Institute of Medicine maternal weight gain recommendations and pregnancy outcomes in a predominately Hispanic population. Obstet Gynecol, 1994; 84:565-73.
- Suitor CW, editor. Maternal weight gain: a report of an expert work group. Arlington, Virginia: National Center for Education in Maternal and Child Health; 1997. Sponsored by Maternal and Child Health Bureau, Health Resources and Services Administration, Public Health Service, U.S. Department of Health and Human Services.
- Williams RL, Creasy RK, Cunningham GC, Hawes WE, Norris FD, Tashiro M. Fetal growth and perinatal viability in California. Obstet.Gynecol. 1982; 59:624-32.

Clarification

The Centers for Disease Control and Prevention (CDC) defines a trimester as a term of three months in the prenatal gestation period with the specific trimesters defined as follows in weeks:

- First Trimester: 0-13 weeks
- Second Trimester: 14-26 weeks
- Third Trimester: 27-40 weeks

Further, CDC begins the calculation of weeks starting with the first day of the last menstrual period. If that date is not available, CDC estimates that date from the estimated date of confinement (EDC). This definition is used in interpreting CDC's Prenatal Nutrition Surveillance System data, comprised primarily of data on pregnant women participating in the WIC Program.

(BMI) Table for Determining Weight Classification for Women (1)

Height (Inches)	Underweight BMI < 18.5	Normal Weight BMI 18.5-24.9	Overweight BMI 25.0-29.9	Obese BMI ≥ 30.0
58”	< 89 lbs	89-118 lbs	119-142 lbs	> 142 lbs
59”	< 92 lbs	92-123 lbs	124-147 lbs	> 147 lbs
60”	< 95 lbs	95-127 lbs	128-152 lbs	> 152 lbs
61”	< 98 lbs	98-131 lbs	132-157 lbs	> 157 lbs
62”	< 101 lbs	101-135 lbs	136-163 lbs	> 163 lbs
63”	< 105 lbs	105-140 lbs	141-168 lbs	> 168 lbs
64”	< 108 lbs	108-144 lbs	145-173 lbs	> 173 lbs
65”	< 111 lbs	111-149 lbs	150-179 lbs	> 179 lbs
66”	< 115 lbs	115-154 lbs	155-185 lbs	> 185 lbs
67”	< 118 lbs	118-158 lbs	159-190 lbs	> 190 lbs
68”	< 122 lbs	122-163 lbs	164-196 lbs	> 196 lbs
69”	< 125 lbs	125-168 lbs	169-202 lbs	> 202 lbs
70”	< 129 lbs	129-173 lbs	174-208 lbs	> 208 lbs
71”	< 133 lbs	133-178 lbs	179-214 lbs	> 214 lbs
72”	< 137 lbs	137-183 lbs	184-220 lbs	> 220 lbs

(1) Adapted from the Clinical Guidelines on the Identification, Evaluation and Treatment of Overweight and Obesity in Adults. National Heart, Lung and Blood Institute (NHLBI), National Institutes of Health (NIH). NIH Publication No. 98-4083.

133 High Maternal Weight Gain

Definition/Cut-off Value

Pregnant Women:

1. A high rate of weight gain, such that in the 2nd and 3rd trimesters, for singleton pregnancies (1):

Pregnancy Weight Classification	BMI	Total Weight Gain (lbs.)/Week
Underweight	< 18.5	> 1.3
Normal Weight	18.5 to 24.9	> 1
Overweight	25 to 29.9	> 0.7
Obese	≥ 30	> 0.6
Multi-fetal Pregnancies:	See Justification for more information	
Note: A BMI is attached to assist in determining weight classification. Also, until research supports the use of different BMI cut-offs to determine weight categories for adolescent prepregnancies, the same BMI cut-offs will be used for all women, regardless of age, when determining WIC eligibility. (See Justification for a more detailed explanation.)		

2. High weight gain at any point in pregnancy, such that using an Institute of Medicine (IOM)-based weight gain grid, a pregnant woman's weight plots at any point above the top line of the appropriate weight gain range for her respective prepregnancy weight category (see below).

Breastfeeding or Non-Breastfeeding Women (most recent pregnancy only):

Total gestational weight gain exceeding the upper limit of the IOM's recommended range (2) based on Body Mass Index (BMI) for singleton pregnancies, as follows (1):

Pregnancy Weight Classification	BMI	Total Weight Gain (lbs.)
Underweight	< 18.5	> 40
Normal Weight	18.5 to 24.9	> 35
Overweight	25 to 29.9	> 25
Obese	≥ 30	> 20
Multi-fetal Pregnancies:	See Justification for more information	
Note: A BMI is attached to assist in determining weight classification. Also, until research supports the use of different BMI cut-offs to determine weight categories for adolescent prepregnancies, the same BMI cut-offs will be used for all women, regardless of age, when determining WIC eligibility. (See		

Pregnancy Weight Classification	BMI	Total Weight Gain (lbs.)
Justification for a more detailed explanation.)		

Participant Category and Priority Level

Category	Priority
Pregnant Women	I
Breastfeeding Women	I
Non-Breastfeeding Women	III, IV, V or VI

Justification

Women with excessive gestational weight gains are at increased risk for cesarean delivery and delivering large for gestational age infants that can secondarily lead to complications during labor and delivery. There is a strong association between higher maternal weight gain and both postpartum weight retention and subsequent maternal obesity. High maternal weight gain may be associated with glucose abnormalities and gestational hypertension disorders, but the evidence is inconclusive (1).

Childhood obesity is one of the most important long-term health outcomes related to high maternal weight gain. A number of epidemiologic studies show that high maternal weight gain is associated with childhood obesity as measured by BMI (1).

The 2009 Institute of Medicine (IOM) report: *Weight Gain During Pregnancy: Reexamining the Guidelines* (1) updated the pregnancy weight categories to conform to the categories developed by the World Health Organization and adopted by the National Heart, Lung and Blood Institute in 1998 (2). The reexamination of the guidelines consisted of a review of the determinants of a wide range of short-and long-term consequences of variation in weight gain during pregnancy for both the mother and her infant. The IOM prenatal weight gain recommendations based on prepregnancy weight status categories are associated with improved maternal and child health outcomes (1).

Included in the 2009 IOM guidelines is the recommendation that the BMI weight categories used for adult women be used for pregnant adolescents as well. More research is needed to determine whether special categories are needed for adolescents. It is recognized that the IOM cut-offs for defining weight categories will classify some adolescents differently than the CDC BMI-for-age charts. For the purpose of WIC eligibility determination, the IOM cut-offs will be used for all women regardless of age. However, due to the lack of research on relevant BMI cut-offs for pregnant and postpartum adolescents, professionals should use all of the tools available to them to assess these applicants' anthropometric status and tailor nutrition counseling accordingly.

For twin gestations, the 2009 IOM recommendations provide provisional guidelines: normal weight women should gain 37-54 pounds; overweight women, 31-50 pounds; and obese women, 25-42 pounds. There was insufficient information for the IOM committee to develop even provisional guidelines for underweight women with multiple fetuses (1). However, a consistent rate of weight gain is advisable. A gain of 1.5 pounds per week during the second and third trimesters has been associated with a reduced risk of preterm and low-birth weight delivery in twin pregnancy (3). In triplet pregnancies the overall gain should be

around 50 pounds with a steady rate of gain of approximately 1.5 pounds per week throughout the pregnancy (3). Education by the WIC nutritionist should address a steady rate of weight gain that is higher than for singleton pregnancies. For WIC eligibility determinations, multi-fetal pregnancies are considered a nutrition risk in and of themselves (Risk #335, Multi-Fetal Gestation), aside from the weight gain issue.

The supplemental foods, nutrition education, and counseling related to the weight gain guidelines provided by the WIC Program may improve maternal weight status and infant outcomes (4). In addition, WIC nutritionists can play an important role, through nutrition education and physical activity promotion, in assisting postpartum women achieve and maintain a healthy weight.

References

1. Institute of Medicine. Weight gain during pregnancy: reexamining the guidelines (Prepublication Copy). National Academy Press, Washington, D.C.; 2009. www.nap.edu. Accessed June 2009.
2. National Heart, Lung, and Blood Institute (NHLBI), National Institutes of Health (NIH). Clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults. NIH Publication No. 98-4083, 1998. www.nhlbi.nih.gov. Accessed June 2009.
3. Brown JE and Carlson M. Nutrition and multifetal pregnancy. J Am Diet Assoc. 2000; 100:343-348.
4. Institute of Medicine. WIC nutrition risk criteria: a scientific assessment. National Academy Press, Washington, D.C.; 1996.

Additional References

1. Carmichael S, Abrams B, Selvin S. The pattern of maternal weight gain in women with good pregnancy outcomes. Am.J.Pub.Hlth. 1997; 87; 12:1984-1988.
2. Brown JE, Schloesser PT. Pregnancy weight status, prenatal weight gain, and the outcome of term twin gestation. Am. J. Obstet. Gynecol. 1990; 162:182-6.
3. Parker JD, Abrams B. Prenatal weight gain advice: an examination of the recent prenatal weight gain recommendations of the Institute of Medicine. Obstet Gynecol, 1992; 79:664-9.
4. Siega-Riz AM, Adair LS, Hobel CJ. Institute of Medicine maternal weight gain recommendations and pregnancy outcomes in a predominately Hispanic population. Obstet Gynecol, 1994; 84:565-73.
5. Suitor CW, editor. Maternal weight gain: a report of an expert work group. Arlington, Virginia: National Center for Education in Maternal and Child Health; 1997. Sponsored by Maternal and Child Health Bureau, Health Resources and Services Administration, Public Health Service, U.S. Department of Health and Human Services.
6. Waller K. Why neural tube defects are increased in obese women. Contemporary OB/GYN 1997; p. 25-32.

Clarification

The Centers for Disease Control and Prevention (CDC) defines a trimester as a term of three months in the prenatal gestation period with the specific trimesters defined as follows in weeks:

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BMI Table for Determining Weight Classifications for Women (1)

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63"	< 105 lbs	105-140 lbs	141-168 lbs	> 168 lbs
64"	< 108 lbs	108-144 lbs	145-173 lbs	> 173 lbs
65"	< 111 lbs	111-149 lbs	150-179 lbs	> 179 lbs
66"	< 115 lbs	115-154 lbs	155-185 lbs	> 185 lbs
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71"	< 133 lbs	133-178 lbs	179-214 lbs	> 214 lbs
72"	< 137 lbs	137-183 lbs	184-220 lbs	> 220 lbs

(1) Adapted from the Clinical Guidelines on the Identification, Evaluation and Treatment of Overweight and Obesity in Adults. National Heart, Lung and Blood Institute (NHLBI), National Institutes of Health (NIH). NIH Publication No. 98-4083.

134 Failure to Thrive

Definition/Cut-off Value

Presence of failure to thrive (FTT) diagnosed, documented, or reported by a physician or someone working under a physician's orders, or as self-reported by applicant/participant/caregiver. See Clarification for more information about self-reporting a diagnosis.

Note: For premature infants with a diagnosis of FTT please see risk #142 Preterm or Early Term Delivery for instructions on adjusting for gestational age when plotting anthropometric measurements on growth charts.

Participant Category and Priority Level

Category	Priority
Infants	I
Children	III

Justification

Failure to thrive (FTT) describes an inadequate growth pattern where growth is significantly lower than what is expected for age and sex (1, 2, 3, 4, 5). Typically a sign of undernutrition, the cause of FTT is often complex and includes many factors. FTT in infants and children can increase the risk of long-term growth and cognitive problems, among other concerns (4, 5).

Some of the indicators that a health care provider might use to diagnose FTT include the following:

- Weight-for-age repeatedly below the 2.3rd percentile for infants/children younger than 2 years or repeatedly below the 5th percentile for children 2 years and older (2, 3, 5)
- Weight-for-length repeatedly below the 2.3rd percentile for infants/children younger than 2 years or Body Mass Index (BMI) repeatedly below the 5th percentile for children 2 years and older (2, 3, 5)
- Stature-for-age consistently below the 2.3rd percentile for infants/children younger than 2 years or repeatedly below 5th percentile for children 2 years and older (3, 5)
- Weight less than 75% of median ("typical") weight-for-age (3)
- Weight less than 80% of median weight-for-stature (3)
- Progressive fall-off in weight-for-age, weight-for-stature, and/or stature-for-age, that crosses down two major percentile lines (2, 3, 4)
- Rate of weight gain less than the 5th percentile based on World Health Organization velocity standards (3)

It is recommended that a combination of growth criteria be considered and that growth be assessed over time, rather than using a single measurement (4). It is useful to note that reduced weight-for-stature can be a strong indicator of recent undernutrition, while low weight-for-age can represent both current and long-term nutrition concerns. Stature takes a longer time to be impacted by malnutrition; therefore, reduced stature may indicate the cumulative effects of chronic malnutrition (5).

In the United States, FTT is diagnosed in about 5-10% of infants and children in outpatient settings and about 3-5% of those in hospitals. Highest rates are found among lower income rural and urban communities. Failure to thrive often manifests early in life; most infants and children with FTT are diagnosed before 18 months of age. (4)

Several stressors may interact with each other to eventually lead to FTT. Undernutrition, as a result of a variety of medical, nutritional or developmental issues, is a major cause and includes the infant/child not being offered adequate calories/nutrients, the infant/child not taking the offered foods/beverages, inadequate calorie/nutrient absorption, and/or excessive calorie expenditure. (4, 5)

The following table includes factors that can contribute to undernutrition and increase the risk for FTT in infants and children (2, 3, 4, 5):

Medical/Nutritional/Developmental	Behavioral/ Feeding Practices*	Environmental/ Psychosocial
General conditions: • Prematurity†, low birth weight‡, and small for gestational age • Exposure to substances in utero • Any chronic medical condition Inadequate intake, which can be caused by: • Neurological disorders • Developmental delays, including autism spectrum disorders • Dental problems including cleft lip, cleft palate, and dental caries • Enlarged tonsils or adenoids • Feeding problems including insufficient or ineffective breast milk transfer, weak suck, swallowing problems, and poor appetite • Gastrointestinal problems, including gastroesophageal reflux, frequent vomiting, and constipation • Chronic or frequent infections (These can lead to reduced intake, which can further compromise the immune system, thus contributing to additional infections and FTT.) • Lead poisoning (This can lead to anorexia, constipation, and abdominal pain. Reduced intake can then lead to calcium and iron	• Infrequent feeding or not appropriately responding to hunger cues • Poor caregiver-infant/child interactions, especially when feeding • Inappropriate feeding based on infant/child's stage of development • Improper breastfeeding positioning or technique • Incorrect preparation of infant formula • Excessive fluids other than breastmilk/formula for infants • Once foods are started, not providing appropriate support (such as a high chair) while eating • For children, inconsistent timing of feeding or allowing to graze on food/beverages throughout day	• Poverty, food insecurity, and homelessness • Caregiver's lack of knowledge about appropriate nutrition and feeding • Caregiver with limited ability to make appropriate feeding decisions/prepare food, including those with a mental health disorder, intellectual disability, or substance use disorder§ • Family stressors such as unemployment, separation, or incarceration • Inadequate access to appropriate foods, including culturally preferred foods

Medical/Nutritional/Developmental	Behavioral/ Feeding Practices*	Environmental/ Psychosocial
deficiencies, further exacerbating the lead poisoning and FTT.) Inadequate absorption, which can be caused by: • Food allergies and lactose intolerance • Celiac disease • Gastrointestinal problems, including chronic diarrhea or vomiting and malformations • Protein-losing enteropathy • Pancreatic conditions, including cystic fibrosis • Inborn errors of metabolism Excessive caloric expenditure, which can be caused by: • Congenital heart disease or heart failure • Chronic pulmonary disease • Hyperthyroidism • Chronic or frequent infections • Inflammatory diseases, including asthma and inflammatory bowel diseases • Malignancy • Renal disease	• Restrictive diet, including vegan, low-fat, or food allergy-related • Feeding in a chaotic household with multiple caregivers • Neglect or abuse	

*See risk #411 *Inappropriate Nutrition Practices for Infants* and risk #425 *Inappropriate Nutrition Practices for Children* for more information about nutrition and feeding practices.

†See risk #142 *Preterm or Early Term Delivery* for more information about preterm delivery.

‡See risk #141 *Low Birth Weight and Very Low Birth Weight* for more information about low birth weight.

§See risk #902 *Woman or Infant/Child of Primary Caregiver with Limited Ability to Make Appropriate Feeding Decisions and/or Prepare Food* for more information.

Failure to thrive in infants/children, especially when severe or prolonged, can have several harmful effects, including the following:

- Dehydration and nutrient deficiencies
- Compromised immune system and increased risk of infections (5)
- Increased susceptibility to lead poisoning (when calcium and iron deficiencies are present) (5)

- Long-term impaired cognitive development, including learning difficulties (4, 5)
- Long-term problems with socioemotional development (4, 5)
- Long-term lower than average weight and/or height (4)

Treatment

The goal of FTT treatment is to achieve optimal growth while also addressing whatever factors may be contributing to the FTT. Catch-up growth (growth at a faster rate than normal for age) is usually necessary; according to the American Academy of Pediatrics, a typical catch-up rate is 2-3 times the average weight gain for age (2, 3, 5). As treatment progresses, the rate of catch-up growth is continually adjusted as needed until growth is deemed appropriate. Thus, growth must be measured frequently and assessed over time (5). It is also important to watch for relapse, as a history of FTT is associated with reoccurrence of FTT in the future (2).

During treatment, close follow-up by the health care provider and other health professionals is crucial. A multidisciplinary approach is often used, including collaboration among the family, pediatrician, dietitian, developmental therapist, and others.

Nutrition therapy is a core component of treatment, starting with nutrition assessment. A comprehensive assessment should take the following into account: feeding history, current intake, breastfeeding/formula-feeding, the caregiver-infant/child feeding relationship, feeding timing/environment, and nutrition knowledge/beliefs. Nutrition and breastfeeding counseling are individualized to the infant/child and typically focus on increasing consumption of calories, protein, and micronutrients (5). The health care provider may also suggest providing a multivitamin that includes the Recommended Dietary Allowance for all vitamins, iron, and zinc during the period of rapid growth, as well as additional iron or vitamin D if there are deficiencies (5).

If behavioral interventions are not effective, treatment providers may recommend nutritional/caloric supplements be given for a limited time to achieve catch-up growth. These include supplemental formula for breastfed infants, high calorie/concentrated formulas for infants, and high calorie beverage supplements for children. If treatment is not effective, hospitalization may be needed, though this is rare. This may occur if the infant/child has a severe safety or health risk, including having a serious infection, medical condition, malnourishment, or dehydration (2, 5).

Implications for WIC Nutrition Services

WIC staff can provide the following nutrition services to infants and children with failure to thrive:

- Learn about and reinforce the health care team's plan of care for treating the participant's FTT. Encourage caregivers to keep all health care appointments.
- Offer breastfeeding support to breastfeeding dyads. Refer to the WIC Designated Breastfeeding Expert, if available, or other professional breastfeeding support when needed.
- Offer participant-centered nutrition counseling based on a thorough assessment and on caregiver's concerns and interests. Suggestions to caregivers may include the following, based on the situation:
    - Increasing children's intake of calorically-dense food
    - Correctly preparing infant formula

  - Reducing volume of fluids consumed, if excessive, to appropriate amounts (other than breastmilk or formula for infants)
  - Allowing children to choose how much and which foods to eat (from what is offered)
  - Feeding children at consistent times and not allowing child to graze on foods and beverages throughout the day
  - Feeding in a supportive setting (such as a table or highchair) and in a distraction-free environment

- Provide individualized food packages, tailored to meet the increased nutritional needs of the infant/child.
- Reinforce the importance of following recommended vaccination schedules, as FTT is sometimes associated with a compromised immunize system.
- Offer individualized referrals based on the household's needs and interests, including referrals to financial assistance, food assistance, cooking classes, housing, transportation, childcare, adult education/career services, and substance use services. Consider referrals that promote a nurturing, responsive caregiver-infant/child relationship, including those to local home visiting programs, parenting programs, and early intervention services.

References

1. Larson-Nath C, Mavis A, Duesing L, Van Hoorn M, et al. Defining Pediatric failure to thrive in the developed world: validation of a semi-objective diagnosis tool. Clinical Pediatrics. 2019 [cited 2019 Jun 25];58(4): 446-452. Available from: https://www.ncbi.nlm.nih.gov/pubmed/30596256.
2. Homan GJ. Failure to thrive: a practical guide. American Family Physician. 2016 [cited 2019 Jun 25];94(4):296-300. Available from: https://www.ncbi.nlm.nih.gov/pubmed/27548594.
3. Larson-Nath C, Biank VF. Clinic review of failure to thrive in pediatric patients. Pediatric Annals. 2016 [cited 2019 Jun 25];45(2):e46-e49. Available from: https://www.ncbi.nlm.nih.gov/pubmed/26878182.
4. Ross E, Munoz FM, Edem B, Nan C, et al. Failure to thrive: Case definition & guidelines for data collection, analysis, and presentation of maternal immunization safety data. Brighton Collaboration Failure to Thrive Working Group. Vaccine. 2017 [cited 2020 Jul 24];35(48 Pt A), 6483–6491. Available from: https://doi.org/10.1016/j.vaccine.2017.01.051
5. American Academy of Pediatrics Committee on Nutrition. Failure to Thrive. In: Kleinman RE, Greer FR, eds. Pediatric Nutrition. 8th ed. Elk Grove Village, IL: American Academy of Pediatrics; 2019.

Clarification

Self-reporting of a diagnosis by a health care provider should not be confused with self-diagnosis, where a person simply claims to have or to have had a medical condition without any reference to professional diagnosis. A self-reported medical diagnosis ("My doctor says that I have/my son or daughter has…") should prompt the CPA to validate the presence of the condition by asking more pointed questions related to that diagnosis.

135 Slowed/Faltering Growth Pattern

Definition/Cut-off Value

Slowed/Faltering Growth is defined as:

Age	Cut-Off Value
Infants Birth to 2 Weeks	Excessive weight loss after birth, defined as ≥ 7% birth weight (1, 2).
Infants 2 weeks to 6 Months of Age	Any weight loss. Use two separate weight measurements taken at least eight weeks apart (3).

Participant Category and Priority Level

Category	Priority
Infants ≤ 6 Months of Age	I

Justification

Growth faltering is defined as a growth rate below that which is appropriate for an infant's age and sex. It can effect length, weight, and head circumferences resulting in values lower than expected. Growth faltering may include weight faltering (a drop in weight-for-age) or slowed growth where both weight and length growth are slower than expected. An example of weight faltering is a drop in weight after a minor illness or a measurement/plotting error (4).

Growth in infants is steady and predictable. It is a reflection of health and nutritional status and the overwhelming majority of infants have no growth problems (5, 6). Normal growth is also pulsatile, with periods of rapid growth or growth spurts followed by periods of slower or no measurable growth (5-8). Catch-up and catch-down growth during early childhood are normal phenomena that affect large numbers of children, particularly during infancy, and may merely be an adjustment to the genetic potential for growth (9). Growth is also seasonal, with length velocities (the change in growth over time) increased during the spring and summer months and stagnant other months (10). Weight may vary depending on the time of day and infant feeding schedule. Growth may be increased or slowed by a variety of conditions, with changes in growth as the first sign of a pathological condition. Such conditions include: undernutrition, hypothyroidism, iron deficiency, human immunodeficiency virus (HIV), inborn errors of metabolism, lead toxicity, zinc deficiency, immune deficiency, failure of a major organ system such as the gastrointestinal digestive system, renal, cardiovascular, and pulmonary (11). Infants that do not follow a steady predictable pattern, such as those with short stature or decreased growth rate, should be the focus of concern (11).

The timely detection of poor growth in early life is a way to identify infants who may be at risk for growth faltering, and intervene before undernutrition has detrimental health outcomes, such as growth retardation, when incurred early are irreversible (12). It can help prevent short stature and adverse functional and deleterious long term consequences, such as poor cognition and educational performance, low adult wages, lost productivity, and when accompanied by weight gain later in childhood, an increased risk of nutrition-related chronic diseases (13, 14).

Excessive Weight Loss After Birth

Infant weight loss in the early postpartum period is physiologically normal, and nearly universal but the amount of weight loss varies (15). Weight loss of 5% and 7% of birth weight is not unusual for formula-fed or breastfed infants, respectively (16). Healthy infants are expected to regain their birth weight within 8-10 days after birth (17). However, if a breastfed infant loses 7% of birth weight in the first 72 hours after birth, an evaluation and review of the mother-infant dyad is needed and any problems resolved immediately. Risk of dehydration and failure to thrive in breastfed newborns can be mitigated by early screening and providing lactation support in the early postpartum period (18).

A weight loss of up to 10% of birth weight is the maximum acceptable weight loss for newborn infants, with any additional loss a potential emergency (17, 19). Contributing factors include (2, 16, 17, 20):

- Hospital practices like epidurals, pacifier use, low or non-nutritive feedings, or strict feeding schedules.
- Maternal factors such as retained placenta, parity, anxiety, and poor maternal knowledge.
- Infant factors such as birth weight, gestational age, gender, and feeding method.
- Breastfed infants with poor positioning, latch and/or milk transfer.

WIC staff should identify and address any potential underlying feeding issues causing newborn weight loss (21). An infant with a weight loss of greater or equal to seven percent signals the need for careful evaluation and intervention, infants with a weight loss of ten percent or more is a marker for a medical referral (22).

Any Weight Loss 2 Weeks to 6 Months

While the 2006 CDC/WHO growth charts show slower growth from 3 – 18 months of age as a normal growth pattern, weight loss is not expected beyond the first two weeks of life and requires follow-up (23). After birth, growth faltering is caused by inadequate caloric intake, normal caloric intake in an environment of excessive loss or malabsorption; or increased metabolic needs. In cases of dehydration or acute illnesses like gastroenteritis, fluid loss that exceeds fluid intake may also lead to significant weight loss. Weight loss in young infants is commonly caused by acute infections, feeding problems, allergy to milk protein, lead poisoning, HIV, malnutrition, pyloric stenosis, gastrointestinal reflux, celiac disease, cystic fibrosis, neglect, growth failure, congenital heart disease, and inborn errors of metabolism.

The primary goal of the intervention is to enhance infant health outcomes by addressing causes of slowed growth and keeping vulnerable infants tracking along growth percentiles established in infancy. In some cases, it may be important to intervene quickly, while in other cases a period of frequent growth monitoring would be more appropriate to prevent too rapid refeeding and subsequent increased risk of type 2 diabetes, obesity, and cardiovascular disease later in life (24, 25).

If faltering growth is suspected, maternal neglect and inadequate caloric intake due to inappropriate formula mixing, breastfeeding problems, early introduction of solid food, maternal depression, and emotional deprivation, must be ruled out and addressed (6). Growth monitoring should occur on a monthly basis – utilizing two separate weight measurements taken at least eight weeks apart as data markers. It is imperative that WIC staff involved in measuring infant growth use standardized equipment and receive adequate training prior to conducting infant measurements to increase reliability between measures (26). If the participant does not respond to nutritional management (i.e. weight continues to falter) or if other

markers falter (such as length for age or stagnant head circumference), then the infant should be referred to their health care provider for assessment.

Normal Growth Patterns

Understanding normal growth patterns in infants is important. The pattern of weight gain during infancy varies depending on the method of feeding. Compared to formula-fed infants, breastfed infants gain weight rapidly in the first three to four months of life and relatively slowly thereafter. Although the weights of formula-fed and breastfed infants are similar by one to two years of age, the typical pattern of slowed weight gain after three to four months among breastfed infants may lead to unnecessary early introduction of solid foods or cessation of breastfeeding if the slowed weight gain is perceived as lactational inadequacy. (27, 28, 29)

The table below shows the average mean values for weight gain for healthy exclusively breastfed infants:

Average Of Mean Values for Gains in Weight for Healthy Exclusively Breastfed Infants (30)

Interval (mo)	Girls (g/day)	Boys (g/day)
0-1	30	33
1-2	28	34
2-3	22	23
3-4	19	20
4-5	15	16
5-6	13	14
6-7	12	11

Screening for Slow or Faltering Growth Patterns

Screening for slow or faltering growth patterns is a preventive health measure which requires careful growth monitoring and critical thinking skills. And while a single measure of weight-for-age may be cause for concern, it cannot be interpreted to show growth faltering. No single measurement on its own is adequate for identifying nutritional growth delay (31). As stated earlier, it is imperative that WIC staff involved in measuring infant growth use standardized equipment and receive adequate training prior to conducting infant measurements to increase reliability between measures (26).

Growth faltering is a reflection of two weight measures, preferably eight weeks (two months) apart, to calculate an increment in growth. It is possible to use four week (one month) intervals for the assessment of slow growth patterns, but since there may be errors in clinical measurement, it is more prudent to use eight weeks as the minimum time interval between measurements. Infant weight will fluctuate over the course of the day and length growth may occur in discrete periods lasting no more than 24 hours separated by growth-free intervals lasting as long as two months. Thus, growth that seems abnormal may be nothing more than a growth-free period in a child's life (10).

Screening for early growth failure should be done using multiple growth indicators, including risks for underweight (Risk #103), short stature (Risk #121), failure to thrive (Risk #134) and low head circumference (Risk #152) to allow for timely remedial interventions and prevention of further growth failure.

In summary, a three-step approach should be considered for evaluation of infants with suspected abnormal growth. First, growth data should be assessed for accuracy. Second, feeding problems, improper formula preparation, etc. should be assessed to determine if calorie intake is insufficient for growth and development. Third, the infant should be assessed for other medical conditions or developmental delay.

Implications for WIC Services

In most situations, growth may not simply be a factor of undernutrition, but rather a combination of environmental and other factors which will require a broad intervention strategy for successful health outcomes (32). In general, intervention strategies may include screening for environmental health factors such as (25, 32):

- Adequate nutrition and nutrient dense foods, including a history of human milk or formula feeding.
- Appropriate introduction of complementary foods.
- Maternal conditions that impact lactation performance: mastitis, prolonged labor, C-Section, hypo or hyperthyroidism, Diabetes, low birth weight infant, pregravida BMI >27, pregnancy-induced hypertension, flat/inverted nipples, vitamin B12 deficiency.
- Meal time routine and eating/feeding behavior.
- Growth faltering in light of familial growth patterns.
- Neglect.
- Lack of social support.
- Adverse social and psychological environment.
- Depressed or poor mental abilities of parent/caregiver. It may manifest as dressing inappropriately for the weather; looking disheveled and lacking in hygiene; or making inappropriate faces or reactions like laughing.
- Lack of parental education and nutrition knowledge.

Nutrition counseling for this risk would ideally be provided by staff with specialized education and training to assess growth parameters and identify causative factors accurately. Intervention strategies to address this criterion include:

- Appropriate timing and type of participant intervention.
- Effective participant-centered nutrition counseling.
- Early postpartum breastfeeding support to minimize risk of dehydration and/or failure to thrive.
- Review of baby behavior hunger and satiety cues. (For more information see WIC Baby Behavior Basics, WIC Online Learning Module available on the WIC Works Resource System: https://wicworks.fns.usda.gov/wic-learning-online.)
- Review/adjustment to breastfeeding/formula feeding schedule.
- Review/adjustment of formula mixing technique.

- Referral to lactation specialist for latch and position assistance.
- Tailored food package prescription.
- Review accuracy of weight, length, and head circumference measurements.

Referral to allied health professionals such as: physician, early childhood intervention, social services, and home visiting program.

A variety of intervention strategies can help infants establish and maintain individual growth patterns. The desired outcome is one where the infant's own growth curve tracks within the channel established in early infancy. Also, because growth monitoring is an intervention that happens largely after the fact, there may be benefit to anticipatory guidance that provides prevention rather than crisis management of this problem (33). It is suggested that when feeding is going well, the baby will eat as much as she needs and grow in the way that is right for her if parents maintain a division of responsibility in feeding (34).

References

1. American Academy of Pediatrics. Policy Statement. Breastfeeding and the use of human milk. Ped. 2005; 115(2):496-506.
2. Academy of Breastfeeding Medicine. Clinical Protocol #3. Hospital guidelines for the use for supplementary feedings in the healthy term breastfed neonate. 2009;(4):175-82.
3. Grummer-Strawn L, Reinhold C, Krebs N. Use of World Health Organization and CDC growth charts for children aged 0-59 months in the United States. CDC Recommendations and Reports September 10, 2010;59(rr09):1-15.
4. Wacogne, S. Weight faltering and failure to thrive in infancy and childhood. BMJ, 345:e5931.
5. Beker J. Principles of growth assessment. Pediatrics in Review 2006:27:196-198.
6. Kessler D. Growth assessment and growth failure: Overview and the role of nutrition. Pediatric Perspectives 2007;4(1); 1-4.
7. Lampl M, Velhius JD, Johnson ML. Saltation and stasis: A model of human growth. Science 1992: 258:801-803.
8. Lampl, M, Johnson, ML, Emmett, PM, et al. Mixed distribution analysis identifies saltation and stasis growth. Ann Hum Biol 2001;28:403.
9. Mei, Z. Shifts in percentiles of growth during early childhood: analysis of longitudinal data from the California Child Health and Development Study. Pediatrics 2004;133(6):617-27.
10. Gelander L, Karlberg J, Albertsson-Wikland K. Seasonailty in lower leg length velocity in prepubertal children. Acta Paediatr 1994;83:1249.
11. Legler J, Rose L. Assessment of abnormal growth curves. Am Fam Phys 1998: (1)153-58.
12. Cameron N, Preece MA. Catch-up growth or regression to the mean? Recovery from stunting revisited. Am J Hum Biol 2005;17:412-7.
13. Victora CG, Adair L, Fall C, et al. Maternal and child undernutrition: consequences for adult health and human capital. Lancet. 2008;371:340-357,.
14. De Onis, Mercedes, et al. Worldwide implementation of the WHO Child Organization growth standards. Public Health Nutrition 2012;1-8.
15. Flaherman VJ, Schafer EW, Kuzniewicz MW, Li SX, Walsh EM, Paul IM. Key weight loss nomograms for exclusively breastfed newborns. Ped . 2015;135(1)e16-23.

16. Martens PJ, Romph, L. Factors associated with newborn in-hospital weight loss: comparisons by feeding method, demographics, and birthing procedures. J Hum Lact 2007;23:233.
17. Wright CM, Parkinson KN. Postnatal weight loss in term infants: what is normal and do growth charts allow for it? Arch Dis Child Fetal Neonatal Ed. 2004;89:f254-257.
18. Gahagan, S. Failure to thrive: a consequence of undernutrition. Pediatrics in Review 2006;27:1-11.
19. Kirkland R, Motil K. Failure to thrive (undernutrition) in children younger than two years. Up To Date 2014 (August).
20. Reilev M, Borch K, Pryds OA. Neonatal hypernatramic dehydration-why increasing incidence? Ugeskr Laiger. 2007:169:1227-31.
21. Livingston, V. Failure to thrive while breastfeeding. Breastfeeding Medicine Vol 1, No. 2, 2006.
22. Lawrence RA, Lawrence, RM. Breastfeeding: a guide for the medical profession. 6th Edition, St. Louis, MO: Elseveier Mosby. 2005.
23. Grummer-Strawn L. Response letter to Patricia Daniels 2008 risk criterion #135 questions. Centers for Disease Control and Prevention. October 11, 2008.
24. Eriksson JG, et al. Catch-up growth in childhood and death from coronary heart disease: longitudinal study. BMJ 1999; 318:427-31. Later 2001 reference entitled, early growth and coronary heart disease in later life: longitudinal study by JG Eriksson et al, BMJ, Apr 21, 2001; 322(7292);949-953.
25. Hales CN; Ozanne SE. The dangerous road of catch-up growth. J Physiol 2003;547:5-10.
26. World Health Organization. Physical status: The use and interpretation of anthropometry. Report of a WHO Expert Committee. WHO Technical Report Series no. 854. Geneva: WHO (1995).
27. Mei Z, et al. Comparison of prevalence of shortness, underweight, and overweight among US children aged 0-59 months by using the CDC 2000 and the WHO 2006 growth charts. J Pediatr. 2008:153:622.
28. Van Dijk, et al. Growth-curve standards and the assessment of early excess weight gain in infancy. Pediatrics 2009; 123:102.
29. Whitehead RG. The importance of diet-specific growth charts. Acta Paediatr 2003; 92:137.
30. The American College of Obstetricians and Gynecologists, American academy of Pediatrics. Breastfeeding Handbook for Physicians. 2nd e. 2014. ACOG, Washington DC; AAP Elk Grove, IL.
31. Kessler D, et al. Failure to thrive: the prevalence and concurrence of anthropometric criteria in a general infant population. Archives of Disease in Childhood. 2007 Feb; 92(2):109-114.
32. Barker DJ. The developmental origins of adult disease. Eur J Epidemiol 2003;18:733-6.
33. Shrimpton R, et al. Worldwide timing of growth faltering: implications for nutritional interventions. Pediatrics 2001:107:e75.
34. American Academy of Pediatrics. Bright Futures Nutrition. 3rd ed. 2011.

141 Low Birth Weight and Very Low Birth Weight

Definition/Cut-off Value

Low birth weight and very low birth weight are defined as follows:

Weight Classification	Cut-off Value
Low Birth Weight (LBW)	Birth weight defined as ≤ 5 pounds 8 ounces (≤ 2500 g), for infants and children less than 24 months.
Very Low Birth Weight (VLBW)	Birth weight defined as ≤ 3 pounds 5 ounces (≤ 1500 g), for infants and children less than 24 months.
Note: See "Guidelines for Growth Charts and Gestational Age Adjustment for Low Birth Weight and Very Low Birth Weight Infants" (FNS Policy Memorandum 98-9, Revision 7, April 2004) for more information about the anthropometric assessment and nutritional care of LBW and VLBW infants.	

Participant Category and Priority Level

Category	Priority
Infants	I
Children < 24 months	III

Justification

Low birth weight is one of the most important biologic predictors of infant death and deficiencies in physical and mental development during childhood among those babies who survive and continues to be a strong predictor of growth in early childhood. Infants and children born with LBW/VLBW, particularly if caused by fetal growth restriction, need an optimal nutrient intake to survive, meet the needs of an extended period of relatively rapid postnatal growth, and complete their growth and development (1).

References

1. Institute of Medicine. WIC nutrition risk criteria a scientific assessment. Washington (DC): National Academy Press; 1996. p. 97.

Additional Reference

1. Anderson DM. Nutritional implications of premature birth, birth weight, and gestational age classification In: Groh-Wargo S, Thompson M, Cox J, editors. Nutritional care for high-risk newborns. Rev. 3rd Ed. Chicago: Precept Press, Inc.; 2000.

142 Preterm or Early Term Delivery

Definition/Cut-off Value

Preterm and early term delivery are defined as follows (1, 2):

- Preterm: Delivery of an infant born ≤36 6/7 weeks gestation.
- Early Term: Delivery of an infant born ≥37 0/7 and ≤38 6/7 weeks gestation.

Note: See Clarification section for information on plotting growth measurements for preterm infants.

Participant Category and Priority Level

Category	Priority
Infants	I
Children < 24 months	III

Justification

Preterm birth is a significant cause of newborn morbidity and mortality. Preterm and early term deliveries strain society's healthcare resources due to the longer hospital stays for the infant and the long-term effects on the health of the newborn (3, 4).

Typically, a pregnancy lasts about 40 weeks. Premature or preterm birth, however, is defined as a birth that occurs between 20 and 37 weeks of pregnancy, according to the American College of Obstetricians and Gynecologists (ACOG) (5). In the past, the period from 3 weeks before until 2 weeks after the estimated date of delivery was considered a "term" pregnancy, with the expectation that a baby would have similar health outcomes if they were born any time during this interval. In 2013, ACOG released a committee opinion that the label "term" should be replaced with the designations *early term* (≥37 0/7 weeks and ≤38 6/7 weeks gestation) and *full term* (≥39 0/7 weeks and ≤40 6/7 weeks gestation) to more accurately describe these groups of infants (1).

Preterm Delivery

Prematurity affects about 12% of all live births in the U.S., and about 50% of these preterm births were preceded by preterm labor (6). In 2011, the annual rate of premature births in the United States reached 11.7%, nearly two times the rate in European nations (6). Preterm births also account for approximately 70% of newborn deaths and 36% of infant deaths (5).

Several factors have been found to increase the risk of preterm delivery. Epidemiological studies have consistently reported low socioeconomic status, nonwhite race, maternal age of ≤ 18 years or ≥ 40 years, and low pre-pregnancy weight as risk factors. A history of one previous preterm birth is associated with a recurrent risk of 17-37%; the risk increases with the number of prior preterm births and decreases with the number of term deliveries. Other maternal factors associated with a risk of preterm birth may include low weight gain during pregnancy, maternal obesity, hypertension, diabetes, or sexually transmitted diseases (7). (See risk 311 *History of Preterm or Early Term Delivery* for more details.)

Despite advances in neonatal care, preterm birth remains a leading cause of infant death in the United States (8). Preterm infants may have health problems because their organs did not have enough time to develop in the womb. Babies that are born too early may have a number of health conditions, including:

- Low or very low birth weight (9)
- Increased caloric needs (9)
- Feeding difficulties due to a lack of reflexes for sucking and swallowing (9)
- Immature digestion and impaired absorption of carbohydrates and lipids (10, 11)
- Breathing problems like chronic lung disease/ bronchopulmonary dysplasia and apnea (9, 12, 13)
- Cerebral palsy, an impairment of the brain that controls movement and muscle tone (10, 14)
- Developmental delay and poorer cognitive function(12, 15, 16, 17)
- Vision problems like retinopathy of prematurity (ROP), which may cause blindness (12, 15)
- Hearing problems (12)
- Behavioral problems and psychiatric disorders (16, 17)
- Increased risk for necrotizing enterocolitis (NEC) due to their immature gastrointestinal systems (10, 12)
- Increased risk for Sudden Infant Death Syndrome (SIDS) (10)
- Temperature control problems (9, 10)
- Heart problems like patent ductus arteriosus and low blood pressure (hypotension) (10, 12)
- Blood problems like anemia and jaundice (10, 13)
- Hypoglycemia (9, 10)
- Immature immune systems, which may result in infections (9)

Preterm infants often need special medical care in a neonatal intensive care unit (NICU) and may need to stay there for days or even months. Breastfeeding is recommended as the normative standard for infant feeding and nutrition for all infants, especially preterm babies. Breastfeeding preterm infants has been associated with positive health outcomes for these infants, including:

- Improved motor maturity and cognitive ability (18, 19, 20)
- Reduced risk of NEC (21, 22)
- Reduced risk of ROP and retinal detachment (23)

Additionally, mothers of preterm infants produce milk that is designed to meet the baby's particular nutritional needs during the first few weeks of life. It is higher in protein and minerals, such as salt, and contains different types of fat that are easier to digest and absorb compared to fats in the milk of mothers of full term babies. The fat in human milk also helps to enhance the development of the baby's brain and neurologic tissues, which is especially important for premature infants. Human milk is also easier for babies to digest than infant formula and avoids exposing the baby's immature intestinal lining to the cow's milk proteins found in premature infant formula. Preterm infants who are breastfed are less likely to develop

intestinal infections than babies who are formula fed, and the colostrum produced in the first few days contains high concentrations of antibodies that will help the baby fight infection (22).

Breastfeeding preterm infants, especially if they are in the NICU, may present unique challenges for breastfeeding dyads. These mothers will benefit from extra breastfeeding support due to the delay of direct breastfeeding, reliance on breast pumps, and the stress of having a sick newborn. Even if the baby cannot breastfeed directly from the breast at first, the mother can be encouraged to express her milk to ensure that her supply is maintained. Supportive care for infants in the NICU may include the use of a feeding tube. Expressed human milk can be passed through the tube, therefore, it is important for the mother to discuss her feeding decisions with her baby's doctor. Preterm infants sometimes need additional calories and nutrients to facilitate adequate growth, and in such cases a human milk fortifier may be prescribed by a health care provider (22).

Preterm infants who are not breastfed may require the use of a formula higher in calories and nutrients to support their growth. According to the American Academy of Pediatrics (AAP), soy formulas are typically not recommended for low birth weight preterm infants, as their use may result in less weight gain and lower serum albumin and phosphorus levels than cow's milk-based formulas (24).

In addition to breastfeeding, skin-to-skin care or kangaroo care (holding your baby naked or in just a diaper on your bare chest), can help preterm infants breathe better, gain weight, keep their body at the right temperature, and prepare them for breastfeeding (25). All caregivers can provide skin-to-skin care, not just the mother.

Infants born at 34 0/7 through 36 6/7 weeks gestation, called late preterm infants, are sometimes mistaken for term infants since their size and weight may be similar (10). However, caregivers, healthcare providers, nutritionists, and lactation consultants must be aware that these babies are physiologically and metabolically immature (9). In addition to the health conditions previously mentioned for preterm infants, it is important to be aware that late preterm babies have an increased risk of morbidity and mortality which is often related to feeding problems. Due to their immaturity, late preterm infants may have more challenges with breastfeeding because they tire easily and have less stamina, which results in greater difficulty with latching, sucking, and swallowing. Mothers of late preterm infants will benefit greatly from timely lactation assessment and support since feeding difficulties, slow weight gain, failure to thrive, hypoglycemia, and jaundice are very common in these babies (26).

Preterm infants have different patterns of growth compared to term infants. Plotting the growth of preterm infants using their adjusted gestational age is an essential component of care until they reach 24 to 36 months of age (27). (See the *Clarification* section for more information on how to determine adjusted gestational age.) Most preterm infants, however, show catch-up growth in weight, length, and head circumference after their initial postnatal growth failure. If catch-up growth occurs, it usually starts early in the first months of life and is often achieved within the first years of life (28).

The effects of preterm birth can continue beyond infancy. Children who were born prematurely are at an increased risk for the following:

- Neurodevelopmental problems (29)
- Intellectual/cognitive impairments, which can lead to learning disabilities and the need for special education services (29, 30, 31)
- Motor problems (31)

- Feeding difficulties such as problems with chewing and swallowing, late development of feeding skills, food refusal, eating behavior problems, and poor appetite (32)
- Emotional problems such as anxiety and depression (31)
- Behavioral concerns such as attention problems and hyperactivity (31)

Early Term Delivery

Up to 10% of babies in the United States are scheduled for early term deliveries via labor-inducing medication or cesarean section before 39 weeks of gestation despite neither the mother nor the baby being at risk if the pregnancy continues (4). Elective deliveries like this are sometimes requested for reasons such as wanting to schedule the date of the infant's birth, physician preference, or for relief of symptoms at the end of the pregnancy (4).

Research shows that a fetus will experience a significant amount of development and growth of the lungs, brain, and liver between 37 and 39 weeks of gestation. The brain develops at its fastest rate at the end of the pregnancy, at a rate of up to one third between weeks 35 and 39. Additionally, layers of fat are added under the infant's skin during the last few weeks of pregnancy which helps them keep warm after birth. According to ACOG, non-medically warranted deliveries prior to 39 weeks should be avoided (33). Early term delivery puts an additional strain on society as the early term infant will likely require a longer hospital stay and may have long term healthcare needs (4).

Implications for WIC Nutrition Services

WIC services can directly support preterm and early term infants and their caregivers, as these babies may have unique feeding difficulties. Preterm delivery is often unexpected and a mother may not have made decisions about how to feed her baby yet. These infants may require additional calories, extra breastfeeding support, and/or the use of a human milk fortifier or special infant formula.

WIC can support preterm and early term infants and their caregivers through:

- Promoting and supporting breastfeeding as the normative standard for infant nutrition and providing early and frequent breastfeeding support.
- Recommending the use of a hospital grade electric breast pump for expressing milk if the baby is in the NICU or the baby is unable to breastfeed directly from the breast.
- Providing anticipatory guidance about potential feeding challenges.
- Encouraging caregivers to provide skin-to-skin contact.
- Providing education on safe preparation, handling, and storage of breast milk and/or formula.
- Educating pregnant women about the importance of carrying a baby to term, unless medically contraindicated.
- Monitoring the child's growth to ensure healthy weight gain.
- Providing nutrition education for mothers/caregivers and appropriate referrals as necessary for growth, feeding, health, and/or infant developmental issues.

References

1. American College of Obstetricians and Gynecologists. Definition of term pregnancy. Committee Opinion No.579. Obstet Gynecol. 2013 Nov;122:1139-40

2. Ob-Gyns redefine meaning of "term pregnancy" [Internet]. Washington, DC: American College of Obstetricians and Gynecologists; c2013 [updated 2013 Oct 22; cited 2016 Dec 6]. Available from: http://www.acog.org/About-ACOG/News-Room/News-Releases/2013/Ob-Gyns-Redefine-Meaning-of-Term-Pregnancy.

3. Wang P, Liou S, Cheng C. Prediction of maternal quality of life on preterm birth and low birthweight: a longitudinal study. BMC Pregnancy Childbirth. 2013 June 2;13:124.

4. National Institute for Health Care Management. Born too early-improving maternal and child health by reducing early elective deliveries. NIHCM Issue Brief, March 2014. [cited 2016 Dec 6]. Available from: http://www.nihcm.org/pdf/Early_Elective_Delivery_Prevention_Brief_2014.pdf.

5. ACOG.org [Internet]. Washington, DC: The American College of Obstetricians and Gynecologists; c2016 [updated 2016 Nov; cited 2016 Dec 6]. Available from: http://www.acog.org/Patients/FAQs/Preterm-Premature-Labor-and-Birth.

6. Dag M, Lie TR, Markestad T. Long-term medical and social consequences of preterm birth. N Engl J Med. 2008 Jul 17. Web. 07 Apr. 2014.

7. Hoffman HJ, Bakketeig LS. Risk factors associated with the occurrence of preterm birth. Clin Obstet Gynecol. 1984 Sep; 27:539-52.

8. Iams JD. Prevention of preterm parturition. N Engl J of Med. 2014 Jan;370(3):254-261.

9. Engle WA, Tomashek KM, Wallman C. “Late-preterm” infants: a population at risk. Pediatrics. 2007 Dec;120(6):1390-1401.

10. Mayoclinic.org [Internet]. Rochester: Mayo Foundation for Medical Education and Research; c1998-2016 [updated 2014 Nov 27; cited 2016 Dec 1]. Available from: http://www.mayoclinic.org/diseases-conditions/premature-birth/basics/definition/con-20020050.

11. Barlow SM, Finan DS, Lee J, Chu S. Synthetic orocutaneous stimulation entrains preterm infants with feeding difficulties to suck. Journal of Perinatology. 2008 June 12;28:541-548.

12. Ward RM, Beachy JC. Neonatal complications following preterm birth. BJOG. 2003 April;110(s20):8-16.

13. Baraldi E, Filippone M. Chronic lung disease after premature birth. N Engl J Med. 2007 Nov 8;357:1946-55.

14. Vincer MJ, Allen AC, Joseph KS, Stinson DA, Scott H, Wood E. Increasing prevalence of cerebral palsy among very preterm infants: a population-based study. Pediatrics. 2006 Dec;18(6)e1621-26.

15. American Academy of Pediatrics Policy Statement. Screening examination of premature infants for retinopathy of prematurity. Pediatrics. 2013 Jan;131(1):189-95.

16. Vohr B. Long-term outcomes of moderately preterm, late preterm, and early term infants. Clin Perinatol. 2013 Dec;40(4):739-51.

17. De Jong M, Verhoeven M, van Baar AL. School outcome, cognitive functioning, and behaviour problems in moderate and late preterm children and adults: a review. Semin Fetal Neonatal Med. 2012 Jun;17(3):163-9.

18. Feldman R, Eidelman A. Direct and indirect effects of breast milk on the neurobehavioral and cognitive development of premature infants. Developmental Psychobiology. 2003 Sept;43(2):109-19.

19. Vohr B, Poindexter B, Dusick A, McKinley LT, Higgins RD, Langer JC, Poole KW. Persistent beneficial effects of breast milk ingested in the neonatal intensive care unit on outcomes of extremely low birth weight infants at 30 months of age. Pediatrics. 2007 Oct;120(4):e953-59.

20. Blaymore Bier J, Oliver T, Ferguson AE, Vohr B. Human Milk Improves Cognitive and Motor Development of premature infants during infancy. J Hum Lact. 2002 Nov;18(4)361-67.

21. Boyd CA, Quigley MA, Brocklehurst P. Donor breast milk versus infant formula for preterm infants: systematic review and meta-analysis. Arch Dis Child Fetal Neonatal Ed. 2007 May;92:F169-75.

22. Healthychildren.org [Internet]. Elk Grove Village: American Academy of Pediatrics; c2011 [updated 2015 Nov 21; cited 2016 Dec 6]. Available from: https://www.healthychildren.org/English/ages-stages/baby/breastfeeding/Pages/Providing-Breastmilk-for-Premature-and-Ill-Newborns.aspx.

23. Okamoto T, Shirai M, Kokubo M, Takahashi S, Kajino M, Takase M, Sakata H, Oki J. Human milk reduces the risk of retinal detachment in extremely low-birthweight infants. Pediatr Int. 2007 Oct;49(6):894-897.

24. American Academy of Pediatrics Committee on Nutrition. Soy protein-based formulas: recommendations for use in infant feeding. Pediatrics. 1998 Jan;101(1):148-53.

25. Kuhn KS, Kuhn MJ. Kangaroo care for your premature or sick baby. J Hum Lact. 2011 Feb;27(1):66-67.

26. Academy of Breastfeeding Medicine. ABM Clinical Protocol #10: Breastfeeding the late term infant (34 0/7 to 36 6/7 weeks gestation). Breastfeeding Medicine. 2011 June;6(3):151-56.

27. Canadian Paediatric Society. A health professional's guide for using the new WHO growth charts. Paediatr Child Health. 2010 Feb;15(2): 84-90.

28. De Wit CC, Sas TCJ, Wit JM, Cutfield WS. Patterns of catch-up growth. The Journal of Pediatrics. 2013 Feb;162(2):415-20.

29. Johnson S, Strauss V, Gilmore C, Jaekel J, Marlow N, Wolke D. Learning disabilities among extremely preterm children without neurosensory impairment: Comorbidity, neuropsychological profiles and scholastic outcomes. Early Hum Dev. 2016 Aug 9;103:69-75.

30. Breeman LD, Jaekel J, Baumann N, Bartmann P, Wolke D. Preterm cognitive function into adulthood. Pediatrics. 2015 Sept;136(3):415-23.

31. Hornman J, de Winter AF, Kerstjens JM, Bos AF, Reijneveld SA. Emotional and behavioral problems of preterm and fully-term children at school entry. Pediatrics. 2016 May;137(5).

32. Johnson S, Matthews R, Draper ES, Field DJ, Manktelow BN, Marlow N, Smith LK, Boyle EM. Eating difficulties in children born late and moderately preterm at 2 years of age: A prospective population-based cohort study. Am J Clin Nutr. 2016 Feb;103(2):406-14.

33. Elective delivery before 39 weeks [Internet]. Washington, DC: American College of Obstetricians and Gynecologists; c2013 [updated 2013 June; cited 2016 Dec 6]. Available from: http://www.acog.org/Patients/FAQs/Elective-Delivery-Before-39-Weeks.

Clarification

All preterm infants and children (up to 2 years of age) who have reached the equivalent age of 40 weeks gestation, shall be assessed for growth using the Centers for Disease Control and Prevention (CDC) Birth to 24 Months gender specific growth charts adjusting for gestational age as follows:

1. Document the infant/child's gestational age (at delivery) in weeks. (Mother/caregiver can self-report, or referral information from the medical provider may be used.)
2. Subtract the child's gestational age in weeks from 40 weeks (gestational age of term infant) to determine the adjustment for prematurity in weeks.
3. Subtract the adjustment for prematurity in weeks from the child's chronological postnatal age in weeks to determine the child's gestation-adjusted age.

Example:

Randy was born prematurely on March 19, 2011. His gestational age at birth was determined to be 30 weeks based on ultrasonographic examination. At the time of the June 11, 2011, clinic visit, his chronological postnatal age is 12 weeks. What is his gestation-adjusted age?

- 30 = gestational age in weeks
- 40 - 30 = 10 weeks adjustment for prematurity
- 12 - 10 = 2 weeks gestation-adjusted age

His measurements would be plotted on a growth chart as a 2-week-old infant.

Note: Preterm infants (≤ 36 6/7 weeks gestation) who have not reached the equivalent age of 40 weeks gestation may be assessed for growth using a growth chart for low birth weight (LBW) or very low birth weight (VLBW) infants (e.g., Infant Health and Development Program [IHDP]) consistent with the protocols of the local medical community in which the WIC clinic operates. The CDC does not recommend the use of the CDC Growth Charts for preterm infants who have not reached the equivalent age of 40 weeks gestation.

151 Small for Gestational Age

Definition/Cut-off Value

Infants and children less than 24 months of age diagnosed as small for gestational age.

Presence of condition diagnosed, documented, or reported by a physician or someone working under a physician's orders, or as self reported by applicant/participant/caregiver. See Clarification for more information about self-reporting a diagnosis.

Note: See "Guidelines for Growth Charts and Gestational Age Adjustment for Low Birth Weight and Very Low Birth Weight Infants" (FNS Policy Memorandum 98-9, Revision 7, April 2004) for more discussion on the anthropometric assessment and nutritional care of SGA infants.

Participant Category and Priority Level

Category	Priority
Infants	I
Children < 24 months	III

Justification

Impairment of fetal growth can have adverse effects on the nutrition and health of children during infancy and childhood, including higher mortality and morbidity, slower physical growth, and possibly slower mental development. Infants who are small for gestational age (SGA) are also more likely to have congenital abnormalities. Severely growth-retarded infants are at markedly increased risk for fetal and neonatal death, hypoglycemia, hypocalcaemia, polycythemia, and neurocognitive complications of pre- and intrapartum hypoxia. Over the long term, growth-retarded infants may have permanent mild deficits in growth and neurocognitive development (1).

WIC staff should routinely complete anthropometric assessments and follow-up (to include coordination with and referral to, other health care providers and services) for infants/children with a diagnosis/history of SGA who have not yet demonstrated normal growth patterns.

References

1. Institute of Medicine. WIC nutrition risk criteria a scientific assessment. Washington (DC): National Academy Press; 1996. p. 100.

Additional References

1. Behrman RE, Kliegman R, Jenson HB. Nelson textbook of pediatrics. Philadelphia (PA): Saunders; 2000.
2. Groh-Wargo S, Thompson M, Cox J, editors. Nutritional care for high-risk newborns. Rev. 3rd edition. Chicago (IL): Precept Press, Inc.; 2000.
3. Kessler DB, Dawson, P, editors. Failure to thrive and pediatric under nutrition, a transdisciplinary approach. Baltimore (MD): Paul H. Brooks Publishing Company, Inc.; 1999.

Clarification

Self-reporting of a diagnosis by a medical professional should not be confused with self-diagnosis, where a person simply claims to have or to have had a medical condition without any reference to professional diagnosis. A self-reported medical diagnosis ("My doctor says that I have/my son or daughter has…") should prompt the CPA to validate the presence of the condition by asking more pointed questions related to that diagnosis.

153 Large for Gestational Age

Definition/Cut-off Value

Birth weight ≥ 9 pounds (≥ 4000 g); or

Presence of large for gestational age. Presence of condition diagnosed, documented, or reported by a physician or someone working under a physician's orders, or as self reported by applicant/participant/caregiver. See Clarification for more information about self-reporting a diagnosis.

Participant Category and Priority Level

Category	Priority
Infants	I

Justification

Infant mortality rates are higher among full-term infants who weigh greater than 4,000 g (greater than 9 lbs) than for infants weighing between 3,000 and 4,000 g (6.6 and 8.8 lbs). Oversized infants are usually born at term; however, preterm infants with weights high for gestational age also have significantly higher mortality rates than infants with comparable weights born at term. When large for gestational occurs with pre-term birth, the mortality risk is higher than when either condition exists alone (1). Very large infants regardless of their gestational age, have a higher incidence of birth injuries and congenital anomalies (especially congenital heart disease) and developmental and intellectual retardation (2).

Large for Gestational Age may be a result of maternal diabetes (which may or may not have been diagnosed before or during pregnancy) and may result in obesity in childhood that may extend into adult life (1).

References

1. Institute of Medicine. WIC nutrition risk criteria a scientific assessment. Washington (DC): National Academy Press; 1996. p. 117.
2. Behrman RE, Kliegman R, Jenson HB. Nelson textbook of pediatrics. Philadelphia (PA): Saunders; 2000. p. 384.

Clarification

Self-reporting of a diagnosis by a medical professional should not be confused with self-diagnosis, where a person simply claims to have or to have had a medical condition without any reference to professional diagnosis. A self-reported medical diagnosis ("My doctor says that I have/my son or daughter has…") should prompt the CPA to validate the presence of the condition by asking more pointed questions related to that diagnosis.

201 Low Hematocrit/Low Hemoglobin

Definition/Cut-off Value

Low Hemoglobin (Hb) or hematocrit (Hct) is defined as less than the 5th percentile of the distribution of Hb concentration or Hct in a healthy reference population based on age, sex, and stage of pregnancy (1).

Cut-off values are provided in the attached Tables 201-A and 201-B, based on the levels established by the Centers for Disease Control and Prevention (CDC). Adjustments for smoking and/or altitude are optional for State agencies. In addition, Table 201-C includes a table of rounded hematocrit values adapted from CDC for those WIC agencies that obtain hematocrits only in whole numeric values.

Participant Category and Priority Level

Category	Priority
Pregnant Women	I
Breastfeeding Women	I
Non - Breastfeeding Women	III, IV, V, or VI
Infants	I
Children	III

Justification

Hemoglobin (Hb) is the iron-containing, oxygen-carrying protein in blood. Hematocrit (Hct) is the percentage of blood that consists of packed red blood cells. Hb and Hct tests are used as an initial screen for anemia (2). There are many types of anemia, determining the specific type and cause of an individual's anemia requires additional evaluation by a health care provider. Iron deficiency anemia (IDA), caused by inadequate iron, is the most common type of anemia (2). Megaloblastic anemia is a group of anemias usually caused by deficiency of folic acid or vitamin B-12 (3). Sickle cell and thalassemia are inherited types of anemia caused by abnormal red blood cells (4, 5). These are just a few of the types of anemia. Hb and Hct results allow WIC staff to identify participants who would benefit from further follow-up by their health care provider. Given that IDA is the most common type of anemia in children and women of childbearing age this write-up focuses on IDA. While neither a Hb nor Hct test are direct measures of iron status and do not distinguish among different types of anemia, these tests are useful screening tools for IDA (2).

Iron is present in all cells in the body and serves several vital functions. Iron is an essential component of Hb, a red blood cell that carries oxygen from the lungs to the rest of the body (2). Iron is involved in the synthesis of hormones as well as normal growth and development. Iron deficiency (ID) occurs when the body's iron stores are depleted. ID may be caused by a diet low in iron, insufficient absorption of iron from the diet, increased iron requirements due to growth or pregnancy, or blood loss. Groups at risk of ID include: pregnant women, infants and young children, women with heavy menstrual bleeding, frequent blood donors, and people with cancer, gastrointestinal disorders or heart failure (2). ID progresses to IDA

when iron stores become so low that hemoglobin production is disrupted. Changes in Hb concentration and Hct occur at the late stages of ID. IDA is associated with gastrointestinal disturbances, diminished physical work capacity, impaired thermoregulation, immune dysfunction, and Helicobacter pylori infection (6). There are additional risks associated with IDA in infants, children and pregnant women detailed below.

Iron in the Diet

Dietary sources of iron come in two major forms: heme and nonheme iron. Heme iron is well absorbed and found primarily in animal food sources, including red meat, liver, poultry, and fish. Nonheme iron is not as well absorbed and is found in foods from plants. Dietary sources of nonheme iron include iron-fortified grain products, legumes, fruits, and green leafy vegetables. Because nonheme iron is less bioavailable, the iron requirement for vegetarians is 1.8 times higher (7). Additional factors can also affect iron absorption. Consumption of vitamin C-rich foods and meat, fish or poultry increase the absorption of nonheme iron. Phytates, found in grains and beans, and some polyphenols, such as those found in cereals and legumes, can inhibit nonheme iron absorption (8). Calcium is linked to a reduction in the absorption of both heme and nonheme iron. The effects of enhancers and inhibitors on iron absorption are diminished by a typical mixed western diet and do not significantly impact most people's iron status (2). Iron absorption, namely nonheme iron, is also dependent on an individual's iron status. In a state of iron sufficiency iron absorption decreases, while absorption increases in a state of ID (8, 9).

Iron Deficiency Anemia in Women

Women of childbearing age require additional iron, when compared to male counterparts, to make up for blood loss during menstruation, increased needs during pregnancy and blood loss at delivery and postpartum. In addition to high iron needs, women often under consume iron putting this group further at risk for IDA (2). Additional risk factors for the development of IDA in pregnant women include: adolescent pregnancy, gestational diabetes and multiparity (10, 11). (For more information on adolescent pregnancy, gestational diabetes and multiparity see risk #331 *Pregnancy at a Young Age,* risk #302 *Gestational Diabetes,* risk #303 *History of Gestational Diabetes* and risk #335 *Multi-fetal Gestation).* The strongest predictors of IDA in postpartum women are IDA during pregnancy and high blood loss during delivery (12).

Pregnant women are at particular risk due to their increased iron needs. Pregnant women need almost twice as much iron as those who are not pregnant to support increased red blood cell production and the development of the fetus and placenta (13). The Recommended Dietary Allowance (RDA), the average daily level of intake sufficient to meet the nutrient requirements of nearly all (97%–98%) healthy individuals, for iron in pregnant women is 27 mg per day; the RDA for iron in non-pregnant women 14-18 years old and 19-50 years old is 15 mg and 18 mg respectively (7). Based on data from the National Health and Nutrition Examination Survey (NHANES), 2001-2014, the average iron intake from food for pregnant women aged 20 to 40 years was 17.2 mg, well below the RDA (14). Given the high iron requirements during pregnancy and insufficient intake from foods, iron supplementation is often recommended during pregnancy (2). Based on data from NHANES, 1999-2010, 16.3% of pregnant women 12-49 years old in the United States had ID, including 2.6 with IDA (15). Data also showed that ID was more prevalent in women in the second or third trimester, Mexican American pregnant women, non-Hispanic black pregnant women, and women with parity greater than or equal to 2.

In addition to the effects of IDA mentioned above, IDA during pregnancy is associated with several negative fetal and maternal outcomes. Maternal IDA increases an infant's risk for low birth weight, premature birth, death, and impaired cognitive and behavioral development (2, 16, 17). IDA during pregnancy also increases the risk of maternal death (17). A long history of studies supported the belief that the fetus is protected

from any impact of maternal iron status, however, a better understanding of regulation of iron physiology and neonatal iron status is challenging this assumption. Newer literature indicates fetal iron stores may be compromised when maternal iron stores are suboptimal, linking IDA during pregnancy with IDA in infants (16, 18, 19, 20, 21).

While the negative outcomes associated with IDA during pregnancy are well documented, additional research is needed to establish a clear causal relationship. IDA can also be a marker for food insecurity or lack of prenatal care, which can have similar effects (16). In a review of published reports, maternal iron supplementation has been shown to improve maternal iron status, however, the evidence is unclear on whether this increase leads to improvement in maternal and fetal health outcomes (17).

Iron Deficiency Anemia in Infants and Children

Infants and children are at risk for ID and IDA given their high iron requirements to support their rapid growth. The prevalence of anemia and possibly ID and IDA in infants and children has declined since the 1970s in the United States, and many attribute this decline to the fortification of infant formula and cereal and the establishment of the WIC program (22, 23). Based on data from the 2007–2010 NHANES 7.1% of children aged 1-5 were iron deficient and 1.1% had IDA (24). The rates of ID and IDA were higher in 1 to 2-year-olds at 13.5% and 2.7% respectively. There are no current national statistics regarding the prevalence of ID and IDA in infants before 12 months of age. Based on CDC recommendations, WIC regulations require a hematological test to screen for anemia during the following timeframes for infants and children (25):

- Infants: 9 to 12 months of age.
- Children 1-2 years: One blood test is required between 12 to 24 months of age, ideally 6 months after the infant screen (around 15 to 18 months of age).
- Children 2-5 years: Once every 12 months for children 2-5 years of age whose blood test results were within the normal range at their last certification.

Iron is essential for normal neurodevelopment of infants and children. Numerous studies have linked IDA in infants and children to later adverse cognitive, motor and behavior effects (22). Cognitive deficits and the impact of IDA can be long lasting and may be irreversible, even with treatment (19, 26). It has been difficult to establish a causal relationship between IDA and these deficits due to confounding variables and difficulty in designing and executing the large-scale studies needed to demonstrate a direct link (22, 27). IDA can also increase susceptibility to lead poisoning by increasing intestinal lead absorption (22). (For more information on lead poisoning see Risk #211 *Elevated Blood Levels*).

While all infants and children are at risk of IDA due to their rapid growth, additional factors can place infants and children at higher risk. The table below outlines risk factors for IDA in infants and children:

Risk Factor	Additional Information
History of Prematurity*	Preterm infants miss out on the rapid accumulation of iron that occurs in the last trimester of pregnancy, are born with lower iron stores and are at risk of depleting their iron stores earlier than full term infants (22, 18, 26).
History of low birth weight or small for gestational age †	Low birth weight and small for gestational age infants are more likely to have lower iron stores that are unable to support the catch-up growth often seen in these infants (11, 18, 22).

Exclusive breastfeeding beyond 4 months of age without supplemental iron	While the iron breast milk contains is highly bioavailable, it is very limited. Full-term infants usually have adequate iron stores for 4 to 6 months but become at risk of developing iron deficiency at 6 to 9 months, unless they obtain adequate iron from complementary foods, iron-fortified formula or iron supplementation (11, 22).
Dietary habits linked with inadequate iron intake	The following dietary habits may increase an infant or child's risk for inadequate iron intake: use of non-iron fortified formula, introduction of cow's milk in the first year of life, weaning to whole milk or complementary foods that do not include iron-fortified cereals or foods naturally rich in iron (11, 22).
Maternal IDA	Infants born to mothers with IDA during pregnancy may be born with lower iron stores and are more likely to develop IDA as infants and children (22).
Feeding problems, poor growth, and inadequate nutrition‡	These challenges, which are often seen in infants with special care needs, are considered risk factors (22).
Demographic factors	Low socioeconomic status and having parents who are migrant workers or recent immigrants are also associated with increased risk (27).

* For more information on prematurity see Risk #142 *Preterm or Early Term Delivery.*

† For more information on low birth weight or small for gestation see Risk #141 *Low Birth Weight and Very Low Birth Weight* and Risk #151 *Small for Gestational Age.*

‡ For more information on special care needs see Risk #362 *Developmental, Sensory or Motor Disabilities Interfering with the Ability to Eat.*

Implications for WIC Nutrition Services

The WIC food package is designed to include foods that contain specific nutrients to improve the health status of program participants, address inadequate intakes, and, ultimately, prevent nutrient deficiencies such as ID and IDA. Nutrition education combined with the WIC food package can help decrease the likelihood that an individual would develop IDA.

For individuals who currently have low Hb or Hct, WIC staff can:

- Refer participants to their health care provider for more thorough testing as appropriate. Only a health care provider can diagnose anemia and determine the specific type and cause.
- Reinforce treatment plans, such as iron supplementation, provided by the health care provider, and refer participants to health care providers for medical follow-up care.
- Per State policy, provide follow up testing/referrals at future appointments.

- Discuss lead testing with participant or parent/caregiver and refer to appropriate resources if needed.
- Reiterate infant feeding guidance such as providing iron-fortified infant formula for infants not breastfed or partially breastfed for the first year of life and offering iron-rich or iron fortified complementary foods around 6 months of age.
- For breastfed infants, refer to healthcare provider to determine if iron supplementation is needed before 6 months of age, see:
    - to https://www.cdc.gov/breastfeeding/breastfeeding-special-circumstances/diet-and-micronutrients/iron.html
- Encourage consumption of iron-rich foods (with an emphasis on the foods in the WIC food package): Lentils and beans, fortified cereals, red meats, fish, and poultry, for more information, see:
    - https://ods.od.nih.gov/factsheets/Iron-HealthProfessional/#h3
- Encourage consumption of foods rich in Vitamin C to aid in iron absorption: Citrus fruits, tomatoes, and other fruits and vegetables, for more information see:
    - http://ods.od.nih.gov/factsheets/VitaminC-HealthProfessional/

Clarification

Basis for blood work assessment: For pregnant women being assessed for iron deficiency anemia, blood work must be evaluated using trimester values established by CDC. Thus, the blood test result for a pregnant woman would be assessed based on the trimester in which her blood work was taken.

Definition of Trimester: CDC defines a trimester as a term of three months in the prenatal gestation period with the specific trimesters defined as follows in weeks:

- First Trimester: 0-13 weeks
- Second Trimester: 14-26 weeks
- Third Trimester: 27-40 weeks

Further, CDC begins the calculation of weeks starting with the first day of the last menstrual period. If that date is not available, CDC estimates that date from the estimated date of confinement (EDC). This definition is used in interpreting CDC's Prenatal Nutrition Surveillance System data, comprised primarily of data on pregnant women participating in the WIC Program.

Adjustments for smoking: A State agency may elect to use only one cutoff for all smokers rather than making specific adjustments based on the individual applicant's smoking frequency. If the State chooses to use only one category for this issue, the "up to <1 pack/day" cutoff values category as shown on Tables 201-A and 201-B is the only one that may be used.

References

1. Centers for Disease Control and Prevention [Internet]. Atlanta (GA): Centers for Disease Control and Prevention. Recommendations to prevent and control Iron deficiency in the United States. Morb Mortal Wkly Rep. 1998 Apr 3 [cited 2020 Apr 14];47(RR-3):1-36. Available from: https://www.cdc.gov/mmwr/preview/mmwrhtml/00051880.htm.
2. National Institutes of Health [Internet]. Bethesda, MD: National Institutes of Health. 2020 Feb 28 [cited 2020 April 14]; [about 14 pages]. Available from: https://ods.od.nih.gov/factsheets/Iron-HealthProfessional/#h6.
3. National Heart, Lung and Blood Institute health topics [Internet]. Bethesda (MD): National Institutes of Health (US). Pernicious Anemia; [cited 2020 Oct 20]. Available from: https://www.nhlbi.nih.gov/health-topics/pernicious-anemia.
4. MedlinePlus health topics [Internet]. Bethesda (MD): National Library of Medicine (US). Sickle Cell Disease; [reviewed 2018 Jun 7; updated 2020 Sep 16; cited 2020 Oct 20]. Available from: https://medlineplus.gov/sicklecelldisease.html.
5. MedlinePlus health topics [Internet]. Bethesda (MD): National Library of Medicine (US). Thalassemia; [reviewed 2016 Dec 16; updated 2020 Aug 24; cited 2020 Oct 20]. Available from: https://medlineplus.gov/thalassemia.html.
6. Clark SF. Iron deficiency anemia. Nutr Clin Pract. 2008 Apr 1 [cited 2020 Apr 24];23(2):128-141. Available from: https://onlinelibrary.wiley.com/doi/full/10.1177/0884533608314536.
7. Institute of Medicine Food and Nutrition Board [Internet]. Dietary Reference Intakes: The essential guide to nutrient requirements. Washington, DC: National Academies Press. 2006. [cited 2020 Apr 29]. Available from: https://doi.org/10.17226/11537.
8. Lynch S, Pfeiffer CM, Georgieff MK, Brittenham G, Fairweather-Tait S, Hurrell RF, et al. Biomarkers of nutrition for development (BOND)-iron review. J Nutr. 2018 Jun 1 [cited 2020 Sep 17];148(suppl_1):1001S-1067S. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6297556/.
9. Domellöf M, Braegger C, Campoy C, Colomb V, Desci T, Fewtrell M, et al. Iron requirements of infants and toddlers. J Pediatr Gastroenterol Nutr. 2014 Jan [cited 2020 April 30];58(1):119-129. Available from: https://journals.lww.com/jpgn/Fulltext/2014/01000/Iron_Requirements_of_Infants_and_Toddlers.28.aspx.
10. Cao C, O'Brien KO, Pregnancy and iron homeostasis: an update. *Nutr Rev. 2013 Jan 1 [cited 2020 Apr 30];*71(1):35–51. Available from: https://doi.org/10.1111/j.1753-4887.2012.00550.x.
11. Burke RM, Leon JS, Suchdev PS. Identification, prevention and treatment of iron deficiency during the first 1000 days. Nutrients. 2014 Oct 10 [cited 2020 Apr 30];10;6(10):4093-114. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4210909/.
12. Milman, N. Postpartum anemia I: definition, prevalence, causes, and consequences. Ann Hematol 2011 Jun 28 [cite 2020 May 5] 90(1247). Available from: https://link.springer.com/article/10.1007%2Fs00277-011-1279-z.

13. Siu AL. Screening for iron deficiency anemia and iron supplementation in pregnant women to improve maternal health and birth outcomes: U.S. Preventative Task Force Recommendation statement. Ann Intern Med. 2015 Oct 6 [cited 2020 Apr 10]; 163(7):529-536. Epub: 2015 Sep 8. Available from: https://www.uspreventiveservicestaskforce.org/uspstf/document/RecommendationStatementFinal/iron-deficiency-anemia-in-pregnant-women-screening-and-supplementation#citation6

14. Bailey RL, Pac SG Fulgoni VL, Reidy KC, Catalano PM. Estimation of total usual dietary intakes of pregnant women in the United States. JAMA Netw Open. 2019 Jun 5 [cited 2020 May 8];2(6):e195967. Available from: https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2736174.

15. Gupta PM, Hamner HC, Suchdev PS, Flores-Ayala R, Mei Z. Iron status of toddlers, nonpregnant females and pregnant females in the United States. Am J Clin Nutr. 2017 Dec [cited 2020 Sep 23];106(6):1640S-1646. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5701724/

16. Means RT. Iron deficiency and iron deficiency anemia: implications and impact in pregnancy, fetal development, and early childhood parameters. Nutrients. 2020 Feb 11 [cited 2020 Apr 30];12(2):447. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7071168/

17. Peña-Rosas JP, De-Regil LM, Garcia-Casal MN, Dowswell T. Daily oral iron supplementation during pregnancy. 2015 Jul 22 [cited 2020 Apr 30]. In: The Cochrane Database of Systematic Reviews [Internet]. London (UK): John Wiley & Sons, Ltd. C2015. Available from: https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD004736.pub5/full.

18. Scholl T. Maternal iron status: relation to fetal growth, length of gestation, and iron endowment of the neonate. *Nutr Rev*. 2011 Nov 1 [cited 2020 Apr 10];69(1):S23–S29. Available from: https://academic.oup.com/nutritionreviews/article/69/suppl_1/S23/1815100.

19. Radlowski EC, Johnson RW. Perinatal iron deficiency and neurocognitive development. Front Hum Neurosci. 2013 Sep 23 [cited 2020 May 5];7:585. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3779843/

20. Abioye AI, McDonald EA, Park S, Ripp K, Bennett B, Wu HW, et al. Maternal anemia type during pregnancy is associated with anemia risk among offspring during infancy. Pediatr Res. 2019 Sep [cited 2020 May 5];86(3):396-402. Epub 2019 May 26. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6702090/.

21. Lee S, Guillet R, Cooper EM, Westerman M, Orlando M, Kent T, et al. Prevalence of anemia and associations between neonatal iron status, hepcidin, and maternal iron status among neonates born to pregnant adolescents. Pediatr Res. 2016 Jan [cited 2020 May 5];79:42–48. Available from: https://www.nature.com/articles/pr2015183#article-info.

22. Baker RD, Freer FR, and the Committee on Nutrition. Diagnosis and Prevention of Iron Deficiency and Iron-Deficiency Anemia in Infants and Young Children (0-3 Years of Age). Pediatrics. 2010 Nov [cited 2020 April 10];126(5):1040–50. Available from: https://pediatrics.aappublications.org/content/126/5/1040.long.

23. Cusick SE, Mei Z, Freedman DS, Looker AC, Ogden CL, Gunter E, et al. Unexplained decline in the prevalence of anemia among US children and women between 1988–1994 and 1999–2002. Am J Clin Nutr. 2008 Dec [cited 2020 May 6];88(6):1611–1617. Available from: https://doi.org/10.3945/ajcn.2008.25926.

24. Gupta PM, Perrine CG, Mei Z, Scanlon KS. Iron, anemia, and iron deficiency anemia among young children in the United States. Nutrients. 2016 May 30 [cited 2020 May 6];8(6):330. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4924171/. Corrected and republished from: Nutrients. 2017 Aug 15 [cited 2020 May 6];9(8):876. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5579669/.

25. Special Supplemental Nutrition Program for Women, Infants and Children, 7 C.F.R. Sect. 246.7(e)(1)(i)(A) (2020). Available from: https://www.ecfr.gov/cgi-bin/text-idx?SID=4aee33ead8001dc4af3ab61a2ad506f8&mc=true&node=pt7.4.246&rgn=div5.

26. Lozloff B, Smith JB, Kaciroti N, Clark KM, Guevara S, Jimenez E. Functional Significance of Early-Life Iron Deficiency: Outcomes at 25 Years. J Pediatr. 2013 November [cited 2020 May 7];163(5):1260-1266. Available from: https://www.sciencedirect.com/science/article/pii/S0022347613005647?via%3Dihub.

27. Sui AL. Screening for iron deficiency anemia in young children: USPSTF Recommendation Statement. Pediatrics. 2015 Oct [cited 2020 Apr 10];136(4):746-752. Available from: https://pediatrics.aappublications.org/content/136/4/746.

Table 201 - A

		Category									
		1st Trimester	2nd Trimester	3rd Trimester	Nonpreg 12 - < 15 yrs	Nonpreg 15 - < 18 yrs	Nonpreg ≥ 18 yrs	Infants 0 - < 6 mo	Infants 6 - < 12 mo	Child 1 - < 2 yrs	Child 2 - < 5 yrs
Altitude	Smoking	Hct <	Hct <	Hct <	Hct <	Hct <	Hct <	Hct <	Hct <	Hct <	Hct <
No altitude adjustment	Nonsmokers	33.0	32.0	33.0	35.7	35.9	35.7		33.0	32.9	33.0
	Up to < 1 pack/day	34.0	33.0	34.0	36.7	36.9	36.7				
	1 - 2 packs/day	34.5	33.5	34.5	37.2	37.4	37.2				
	> 2 packs/day	35.0	34.0	35.0	37.7	37.9	37.7				
3,000-3,999 ft	Nonsmokers	33.5	32.5	33.5	36.2	36.4	36.2		33.5	33.4	33.5
	Up to < 1 pack/day	34.5	33.5	34.5	37.2	37.4	37.2				
	1 - 2 packs/day	35.0	34.5	35.0	37.7	37.9	37.7				
	> 2 packs/day	35.5	34.5	35.5	38.2	38.4	38.2				
4,000-4,999 ft	Nonsmokers	34.0	33.0	34.0	36.7	36.9	36.7		34.0	33.9	34.0
	Up to < 1 pack/day	35.0	34.0	35.0	37.7	37.9	37.7				
	1 - 2 packs/day	35.5	34.5	35.5	38.2	38.4	38.2				
	> 2 packs/day	36.0	35.0	36.0	38.7	38.9	38.7				
5,000-5,999 ft	Nonsmokers	34.5	33.5	34.5	37.2	37.4	37.2		34.5	34.4	34.5
	Up to < 1 pack/day	35.5	34.5	35.5	38.2	38.4	38.2				
	1 - 2 packs/day	36.0	35.0	36.0	38.7	38.9	38.7				
	> 2 packs/day	36.5	35.5	36.5	39.2	39.4	39.2				
6,000-6,999 ft	Nonsmokers	35.0	34.0	35.0	37.7	37.9	37.7		35.0	34.9	35.0
	Up to < 1 pack/day	36.0	35.0	36.0	38.7	38.9	38.7				
	1 - 2 packs/day	36.5	35.5	36.5	39.2	39.4	39.2				
	> 2 packs/day	37.0	36.0	37.0	39.7	39.9	39.7				

Category

Table 201- A, pg.2

Altitude	Smoking	1st Trimester Hct <	2nd Trimester Hct <	3rd Trimester Hct <	Nonpreg 12 - < 15 yrs Hct <	Nonpreg 15 - < 18 yrs Hct <	Nonpreg ≥ 18 yrs Hct <	Infants 0 - < 6 mo Hct <	Infants 6 - < 12 mo Hct <	Child 1 - < 2 yrs Hct <	Child 2 - < 5 yrs Hct <
7,000-7,999 ft	Nonsmokers	36.0	35.0	36.0	38.7	38.9	38.7		36.0	35.9	36.0
	Up to < 1 pack/day	37.0	36.0	37.0	39.7	39.9	39.7				
	1 - 2 packs/day	37.5	36.5	37.5	40.2	40.4	40.2				
	> 2 packs/day	38.0	37.0	38.0	40.7	40.9	40.7				
8,000-8,999 ft	Nonsmokers	37.0	36.0	37.0	39.7	39.9	39.7		37.0	36.9	37.0
	Up to < 1 pack/day	38.0	37.0	38.0	40.7	40.9	40.7				
	1 - 2 packs/day	38.5	37.5	38.5	41.2	41.4	41.2				
	> 2 packs/day	39.0	38.0	39.0	41.7	41.9	41.7				
9,000-9,999 ft	Nonsmokers	38.0	37.0	38.0	40.7	40.9	40.7		38.0	37.9	38.0
	Up to < 1 pack/day	39.0	38.0	39.0	41.7	41.9	41.7				
	1 - 2 packs/day	39.5	38.5	39.5	42.2	42.4	42.2				
	> 2 packs/day	40.0	39.0	40.0	42.7	42.9	42.7				
10,000 ft or more	Nonsmokers	39.0	38.0	39.0	41.7	41.9	41.7		39.0	38.9	39.0
	Up to < 1 pack/day	40.0	39.0	40.0	42.7	42.9	42.7				
	1 - 2 packs/day	40.5	39.5	40.5	43.2	43.4	43.2				
	> 2 packs/day	41.0	40.0	41.0	43.7	43.9	43.7				

Category

Table 201 - B

Altitude	Smoking	1st Trimester Hct <	2nd Trimester Hct <	3rd Trimester Hct <	Nonpreg 12 - < 15 yrs Hct <	Nonpreg 15 - < 18 yrs Hct <	Nonpreg ≥ 18 yrs Hct <	Infants 0 - < 6 mo Hct <	Infants 6 - < 12 mo Hct <	Child 1 - < 2 yrs Hct <	Child 2 - < 5 yrs Hct <
No altitude adjustment	Nonsmokers	11.0	10.5	11.0	11.8	12.0	12.0		11.0	11.0	11.1
	Up to < 1 pack/day	11.3	10.8	11.3	12.1	12.3	12.3				
	1- 2 packs/day	11.5	11.0	11.5	12.3	12.5	12.5				
	> 2 packs/day	11.7	11.2	11.7	12.5	12.7	12.7				
3,000-3,999 ft	Nonsmokers	11.2	10.7	11.2	12.0	12.2	12.2		11.2	11.2	11.3
	Up to < 1 pack/day	11.5	11.0	11.5	12.3	12.5	12.5				
	1- 2 packs/day	11.7	11.2	11.7	12.5	12.7	12.7				
	> 2 packs/day	11.9	11.4	11.9	12.7	12.9	12.9				
4,000-4,999 ft	Nonsmokers	11.3	10.8	11.3	12.1	12.3	12.3		11.3	11.3	11.4
	Up to < 1 pack/day	11.6	11.1	11.6	12.4	12.6	12.6				
	1- 2 packs/day	11.8	11.3	11.8	12.6	12.8	12.8				
	> 2 packs/day	12.0	11.5	12.0	12.8	13.0	13.0				
5,000-5,999 ft	Nonsmokers	11.5	11.0	11.5	12.3	12.5	12.5		11.5	11.5	11.6
	Up to < 1 pack/day	11.8	11.3	11.8	12.6	12.8	12.8				
	1- 2 packs/day	12.0	11.5	12.0	12.8	13.0	13.0				
	> 2 packs/day	12.2	11.7	12.2	13.0	13.2	13.2				
6,000-6,999 ft	Nonsmokers	11.7	11.2	11.7	12.5	12.7	12.7		11.7	11.7	11.8
	Up to < 1 pack/day	12.0	11.5	12.0	12.8	13.0	13.0				
	1- 2 packs/day	12.2	11.7	12.2	13.0	13.2	13.2				
	> 2 packs/day	12.4	11.9	12.4	13.2	13.4	13.4				

Category

Table 201 – B, pg. 2

Altitude	Smoking	1st Trimester Hct <	2nd Trimester Hct <	3rd Trimester Hct <	Nonpreg 12 - < 15 yrs Hct <	Nonpreg 15 - < 18 yrs Hct <	Nonpreg ≥ 18 yrs Hct <	Infants 0 - < 6 mo Hct <	Infants 6 - < 12 mo Hct <	Child 1 - < 2 yrs Hct <	Child 2 - < 5 yrs Hct <
7,000-7,999 ft	Nonsmokers	12.0	11.5	12.0	12.8	13.0	13.0		12.0	12.0	12.1
	Up to < 1 pack/day	12.3	11.8	12.3	13.1	13.3	13.3				
	1- 2 packs/day	12.5	12.0	12.5	13.3	13.5	13.5				
	> 2 packs/day	12.7	12.2	12.7	13.5	13.7	13.7				
8,000-8,999 ft	Nonsmokers	12.3	11.8	12.3	13.1	13.3	13.3		12.3	12.3	12.4
	Up to < 1 pack/day	12.6	12.1	12.6	13.4	13.6	13.6				
	1- 2 packs/day	12.8	12.3	12.8	13.6	13.8	13.8				
	> 2 packs/day	13.0	12.5	13.0	13.8	14.0	14.0				
9,000-9,999 ft	Nonsmokers	12.6	12.1	12.6	13.4	13.6	13.6		12.6	12.6	12.7
	Up to < 1 pack/day	12.9	12.4	12.9	13.7	13.9	13.9				
	1- 2 packs/day	13.1	12.6	13.1	13.9	14.1	14.1				
	> 2 packs/day	13.3	12.8	13.3	14.1	14.3	14.3				
10,000 ft or more	Nonsmokers	13.0	12.5	13.0	13.8	14.0	14.0		13.0	13.0	13.1
	Up to < 1 pack/day	13.3	12.8	13.3	14.1	14.3	14.3				
	1- 2 packs/day	13.5	13.0	13.5	14.3	14.5	14.5				
	> 2 packs/day	13.7	13.2	13.7	14.5	14.7	14.7				

Category

Table 201 - C

Altitude	Smoking	1st Trimester Hct <	2nd Trimester Hct <	3rd Trimester Hct <	Nonpreg 12 - < 15 yrs Hct <	Nonpreg 15 - < 18 yrs Hct <	Nonpreg ≥ 18 yrs Hct <	Infants 0 - < 6 mo Hct <	Infants 6 - < 12 mo Hct <	Child 1 - < 2 yrs Hct <	Child 2 - < 5 yrs Hct <
No altitude adjustment	Nonsmokers	33	32	33	36	36	36		33	33	33
	Up to < 1 pack/day	34	33	34	37	37	37				
	1- 2 packs/day	35	34	35	38	38	38				
	> 2 packs/day	35	34	35	38	38	38				
3,000-3,999 ft	Nonsmokers	34	33	34	37	37	37		34	34	34
	Up to < 1 pack/day	35	34	35	38	38	38				
	1- 2 packs/day	35	34	35	38	38	38				
	> 2 packs/day	36	35	36	39	39	39				
4,000-4,999 ft	Nonsmokers	34	33	34	37	37	37		34	34	34
	Up to < 1 pack/day	35	34	35	38	38	38				
	1- 2 packs/day	36	35	36	39	39	39				
	> 2 packs/day	36	35	36	39	39	39				
5,000-5,999 ft	Nonsmokers	35	34	35	38	38	38		35	35	35
	Up to < 1 pack/day	36	35	36	39	39	39				
	1- 2 packs/day	36	35	36	39	39	39				
	> 2 packs/day	37	36	37	40	40	40				
6,000-6,999 ft	Nonsmokers	35	34	35	38	38	38		35	35	35
	Up to < 1 pack/day	36	35	36	39	39	39				
	1- 2 packs/day	37	36	37	40	40	40				
	> 2 packs/day	37	36	37	40	40	40				

Category

Table 201 – C, pg. 2

Altitude	Smoking	1st Trimester	2nd Trimester[d]	3rd Trimester	Nonpreg 12 - < 15 yrs	Nonpreg 15 - < 18 yrs	Nonpreg ≥ 18 yrs	Infants 0 - < 6 mo	Infants 6 - < 12 mo	Child 1 - < 2 yrs	Child 2 - < 5 yrs
		Hct <	Hct <	Hct <	Hct <	Hct <	Hct <	Hct <	Hct <	Hct <	Hct <
7,000-7,999 ft	Nonsmokers	36	35	36	39	39	39		36	36	36
	Up to < 1 pack/day	37	36	37	40	40	40				
	1- 2 packs/day	38	37	38	41	41	41				
	> 2 packs/day	38	37	38	41	41	41				
8,000-8,999 ft	Nonsmokers	37	36	37	40	40	40		37	37	37
	Up to < 1 pack/day	38	37	38	41	41	41				
	1- 2 packs/day	39	38	39	42	42	42				
	> 2 packs/day	39	38	39	42	42	42				
9,000-9,999 ft	Nonsmokers	38	37	38	41	41	41		38	38	38
	Up to < 1 pack/day	39	38	39	42	42	42				
	1- 2 packs/day	40	39	40	43	43	43				
	> 2 packs/day	40	39	40	43	43	43				
10,000 ft or more	Nonsmokers	39	38	39	42	42	42		39	39	39
	Up to < 1 pack/day	40	39	40	43	43	43				
	1- 2 packs/day	41	40	41	44	44	44				
	> 2 packs/day	41	40	41	44	44	44				

211 Elevated Blood Lead Level

Definition/Cut-off Value

Elevated blood lead level (BLL) is the amount of lead in the blood, measured in micrograms of lead per deciliter of blood (µg/dL), at which follow-up action should be taken for an individual. Elevated BLL is specific to each WIC participant category as follows (1, 2):

Category*	Elevated Blood Lead Level (µg/dL) (within the past 12 months)
Women (all categories)**	≥ 5
Infants	≥ 5
Children	≥ 3.5

* See Clarification section for more information about category specific elevated BLLs.

** See the Nutrition and Lead Exposure section below for recommendations on the initiation and continuation of breastfeeding.

Participant Category and Priority Level

Category	Priority
Pregnant Women	I
Breastfeeding Women	I
Non-Breastfeeding Women	III, IV, V, or VI
Infants	I
Children	III

Justification

Lead exposure is a persistent public health problem in the U.S. and worldwide. A naturally occurring element that has been mined and used by humans for centuries, lead is toxic to humans with impacts ranging from changes in organ function to death. The toxic effects of lead have been observed in every organ system and there is no known safe level of exposure. Even low levels of lead exposure can have harmful and irreversible neurological, renal, cardiovascular, hematological, immunological, reproductive, and developmental effects. In addition to these most extensively studied outcomes, scientific evidence also suggests that lead exposure can have detrimental respiratory, hepatic, endocrine, gastrointestinal, musculoskeletal, and ocular effects, and increase risk of all cancers. (3)

Lead exposure during pregnancy or postpartum can adversely impact the mother as well as the developing fetus and breastfeeding infant during critical stages of development. Lead readily crosses the placenta, and

lead exposure during pregnancy is associated with increased risk of miscarriage, preterm birth, and decreased birth size (weight, length and head circumference); fetal brain, kidney, and nervous system damage; and lifelong learning and behavior problems (2, 3). Lead can also transfer from maternal blood to breastmilk, and ultimately to the breastfeeding infant (2).

Lead exposure is most common in young children because they have greater contact with lead sources and higher gastrointestinal absorption of ingested lead. Additionally, children's developing nervous systems are more vulnerable to the effects of lead exposure. Elevated BLL in children has been associated with adverse neurological and behavioral outcomes including cognitive deficits (e.g., learning and memory), altered behavior and mood (e.g., attention, hyperactivity, impulsivity, irritably, delinquency), and altered neuromotor and neurosensory function (e.g., visual-motor integration, dexterity, postural sway, changes in hearing and visual thresholds). (3)

Prevalence of Lead Exposure

Over the four decades from 1976 to 2016, BLLs decreased significantly among children ages 1 to 5 years and among women of childbearing age (15 to 49 years) in the U.S. (4, 5). Specifically, during this timeframe, population average BLLs decreased from 15.2 to 0.83 µg/dL and 10.37 to 0.61 µg/dL for these groups, respectively. Correspondingly, the prevalence of BLL ≥5 µg/dL decreased from 99.8 to 1.3 percent among children ages 1 to 5 and from 98.3 to 0.7 percent among women of childbearing age. These favorable trends reflect the implementation of federal policies regulating the use of lead in gasoline, paint, plumbing, and other consumer products, among other public health interventions (6).

Despite this progress, sociodemographic disparities have persisted. Low-income and certain racial/ethnic minority populations continue to be disproportionately affected by lead exposure as a result of these groups more commonly living in communities and housing with greater lead contamination (4, 5).

Sociodemographic disparities in lead exposure vary by WIC participant category and are discussed further as follows.

Disparities among Women

According to the most recent NHANES data, over 500,000 women of childbearing age (15 to 49 years) in the U.S. have BLL ≥5 µg/dL. Lead exposure is more prevalent among certain subpopulations, including women with low-income, of older age, born outside the U.S., of "other" race/ethnicity (i.e., other than black, white, Hispanic, or Mexican American), previous pregnancies, and a higher number of live births. (5)

In particular, recent immigrants, migrants, and refugee women are at increased risk of lead exposure since they have commonly lived in areas where ambient lead exposure is relatively high. These groups may also be more likely to consume products contaminated with lead such as traditional remedies, herbal supplements, spices, candies, cosmetics, and jewelries or amulets. (7)

Disparities among Children

Between 2011 to 2016, an estimated 262,235 children ages 1 to 5 years had BLLs ≥5 µg/dL (note: the studies summarized here were conducted prior to October 2021, when the BLRV was ≥5 µg/dL). Subpopulations with greater prevalence of lead exposure include children of younger ages (i.e., 1 to 2 years old), non-Hispanic Black race/ethnicity, low-income (including children participating in WIC), and children born in Mexico, living in older housing, and living in the Northeast or Midwest regions of the U.S. compared to West and South regions. (4)

Between 1999 and 2016, population mean BLL was greatest for non-Hispanic Black children at all ages under 5 years compared to other racial/ethnic groups (non-Hispanic White, Hispanic, and Other) as was the proportion of non-Hispanic Black children ages 1 to 5 with BLL ≥5 µg/dL. Further, greater proportions of non-Hispanic Black children had higher BLLs, with Black children accounting for all children with BLL ≥40 µg/dL. (8)

Lead exposure is also more common among refugee children in the U.S., particularly among children from certain countries of origin and country of last residence (e.g., India, Afghanistan, Burma, and Nepal). Children, as well as adults, may also be at risk for elevated BLL after arrival due to continued use of lead-contaminated spices, candies, traditional cosmetics, and cookware. (7)

Sources of Lead Exposure

Lead exposure among the general population may occur through contact with soil, dust, drinking water, food, and air (3). The most common sources of lead exposure in the U.S. are lead-based paint chips and dust, lead-contaminated soil, and lead in drinking water (1). These exposures generally result from living in housing built before 1978, prior to when lead-based paint was banned, or with lead pipes or plumbing. An estimated 83 percent of privately owned homes and 86 percent of public housing family units built before 1980 contain lead-based paint (3). Additionally, up to 10 million households and 400,000 schools and childcare facilities connect to water through lead pipes and service lines (6, 9). Living near a highway, airport, powerplant, smelter, or hazardous waste site may also cause lead exposure through contaminated soil or air (2, 3).

Other sources of lead exposure include:

- Occupations that involve working with lead-based products, most commonly in the manufacturing, construction, services, and mining industries (10).
- Hobbies or activities that involve working with lead-based products such as casting, stained glass, pottery, painting, glassblowing and screen printing (3).
- Smoking cigarettes or e-cigarettes, chewing tobacco, and exposure to second-hand smoke (3).
- A variety of consumer products such as storage batteries, solders, tire weights, pottery glazes, leaded crystal glassware, cosmetics, hair dyes, jewelry, antiques, gunshot and ammunition, relic fishing sinkers, and imported children's toys (3).
- Imported foods, candies, and spices, including:
    - Candy with ingredients such as chili powder and tamarind (lead can get into the candy when drying, storing, and grinding the ingredients are done improperly). Ink from plastic or paper candy wrappers may also contain lead that leaches or seeps into the imported candy (11).
    - Certain commonly used spices, particularly those purchased abroad in Georgia, Bangladesh, Pakistan, Nepal, and Morocco (12).
- Cultural and traditional medicines, including (7):
    - Ba-baw-san: a Chinese herbal remedy used to treat colic pain or to pacify young children.
    - Daw Tway: a digestive aid used in Thailand and Myanmar (Burma).

    - Greta and Azarcon (also known as alarcon, coral, luiga, maria luisa, or rueda): Hispanic traditional medicines used for an upset stomach, constipation, diarrhea, and vomiting. They are also used on teething babies.
- For additional examples, refer to the CDC's table of Examples of regional or culture-specific exposures associated with elevated blood lead levels in children (7).

Among pregnant and lactating women, the most common sources of lead exposure include (3):

- Working in certain occupations.
- Practicing pica (ingesting non-nutritive substances such as soil or paint chips).
- Using herbal or traditional remedies or imported cosmetics.
- Using traditional lead-glazed ceramic pottery for cooking and storing food.
- Living in an older home during a renovation.
- History of lead exposure since bone lead stores persist for decades and are mobilized into the blood during periods of increased bone turnover including pregnancy and lactation.

The primary source of lead exposure among children ages 1 to 5 in the U.S. is soil and surface dust contaminated with lead. Young children are particularly susceptible to lead exposure due to their increased contact with dust, dirt, and surfaces potentially contaminated with lead and frequent hand-to mouth-activity. Children living in older housing with lead-based paint (especially deteriorated paint), are at higher risk for lead exposure. Among children with lower BLL or living in certain communities, other exposure sources such as lead in drinking water and food may be more significant. (3)

Lead Screening and Testing

Lead exposure prevention and reduction are possible, and such primary prevention strategies are critical to preventing long-term damage that can result from even low-level lead exposure. However, because lead is ubiquitous in the environment, secondary prevention is necessary to identify and follow children who are exposed to lead. CDC recommends that public health and clinical professionals focus screening efforts on neighborhoods and children at high risk based on age of housing and sociodemographic risk factors and work together to develop screening plans responsive to local conditions using local data. CDC supports these efforts through cooperative agreements with state and local health departments that fund lead exposure prevention activities including blood lead testing (13). Where state or local screening plans do not exist, CDC recommends universal BLL testing (1).

For pregnant women, CDC recommends against universal blood lead testing of all pregnant women in the U.S. Instead, state or local public health departments should identify populations at increased risk for lead exposure and provide guidance about community-specific risk factors to assist clinicians in determining the need for blood lead testing for identified populations or individuals at risk. Follow-up blood lead testing is recommended for pregnant women with BLL ≥5 µg/dL and their newborn infants. Pregnant women identified with blood lead levels ≥5 µg/dL should be tested at the time of birth to establish a baseline to guide postnatal care for the mother and infant. Lactating women with BLL ≥5 µg/dL should be referred for follow-up testing at an interval according to the BLL. (2)

For children, CDC recommends blood lead screening for those at high risk for elevated BLL with follow-up screening within 12 months and specific follow-up actions depending on an individual's BLL. For additional information, refer to the CDC's Recommended Actions Based on Blood Lead Levels. (14)

All Medicaid-enrolled children are required to be tested at ages 12 and 24 months, or at age 24–72 months if they have not previously been screened (15).

For infants, the American Academy of Pediatrics recommends a risk assessment at 6 and 9 months, and if positive, appropriate follow up action. Risk assessment questions appropriate to local lead hazards should be developed by local health care professionals in collaboration with state, county, or local health authorities (16).

CDC's specific screening guidelines for newly arrived refugees recommend that all refugee infants and children <16 years old and pregnant and breastfeeding women be screened for lead exposure with a blood test. Refugee adolescents > 16 years of age should be screened if there is a high index of suspicion, or clinical signs/symptoms of lead exposure. Follow up screening should occur 3 to 6 months later for all children under 6 years old, children and adolescents 7 to 16 years of age who had BLLs ≥3.5 µg/dL or who has a risk factor, and pregnant or lactating adolescents (<18 years of age) who had BLLs at or ≥3.5 µg/dL at initial screening. In addition, all newly arrived pregnant or breastfeeding women should be prescribed a prenatal or multivitamin with adequate iron and calcium. (7)

Note: Venous blood samples are the most accurate method of blood lead testing. Elevated BLLs obtained using capillary (finger stick) samples should be confirmed using a venous blood test (2).

Nutrition and Lead Exposure

Adequate intake of certain vitamins and minerals may mediate the absorption of lead and thereby the impacts of lead exposure. Specifically, adequate consumption of both calcium and iron, which compete with lead for intestinal absorption, have been found to decrease lead absorption (2). During pregnancy, adequate calcium intake may reduce maternal bone resorption and thereby reduce the mobilization of lead stored in the bone into the blood (17). Iron deficiency can be an indicator of lead poisoning as they often co-occur (see risk #201 for more information about iron deficiency anemia). Participants with elevated BLL should be provided with nutritional advice emphasizing adequate calcium and iron intake and pregnant participants should be encouraged to take a prenatal vitamin as prescribed by their healthcare provider (7).

While lead can be passed to breastfeeding infants through human milk, research suggests that the amount of blood lead transferred into breastmilk is minimal and hence breastmilk has a relatively small impact on infant BLL (7). CDC has developed breastfeeding recommendations specific to maternal BLL based on the available science.

For breastfeeding women, CDC recommends the following (2):

- Initiation of Breastfeeding:
    - Mothers with BLL <40 µg/dL should breastfeed.
    - Mothers with confirmed BLL ≥40 µg/dL should begin breastfeeding when their blood lead levels drop below 40 µg/dL. Until then, they should pump and discard their breastmilk.
- Continuation of Breastfeeding:
    - Breastfeeding should continue for all infants with BLL <5 µg/dL.
    - Infants born to mothers with BLL ≥5 µg/dL and <40 µg/dL can continue to breastfeed unless there are indications that the breast milk is contributing to elevated BLL.

Implications for WIC Nutrition Services

WIC nutrition services may benefit participants with elevated BLL by:

- Making recommendations for primary prevention of lead exposure, which may include (18):
    - Avoiding relevant risk factors (e.g., certain traditional medicines and cosmetics, imported or antique children's toys, imported or pottery dishes, and imported spices and candies).
    - Referring the participant to a licensed lead inspector to have their home tested for lead.
    - Referring the participant to the local water authority for testing for lead in tap water.
    - Washing children's hands after playing outside, regularly washing pacifiers, toys, etc., and removing shoes when entering the house.
- Encouraging consumption of foods (with an emphasis on the foods available in their WIC food package) with nutrients that help minimize absorption of ingested lead and assist in preventing adverse consequences, including:
    - Calcium: Low-fat dairy, bone-in canned fish, and fortified fruit and vegetable juices (19). For more information see: http://ods.od.nih.gov/factsheets/Calcium-HealthProfessional/
    - Iron: Lentils and beans, fortified cereals, red meats, fish, and poultry (20). For more information see: http://ods.od.nih.gov/factsheets/Iron-HealthProfessional/
- Helping to determine source(s) of lead exposure and counseling participants on avoiding exposure, including by:
    - Assessing pica behavior (for more information, see Risk #427 Inappropriate Nutrition Practices for Women and Risk #425 Inappropriate Nutrition Practices for Children).
    - Working with local lead programs to determine source(s) of lead exposure and to support their recommendations for reducing further exposure.
        - Information about State and local childhood lead poisoning prevention and surveillance programs can be found here (13): Lead Funding Information | CDC
- Referring participants to lead screening/testing: WIC agencies must ask parents/caretakers if the child they are enrolling in WIC has had a blood lead screening test; any child who has not had a test must be referred to a program where they can obtain one.
- Providing a referral to a lead treatment program via the local health departments.
- Working with healthcare providers to support breastfeeding according to CDC guidelines. This may include providing breastfeeding support to mothers with elevated BLLs who need to temporarily pump and discard their breast milk.

Clarification

The Definition/ Cut-off Value for each WIC participant category is based on current CDC guidelines. It is important to note that these values are not a health standard or toxicity threshold, but a guide to help determine when medical or environmental follow-up actions should be taken for an individual.

For women and infants, the values are adopted from CDC's Guidelines for the identification and management of lead exposure in pregnant and lactating women (cdc.gov) (2). For more information, refer to the following tables in this guidance:

- For infants, Tables 5-1 and 5-2 for Infants (pages 58-59). For simplicity and consistency, WIC is applying BLL ≥5 for all infants (CDC guidance varies by infant <1 month vs <6 month and does not address infants 6-12 months).
- For women, Tables 5-3 (page) and 9-1 (page 103).

For children, the value is the current Blood Lead Reference Value (BLRV), a population measure developed by the Centers for Disease Control and prevention (CDC) to identify children ages 1 to 5 years old with higher levels of lead in their blood compared to 97.5 percent of children in the United States (U.S.). The CDC established the BLRV in 2012 and updated it in 2021 (from 5 to 3.5 µg/dL) based on current national BLL data from the National Health and Nutrition Examination Survey (NHANES). (1)

References

1. Ruckart PZ, Jones RL, Courtney JG, et al. Update of the Blood Lead Reference Value - United States, 2021. MMWR Morb Mortal Wkly Rep. 2021;70(43):1509-1512. Published 2021 Oct 29. doi:10.15585/mmwr.mm7043a4
2. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Environmental Health. Guidelines for the identification and management of lead exposure in pregnant and lactating women. Atlanta, Ga.; 2010. Available at: Guidelines for the identification and management of lead exposure in pregnant and lactating women (cdc.gov).
3. Abadin H, Klotzbach JM, Taylor J, et al. Toxicological Profile for Lead. Atlanta (GA): Centers for Disease Control and Prevention, Agency for Toxic Substances and Disease Registry, 2020.
4. Egan KB, Cornwell CR, Courtney JG, Ettinger AS. Blood Lead Levels in U.S. Children Ages 1-11 Years, 1976-2016. Environ Health Perspect. 2021;129(3):37003. doi:10.1289/EHP7932
5. Dignam T, Kaufmann RB, LeStourgeon L, Brown MJ. Control of Lead Sources in the United States, 1970-2017: Public Health Progress and Current Challenges to Eliminating Lead Exposure. J Public Health Manag Pract. 2019;25 Suppl 1, Lead Poisoning Prevention: S13-S22. doi:10.1097/PHH.0000000000000889
6. The Whitehouse Briefing Room. Fact Sheet: The Biden-Harris Lead Pipe and Paint Action Plan. Available at: https://www.whitehouse.gov/briefing-room/statements-releases/2021/12/16/fact-sheet-the-biden-harris-lead-pipe-and-paint-action-plan/
7. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, Immigrant, Refugee and Migrant Health. Screening for Lead during the Domestic Medical Examination for Newly Arrived Refugees. Available at: https://www.cdc.gov/immigrantrefugeehealth/guidelines/lead-guidelines.html#ref-28.

8. Teye SO, Yanosky JD, Cuffee Y, et al. Exploring persistent racial/ethnic disparities in lead exposure among American children aged 1-5 years: results from NHANES 1999-2016. Int Arch Occup Environ Health. 2021;94(4):723-730. doi:10.1007/s00420-020-01616-4

9. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health. Adult Blood Lead Epidemiology and Surveillance (ABLES). Available at: https://www.cdc.gov/niosh/topics/ables/default.html

10. Advisory Committee on Childhood Lead Poisoning Prevention. Low level lead exposure harms children: a renewed call for primary prevention. Atlanta, GA: US Department of Health and Human Services, CDC, Advisory Committee on Childhood Lead Poisoning Prevention; 2012.

11. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Environmental Health. Lead in Foods, Cosmetics, and Medicines. Available at: https://www.cdc.gov/nceh/lead/prevention/sources/foods-cosmetics-medicines.htm

12. Hore P, Alex-Oni K, Sedlar S, Nagin D. A Spoonful of Lead: A 10-Year Look at Spices as a Potential Source of Lead Exposure. J Public Health Manag Pract. 2019;25 Suppl 1, Lead Poisoning Prevention: S63-S70. doi:10.1097/PHH.0000000000000876

13. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Environmental Health. Childhood Lead Poisoning Prevention. Available at: https://www.cdc.gov/nceh/lead/programs/default.htm

14. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Environmental Health. Recommended Actions Based on Blood Lead Level. Available at: https://www.cdc.gov/nceh/lead/advisory/acclpp/actions-blls.htm.

15. Centers for Medicare & Medicaid Services. Lead Screening. Available at: https://www.medicaid.gov/medicaid/benefits/early-and-periodic-screening-diagnostic-and-treatment/lead-screening/index.html

16. American Academy of Pediatrics. Preventive Care/Periodicity Schedule. Available at: https://www.aap.org/en/practice-management/care-delivery-approaches/periodicity-schedule/

17. McElroy KG, Iobst SE, DeVance-Wilson C, Ludeman E, Barr E. Systematic Review and Meta-Analysis of the Effect of Nutrients on Blood Lead Levels in Pregnancy. J Obstet Gynecol Neonatal Nurs. 2020;49(3):243-253. doi:10.1016/j.jogn.2020.02.004

18. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Environmental Health. How to Prevent Lead Poisoning in Children. Available at: https://www.cdc.gov/nceh/lead/docs/how-to-prevent-lead-poisoning-in-children.html

19. National Institutes of Health, Office of Dietary Supplements. Calcium: Fact Sheet for Health Professionals. Available at: Calcium - Health Professional Fact Sheet (nih.gov)

20. National Institutes of Health, Office of Dietary Supplements. Iron: Fact Sheet for Health Professionals. Available at: Iron - Health Professional Fact Sheet (nih.gov)

301 Hyperemesis Gravidarum

Definition/Cut-off Value

Hyperemesis Gravidarum (HG) is defined as severe and persistent nausea and vomiting during pregnancy which may cause more than 5% weight loss and fluid and electrolyte imbalances (1). This nutrition risk is based on a chronic condition, not single episodes. HG is a clinical diagnosis, made after other causes of nausea and vomiting have been excluded.

Presence of condition diagnosed, documented, or reported by a physician or someone working under a physician's orders, or as self-reported by applicant/participant/caregiver. See Clarification for more information about self-reporting a diagnosis.

Participant Category and Priority Level

Category	Priority
Pregnant Women	I

Justification

Nausea and vomiting are common early in gestation; 50-80% or more of pregnant women experience some vomiting. However, pregnant women diagnosed with HG are at risk of weight loss, dehydration, ketonuria, and electrolyte imbalances such as hypokalemia. HG affects approximately 0.3-3.0% of pregnancies and may lead to adverse fetal consequences and hospitalization in some cases. HG is the second most common reason for hospitalization for pregnant women, with preterm labor being the most common (2).

Risk Factors for HG

Biological, physiological, psychological and sociocultural factors are thought to be influential in HG (3). The various risk factors for HG include maternal underweight, multiple pregnancy, nulliparity, previous history of HG and trophoblastic disorders (see clarification). A history of eating disorders, such as anorexia nervosa or bulimia, is also a risk factor associated with HG (4, 5). Helicobacter pylori infection may be a contributing factor for HG (6). Studies indicate that offspring or siblings of women with HG, and/or women pregnant with a female fetus, have increased chances of having HG. A history of motion sickness and/or migraine headaches are also risk factors for HG (7).

Various hormones such as estrogen, progesterone, adrenocorticotropic hormone, cortisol, growth hormone, prolactin and human chorionic gonadotropin (HcG) play an influential role in HG. Increased levels of HcG, which may occur in molar (see clarification) or multi fetal pregnancies may be associated with HG. Studies indicate that HG increases when HcG level reaches its peak at 9 weeks of gestation (8). It should be noted that thyroid function is affected in pregnancy. For pregnant women with hyperthyroidism, decreased levels of thyroid stimulating hormone may be implicated for HG (9, 10).

HG and Adverse Maternal Outcomes

HG can adversely affect maternal outcomes and, if inadequately managed, can lead to malnutrition, dehydration, electrolyte imbalances, thrombosis, and Wernicke's encephalopathy (a very rare but potentially life-threatening complication of HG, caused by thiamine deficiency) (11). Vitamin K deficiency has also been reported with HG and may be implicated in neonatal hemorrhage (12). Other serious

complications include esophageal rupture (caused by severe vomiting), peripheral neuropathy, coagulopathy and Mallory-Weiss syndrome (acute increase in esophageal pressure due to vomiting) (8).

Studies indicate that pregnant women with HG in the second trimester are also at an increased risk for placental disorders, such as placental abruption (13). Pregnant women with HG are at an increased risk for any autoimmune disorder, and in extreme cases this may lead to organ damage manifesting as oliguria and abnormal liver function tests (14). In addition, pregnant women with HG are at increased risk for psychological distress therefore leading to an increased risk for depression and anxiety (15). Other concerns associated with HG include severe distress, social dysfunction and loss of time from work (16, 17).

Malnourishment may develop over a period of time in women suffering with HG, which may lead to refeeding syndrome (RFS). RFS includes severe metabolic abnormalities and electrolyte disturbances due to the change from catabolic to anabolic metabolism that occurs when refeeding (orally, parentally, or enterally) occurs too quickly after severe malnourishment. RFS requires multidisciplinary nutrition team management as it is a life-threatening condition (18).

HG and Adverse Birth Outcomes

Systematic review and meta-analysis indicate that HG is frequently associated with adverse birth outcomes (19). Women with HG have an increased risk of giving birth to low birth weight, small for gestational age, and premature infants (20). Infants born to mothers suffering from HG have increased risk of colic, irritability, and growth restrictions (21). There is a scarcity of data examining the long-term effect on fetuses exposed to HG in utero. However, some studies indicate that there is an increased risk of psychological disorders and reduced insulin sensitivity for infants born to women with HG (22, 23)

Implications for WIC Nutrition Services

WIC nutrition staff can provide the following nutrition services to women with HG:

- Refer to a health care provider for appropriate monitoring and treatments as necessary.
- Provide education on how to recognize symptoms of dehydration such as: Increased thirst, dry mouth, low urine output or urine that is darker in color than normal.
- Offer suggestions to help with nausea such as:
    - Avoid foods and smells that seem to trigger nausea (e.g., fried or greasy foods, spicy foods, foods of a certain texture).
    - Eat crackers or dry cereal before getting out of bed to curb nausea in the morning.
    - Avoid large fluid intakes in the morning. Drink liquids between meals instead of with meals.
    - Choose foods carefully. Select foods that are high in carbohydrates or protein, low in fat, and easy to digest. Salty foods are sometimes helpful, as are foods that contain ginger — such as ginger lollipops. Avoid greasy, spicy and fatty foods.Consume foods that settle the stomach and calm the nausea. (24)
    - Eat several small meals throughout the day instead of three large meals. Meals should contain more carbohydrate than fat and acid. Protein-rich meals also decrease symptoms. Lighter snacks, including nuts, dairy products, and beans, are recommended. (25)

- Take prenatal supplement at night or before bedtime.

- Review weight gain goal and weight gain pattern. If weight loss is a problem, discuss nutrient and calorie-dense food choices and refer to the health care provider.
- Encourage women to take prenatal vitamins if considering becoming pregnant again. Studies indicate that taking prenatal vitamins a month before conception may help alleviate the symptoms of HG during pregnancy (26).

Clarification

Self-reporting of a diagnosis by a health care provider should not be confused with self-diagnosis, where a person simply claims to have or to have had a medical condition without any reference to professional diagnosis. A self-reported medical diagnosis ("My doctor says that I have/my son or daughter has…") should prompt the CPA to validate the presence of the condition by asking more pointed questions related to that diagnosis.

Gestational Trophoblastic Disease (GTD) may be defined as a condition in which a tumor develops in the uterus that would normally develop as a placenta. Molar pregnancy or a hydatidiform mole may be classified as a form of noninvasive tumor under GTD. A molar pregnancy results from an abnormal fertilization of the egg lacking in maternal tissues. It should be noted that although the tumor is considered benign they have potential to become malignant. The symptoms include vaginal bleeding, hyperemesis, preeclampsia, and hyperthyroidism. (27)

References

1. Miller F. Nausea and vomiting in pregnancy: the problem of perception--is it really a disease? American Journal of Obstetrics and Gynecology and Suppl. 2002:186(5):S182–S183.
2. Schiff MA, Reed SD, Daling JR. The sex ratio of pregnancies complicated by hospitalisation for hyperemesis gravidarum. BJOG: An International Journal of Obstetrics & Gynaecology. 2004 Jan 1;111(1):27-30.
3. Simpson SW, Goodwin TM, Robins SB, Rizzo AA, Howes RA, Buckwalter DK, Buckwalter JG. Psychological factors and hyperemesis gravidarum. Journal of Women's Health & Gender-based Medicine. 2001 Jun 1;10(5):471-7.
4. Poursharif B, Korst LM, Fejzo MS, MacGibbon KW, Romero R, Goodwin TM. The psychosocial burden of hyperemesis gravidarum. Journal of Perinatology. 2008 Mar 1;28(3):176-81.
5. Lee NM, Saha S. Nausea and vomiting of pregnancy. Gastroenterology clinics of North America. 2011 Jun 30;40(2):309-34.
6. Golberg D, Szilagyi A, Graves L. Hyperemesis gravidarum and Helicobacter pylori infection: a systematic review. Obstetrics & Gynecology. 2007 Sep 1;110(3):695-703.
7. Basso O, Olsen J. Sex ratio and twinning in women with hyperemesis or pre-eclampsia. Epidemiology. 2001 Nov and 12(6):747-9.
8. Sheehan P. Hyperemesis gravidarum: assessment and management. Australian Family Physician. 2007 Sep 1;36(9):698.
9. Chan NN. Thyroid function in hyperemesis gravidarum. The Lancet. 1999 Jun 26;353(9171):2243.

10. Blankenstein TJ, Kainer F, Friese K, Mylonas I. Extended hyperemesis gravidarum in a patient after total thyroidectomy. Archives of Gynecology and Obstetrics. 2009 Dec 1;280(6):1029.

11. Dodds L, Fell DB, Joseph KS, Allen VM, Butler B. Outcomes of pregnancies complicated by hyperemesis gravidarum. Obstetrics & Gynecology. 2006 Feb 1;107(2, Part 1):285-92.

12. Toriello HV, Erick M, Alessandri JL, Bailey D, Brunetti-Pierri N, Cox H,Maternal vitamin K deficient embryopathy: association with hyperemesis gravidarum and Crohn disease. American Journal of Medical GGenetics Part A. 2013 Mar 1;161(3):417-29.

13. Bolin M, Åkerud H, Cnattingius S, Stephansson O, Wikström AK. Hyperemesis gravidarum and risks of placental dysfunction disorders: a population-based cohort study. BJOG: An International Journal of Obstetrics & Gynaecology. 2013 Apr 1;120(5):541-7.

14. Ahmed KT, Almashhrawi AA, Rahman RN, Hammoud GM, Ibdah JA. Liver diseases in pregnancy: diseases unique to pregnancy. World Journal of Gastroenterology: WJG. 2013 Nov 21;19(43):7639.

15. McCarthy FP, Khashan AS, North RA, Moss-Morris R, Baker PN, Dekker G, Poston L, Kenny LC, SCOPE consortium. A prospective cohort study investigating associations between hyperemesis gravidarum and cognitive, behavioural and emotional well-being in pregnancy. PloS one. 2011 Nov 18 and 6(11):e27678.

16. Piwko C, Ungar WJ, Einarson TR, Wolpin J, Koren G. The weekly cost of nausea and vomiting of pregnancy for women calling the Toronto Motherisk Program. Current Medical Research and Opinion. 2007 Apr 1;23(4):833-40.

17. Piwko C, Koren G, Babashov V, Vicente C, Einarson TR. Economic burden of nausea and vomiting of pregnancy in the USA. J Popul Ther Clin Pharmacol. 2013;20(2):e149-60.

18. Stokke G, Gjelsvik BL, Flaatten KT, Birkeland E, Flaatten H, Trovik J. Hyperemesis gravidarum, nutritional treatment by nasogastric tube feeding: a 10-year retrospective cohort study. Acta Obstetricia et Gynecologica Scandinavica. 2015 Apr 1;94(4):359-67.

19. London V, Grube S, Sherer DM, Abulafia O. Hyperemesis Gravidarum: A Review of Recent Literature. Pharmacology. 2017;100(3-4):161-71.

20. Veenendaal MV, van Abeelen AF, Painter RC, van der Post JA, Roseboom TJ. Consequences of hyperemesis gravidarum for offspring: a systematic review and meta-analysis. BJOG: An International Journal of Obstetrics & Gynaecology. 2011 Oct 1;118(11):1302-13.

21. Mullin PM, Ching C, Schoenberg F, MacGibbon K, Romero R, Goodwin TM, Fejzo MS. Risk factors, treatments, and outcomes associated with prolonged hyperemesis gravidarum. The Journal of Maternal-Fetal & Neonatal Medicine. 2012 Jun 1;25(6):632-6.

22. Mullin PM, Bray A, Schoenberg F, MacGibbon KW, Romero R, Goodwin TM. Prenatal exposure to hyperemesis gravidarum linked to increased risk of psychological and behavioral disorders in adulthood. Journal of Developmental Origins of Health and Disease. Aug, 2011 and 2(4):200-4.

23. Ayyavoo A, Derraik JG, Hofman PL, Biggs J, Bloomfield FH, Cormack BE, Stone P, Cutfield WS. Severe hyperemesis gravidarum is associated with reduced insulin sensitivity in the offspring in childhood. The Journal of Clinical Endocrinology & Metabolism. 2013 Aug and 98(8):3263-8.

24. Mayo Clinic [Internet]. Minneapolis: Patient Care and Health Information; [Sep 2014: cited 2018 May 1] Morning Sickness. Available from: https://www.mayoclinic.org/diseases-conditions/morning-sickness/diagnosis-treatment/drc-20375260.

25. Wegrzyniak LJ, Repke JT, Ural SH. Treatment of hyperemesis gravidarum. Rev Obstet Gynecol. 2012;5(2):78-84. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3410506/.

26. Committee on Practice Bulletins-Obstetrics. ACOG Practice Bulletin No.189.Nausea and Vomiting of Pregnancy. Obstet Gynecol. 2018 Jan 1;131(1):15-30.

27. Garner EI, Goldstein DP, Feltmate CM, Berkowitz RS. Gestational trophoblastic disease. Clin Obstet Gynecol. 2007 Mar;50(1):112-22.

302 Gestational Diabetes

Definition/Cut-off Value

Gestational diabetes mellitus (GDM) is defined as any degree of glucose/carbohydrate intolerance with onset or first recognition during pregnancy (1, 2).

Presence of condition diagnosed, documented, or reported by a physician or someone working under a physician's orders, or as self reported by applicant/participant/caregiver. See Clarification for more information about self-reporting a diagnosis.

Participant Category and Priority Level

Category	Priority
Pregnant Women	I

Justification

The definition of GDM applies regardless of whether insulin or only diet modification is used for treatment, or whether the condition persists after pregnancy. Included in this classification are women who may have had undiagnosed diabetes prior to pregnancy but who are first diagnosed during pregnancy (1, 2). Pregnant women requiring the use of exogenous steroids, tocolytics, or other medications, or who have medical conditions that alter glucose tolerance, may develop GDM (2). GDM represents nearly 90% of all pregnancies complicated by diabetes (1). The criteria for the diagnosis of GDM (3) are shown in Table 1 (see Clarification).

Pregnancy is an insulin-resistant and diabetogenic state (2). Deterioration of glucose tolerance occurs normally during pregnancy, particularly in the 3rd trimester (1, 2). Untreated or poorly treated GDM results in a higher risk of morbidity and mortality for both the mother and the fetus (2).

Established risk factors for GDM are advanced maternal age, obesity, and family history of diabetes (4). Risk assessment for GDM should be undertaken at the first prenatal visit. Women with clinical characteristics consistent with a high risk for GDM (e.g., those with marked obesity, personal history of GDM or delivery of a previous large-for-gestation-age infant, glycosuria, polycystic ovary syndrome, or a strong family history of diabetes) should undergo glucose testing as soon as possible (5). Unquestionably, there are also ethnic differences in the prevalence of GDM. In the U.S., Native Americans, Asians, Hispanics, and African American women are at a higher risk for GDM than non-Hispanic White women. Besides obesity, there is a suggestion that physical inactivity, diets high in saturated fat and smoking are associated with increasing risk for GDM or recurrent GDM (4).

Infants of women with GDM are at an increased risk of developing obesity, impaired glucose tolerance or diabetes as children or young adults (4). GDM is associated with a higher incidence of maternal and fetal complications. Maternal complications include polycythemia, respiratory distress syndrome, and increased rate of stillbirth (6). Although rarely seen in GDM, congenital anomalies, neural tube defects, cardiac abnormalities and/or caudal regression may occur if a woman has GDM in the early first trimester (6, 7).

Since GDM is a risk factor for subsequent type 2 diabetes after delivery, lifestyle modifications aimed at reducing weight and increasing physical activity are recommended (8). The National Diabetes Education

Program (NDEP) is currently promoting a GDM Prevention Initiative, targeting both providers and women with a GDM history (9). Key messages are illustrated in Table 2 (see Clarification).

Medical Nutrition Therapy (MNT) is the primary treatment for the management of GDM (7). MNT for GDM primarily involves a carbohydrate-controlled meal plan that promotes optimal nutrition for maternal and fetal health with adequate energy for appropriate gestational weight gain, achievement and maintenance of normoglycemia, and absence of ketosis (7, 8). Breastfeeding should be strongly encouraged as it is associated with maternal weight loss and reduced insulin resistance for both mother and offspring (10). WIC nutrition services can reinforce and support the medical and diet therapies (such as MNT) that participants with GDM receive from their health care providers.

References

1. American Diabetes Association: Diagnosis and classification of diabetes mellitus. Diabetes Care. Jan 2008; 31 Suppl 1:S55-60.
2. Franz MJ, Biastre SA, Slocum J. Diabetes in the life cycle and research. In: Gestational Diabetes – A core curriculum for diabetes education, American Association of Diabetes Educators. 5th Ed. 2003.
3. American Diabetes Association. Gestational diabetes mellitus (position statement). Diabetes Care. 2003; 26 Suppl. 1:S103-105.
4. Ferrara, A. Increasing prevalence of gestational diabetes mellitus: a public health perspective. Proceedings of the fifth international workshop – conference on Gestational Diabetes Mellitus. Diabetes Care. Jul 2007; 30 Suppl. 2:S141-46.
5. American Diabetes Association. Standards of medical care in diabetes (position statement). Diabetes Care. Jan 2007; 30 Suppl. 2:S4-41.
6. Thomas AM, Gutierrez YM. American Dietetic Association guide to gestational diabetes mellitus in postpartum considerations. Eds. American Dietetic Association; 2005:101-113.
7. Brian SR, Nickless N, Thung SF, Inzucchio SE. Gestational diabetes update: screening, medical management and follow-up. Practical Diabetology. Mar 2007; 10-18.
8. American Diabetes Association. Diagnosis and classification of diabetes mellitus. Diabetes Care. 2008 Jan; 31 Suppl. 1:S55-60.
9. Ratner, RE. Prevention of type 2 diabetes in women with previous gestational diabetes. Proceedings of the fifth international workshop – conference on gestational diabetes mellitus. Diabetes Care. Jul 2007; 30 Suppl. 2:S242-245.
10. Evert AG, Vande Hei K. Gestational diabetes education and diabetes prevention strategies. Diabetes Spectrum. 2006; 19(3):135-139.

Clarification

Self-reporting of a diagnosis by a medical professional should not be confused with self-diagnosis, where a person simply claims to have or to have had a medical condition without any reference to professional diagnosis. A self-reported medical diagnosis ("My doctor says that I have/my son or daughter has…") should prompt the CPA to validate the presence of the condition by asking more pointed questions related to that diagnosis.

Women at high risk for GDM who have tested negative at the initial screening, and women at average risk for GDM should be tested by a licensed medical provider, between 24 and 28 weeks of gestation. Women of average risk should be tested at 24-28 weeks of gestation. Testing should follow one of two approaches:

1. One-step approach: perform a diagnostic 100-g OGTT (Oral Glucose Tolerance Test).
2. Two-step approach:
    - A screening test (glucose challenge test) that measures plasma or serum glucose is done 1 hour after a 50-g oral glucose load without regard for time of day or time of last meal. If a plasma or serum glucose level meets or exceeds the threshold (≥ 130 mg/dl [7.2 mmol/L] or ≥ 140 mg/dl [7.8 mmol/L], respectively), an OGTT is performed (3).
    - A diagnosis of GDM is made with a 100-g oral glucose load after an overnight fast. Using a 3-hour test, if two or more plasma or serum glucose levels meet or exceed the threshold, a diagnosis of GDM is made. Alternatively, the diagnosis can be made using a 75-g oral glucose load. The glucose threshold values for both tests are listed in Table 1 (10). The 75-g glucose load test is not as well validated as the 100-g OGTT.

With either the 75-g OGTT or the 100-g OGTT, it is recommended that the test be performed after an overnight fast of at least 8 hours but no longer than 14 hours. For 3 days prior to the test the woman should consume an unrestricted diet (≥ 150 g carbohydrate per day) and maintain unrestricted physical activity. Women need to remain seated and not smoke during the test. (1, 2).

Table 1. Diagnosis of Gestational Diabetes Mellitus with a 100-g or 75-g Oral Glucose Load

Time (h)	100-g Oral Glucose Load	75-g Oral Glucose Load
Fasting	95 mg/dL (5.3 mmol/L)	95 mg/dL (5.3 mmol/L)
1	180 mg/dL (10.0 mmol/L)	180 mg/dL (10.0 mmol/L)
2	155 mg/dL (8.6 mmol/L)	155 mg/dL (8.6 mmol/L)
3	140 mg/dL (7.8 mmol/L)	
Two or more of the venous plasma concentrations must be met or exceeded for a positive diagnosis. Source: American Diabetes Association (3).		

Table 2. Gestational Diabetes Mellitus (GDM) Prevention Initiative from the National Diabetes Education Program

- GDM imparts lifelong risk for diabetes, mostly type 2.
- Modest weight loss and physical activity can delay or prevent type 2 diabetes.
- Offspring can lower risk of diabetes by eating healthy foods, being active, and not becoming overweight.

Conservative recommendations to patients include:

- Let health care practitioners know of any history of GDM.

- Get glucose testing at 6 to 12 weeks postpartum, then every 1-2 years.
- Reach pre-pregnancy weight 6 to 12 months postpartum.
- If still overweight, lose at least 5 to 7% of weight slowly, over time, and keep it off.

Adapted from the National Diabetes Education Program (9).

303 History of Gestational Diabetes

Definition/Cut-off Value

History of diagnosed gestational diabetes mellitus (GDM).

Presence of condition diagnosed, documented, or reported by a physician or someone working under a physician's orders, or as self reported by applicant/participant/caregiver. See Clarification for more information about self-reporting a diagnosis.

Participant Category and Priority Level

Category	Priority
Pregnant Women	I
Breastfeeding Women	I
Non-Breastfeeding Women	III, IV, V or VI

Justification

Women who have had a pregnancy complicated by GDM are 40-60% more likely to develop diabetes within 15-20 years (1), usually type 2 (2). This risk of subsequent diabetes is greatest in women with GDM who are diagnosed early in the pregnancy, exhibit the highest rates of hyperglycemia during the pregnancy, and are obese.

Approximately 30-50% of the women with a history of GDM will develop GDM in a subsequent pregnancy. Studies have found that the risk factors for subsequent GDM include insulin use in the index pregnancy, obesity, diet composition*, physical inactivity, failure to maintain a healthy BMI and weight gain between pregnancies (2, 3). In addition, if a woman's lipid levels are elevated, a history of GDM is also a risk factor for cardiovascular disorders (3).

There is evidence to suggest that some women with a history of GDM show relative beta-cell dysfunction during and after pregnancy (3). Most women with a history of GDM are insulin resistant. Changes in lifestyle (dietary and physical activity) may improve postpartum insulin sensitivity and could possibly preserve B-cell function to slow the progression to type 2 diabetes (2, 3).

During WIC nutrition education and counseling, obese women with a history of GDM should be encouraged to lose weight before a subsequent pregnancy. Breastfeeding has been shown to lower the blood glucose level and to decrease the incidence of type 2 diabetes in women with a history of GDM (2, 3). Exercise also has a beneficial effect on insulin action by enhancing peripheral tissue glucose uptake (3). Medical Nutrition Therapy (MNT) is an essential component in the care of women with a history of GDM.

Women with a history of GDM but without immediate subsequent postpartum diagnosis of diabetes should be advised to discuss with their medical provider the importance of having a Glucose Tolerance Testing (GTT) at 6 to 12 weeks postpartum (see Clarification, Table 1); to have a pre-pregnancy consultation before the next pregnancy, and to request early glucose screening in the next pregnancy (4). The National Diabetes Education Program (NDEP) is currently promoting a GDM Diabetes Prevention Initiative, targeting

both providers and women with a history of GDM (5). Key messages are illustrated in Table 2 (see Clarification).

WIC nutrition services can support and reinforce the MNT and physical activity recommendations that participants receive from the health care providers. In addition, WIC nutritionists can play an important role in providing women with counseling to help manage their weight after delivery. Also, children of women with a history of GDM should be encouraged to establish and maintain healthy dietary and lifestyle behaviors to avoid excess weight gain and reduce their risk for type 2 diabetes (1).

Diet Composition

Carbohydrate is the main nutrient that affects postprandial glucose elevations. During pregnancy complicated with GDM, carbohydrate intake can be manipulated by controlling the total amount of carbohydrate, the distribution of carbohydrate over several meals and snacks, and the type of carbohydrate. These modifications need not affect the total caloric intake level/prescription (6).

Because there is wide inter-individual variability in the glycemic index each woman needs to determine, with the guidance of the dietitian, which foods to avoid or use in smaller portions at all meals or during specific times of the day, for the duration of her pregnancy. Practice guidelines have avoided labeling foods as "good" or "bad" (6).

Meal plans should be culturally appropriate and individualized to take into account the patient's body habitus, weight gain and physical activity; and should be modified as needed throughout pregnancy to achieve treatment goals (6).

References

1. Evert AG, Vande Hei K. Gestational diabetes education and diabetes prevention strategies. Diabetes Spectrum. 2006; 19 (3):135-139.
2. Franz MJ, Biastre SA, Slocum J. Diabetes in the life cycle and research. In: Gestational diabetes - A core curriculum for diabetes education, American Association of Diabetes Educators. 5th ed. 2003; 145-163.
3. Thomas AM, Gutierrez YM. American Dietetic Association guide to gestational diabetes mellitus in postpartum considerations. Eds. American Dietetic Association. 2005; 101-113.
4. Kitzmiller JL, Dang-Kilduff L, Taslimi MM. Gestational diabetes after delivery: short-term management and long-term risks. Proceedings of the fifth international workshop — conference on Gestational Diabetes Mellitus. Diabetes Care. Jul 2007; 30 Suppl. 2:S225-231.
5. Ratner RE. Prevention of type 2 diabetes in women with previous gestational diabetes. Proceedings of the fifth international workshop — conference on Gestational Diabetes Mellitus. Diabetes Care. Jul 2007; 30 Suppl. 2:S242-245.
6. Reader DM. Medical nutrition therapy and lifestyle interventions. Proceedings of the fifth international workshop — conference on Gestational Diabetes Mellitus. Diabetes Care. Jul 2007; 30 Suppl. 2:S188-193.

Clarification

Self-reporting of "History of …" conditions should be treated in the same manner as self-reporting of current conditions requiring a physician's diagnosis, i.e., the applicant may report to the CPA that s/he was diagnosed by a physician with a given condition at some point in the past. As with current conditions, self-diagnosis of a past condition should never be confused with self-reporting.

Table 1. Reasons for Delayed Postpartum Glucose Testing of Women with Prior Gestational Diabetes Mellitus (GDM)

1. The substantial prevalence of glucose abnormalities detected by 3 months postpartum.
2. Abnormal test results identify women at high risk of developing diabetes over the next 5 to 10 years.
3. Ample clinical trial evidence in women with glucose intolerance that type 2 diabetes can be delayed or prevented by lifestyle interventions or modest and perhaps intermittent drug therapy.
4. Women with prior GDM and impaired glucose tolerance (IGT) have cardiovascular disease (CVD) risk factors. Interventions may reduce subsequent CVD, which is the leading cause of death in both types of diabetes.
5. Identification, treatment, and planning of pregnancy in women developing diabetes after GDM should reduce subsequent early fetal loss and major congenital malformations.

Kitzmiller JL, Dang-Kilduff L, Taslimi MM

Table 2. Gestational Diabetes Mellitus (GDM) Prevention Initiative from the National Diabetes Education Program

- GDM imparts lifelong risk for diabetes, mostly type 2.
- Modest weight loss and physical activity can delay or prevent type 2 diabetes.
- Offspring can lower risk by eating healthy foods, being active, and not becoming overweight.

Conservative recommendations to patients include:

- Let health care practitioners know of any history of GDM.
- Get glucose testing at 6 to 12 weeks postpartum, then every 1-2 years.
- Reach prepregnancy weight 6 to 12 months postpartum.
- If still overweight, lose at least 5 to 7% of weight slowly, over time, and keep it off.

Adapted from the National Diabetes Education Program.

304 History of Preeclampsia

Definition/Cut-off Value

History of diagnosed preeclampsia.

Presence of condition diagnosed, documented, or reported by a physician or someone working under a physician's orders, or as self-reported by applicant/participant/caregiver. See Clarification for more information about self-reporting a diagnosis.

Participant Category and Priority Level

Category	Priority
Pregnant Women	I
Breastfeeding Women	I
Non-Breastfeeding Women	III, IV, V or VI

Justification

Please see risk #345 *Hypertension and Prehypertension*, for a thorough overview of preeclampsia, including incidence, risk factors, signs and symptoms, prevention, and treatment.

Preeclampsia is defined as hypertension with onset during pregnancy, usually after 20 weeks gestation, and typically with proteinuria (high levels of protein found in urine). For some women, proteinuria does not occur; for these women, preeclampsia is diagnosed as hypertension with thrombocytopenia (low platelet count), impaired liver function, renal insufficiency (poor kidney function), pulmonary edema (excess fluid in the lungs), and/or cerebral or visual disturbances (brain and vision problems) (1). The most common type of hypertensive disorder during pregnancy, preeclampsia occurs in 3.4% of pregnancies in the United States and is associated with one maternal death per 100,000 live births in developed countries (1, 2). Worldwide, it leads to the death of over 60,000 women annually (3).

It is important to note that *postpartum* preeclampsia can also occur, regardless of whether it was present during pregnancy. It is usually diagnosed within 48 hours of delivery but can occur up to 6 weeks postpartum. Thus, women during this period should monitor for preeclampsia symptoms and contact their healthcare provider immediately if they occur. (1, 4)

Women with a history of preeclampsia are at greater risk for future hypertension (HTN), heart attack, stroke, congestive heart failure, metabolic disease, and postpartum depression; these risks increase with repeated incidence of preeclampsia and with preterm delivery (1, 2, 5, 6). Because women with a history of preeclampsia are at increased risk for HTN and related conditions, implementing lifestyle changes after delivery to help prevent HTN is crucial. Lifestyle measures to reduce the risk of HTN for women who are not pregnant include the following:

- Have blood pressure checked at least yearly or as recommended by one's healthcare provider. For those at risk of HTN, regularly monitoring blood pressure is crucial. Blood pressure levels greater than 180/120 mmHg are extremely dangerous and require immediate medical attention (7).

- Consume a diet consistent with the Dietary Guidelines for Americans or follow the Dietary Approaches to Stop Hypertension (DASH) eating plan. Details regarding the DASH eating plan can be found on the National Heart, Lung, and Blood Institute's website: www.nhlbi.nih.gov/health-topics/dash-eating-plan.
- Engage in regular physical activity.
- Achieve and maintain a healthy weight.
- Limit alcohol and avoid any use of tobacco, marijuana or illegal substances. (See risk #371 *Maternal Smoking* and risk #372 *Alcohol and Substance Use*.)

Currently, there is inconclusive scientific evidence on preventative measures for preeclampsia in future pregnancies. However, when dietary calcium is inadequate, research indicates adequate dietary calcium or supplementation (1.5-2 grams/day) may help prevent preeclampsia (1, 2, 3, 8). Dietary folate and folic acid supplementation during pregnancy has also been associated with lower risk of preeclampsia (6, 9).

Breastfeeding

Women who had preeclampsia face a greater risk of HTN later in life; however, longer breastfeeding duration has been found to reduce this risk. (10, 11). Unfortunately, women who had preeclampsia during pregnancy are more likely to not initiate breastfeeding or to stop breastfeeding earlier than women with normal blood pressure (10, 12). Some potential causes for this include greater incidence of preterm birth, low birth weight, caesarean delivery, exposure to medications not compatible with breastfeeding, and mother/infant separation (12).

Women with history of preeclampsia should be encouraged to breastfeed, unless contraindicated. If postpartum women require antihypertensive medications, medications should be chosen that are compatible with breastfeeding, if possible. It is thus very important for the mother to discuss her breastfeeding status and goals with her healthcare provider to determine the best infant feeding and medication plan.

Implications for WIC Nutrition Services

The WIC Program provides support to participants with a history of preeclampsia by offering nutritious food that are important components of a diet to help prevent HTN. WIC nutrition staff also offer nutrition education, counseling, and referrals. In addition, WIC staff can assist participants by:

Pregnant Women with History of Preeclampsia:

- Encouraging prenatal care as soon as possible and to attend all health care appointments.
- Providing information about the symptoms of preeclampsia (sudden weight gain, swelling of face or hands, upper abdominal pain, difficulty breathing, changes in vision (including seeing spots), severe headache, nausea, and/or vomiting) and of the importance of contacting their healthcare provider immediately if they occur. Also, inform them that preeclampsia can occur postpartum.
- Counseling them on healthy weight gain, prenatal vitamin use, and a nutritious diet, including adequate calcium intake. For women with low calcium intake, refer them to their healthcare provider to discuss whether a calcium supplement is appropriate. Please note that a low-sodium diet and/or weight loss is not recommended as treatment for HTN *during* pregnancy.
- Encouraging them to discuss individualized physical activity recommendations with their healthcare provider.

- Providing information on avoiding any use of alcohol, tobacco, marijuana or illegal substances, as well as offering substance use referrals. The WIC Substance Use Prevention Manual is available for additional guidance and referral resources (https://wicworks.fns.usda.gov/resources/wic-substance-use-prevention-guide).
- Referring to local home visiting programs for health monitoring and support, if available.

Postpartum Women with History of Preeclampsia:

- Informing them of the symptoms of postpartum preeclampsia and of the importance of contacting their healthcare provider immediately if they occur.
- Providing breastfeeding promotion and support, unless contraindicated. Encourage women to discuss their breastfeeding status and goals with their healthcare provider, especially if medications are prescribed.
- Encouraging them to attend all health care appointments, including their 4-6 week postpartum visit; to develop a plan for future pregnancies; to discuss health conditions and medication needs with their healthcare provider; and to have their BMI, blood pressure, lipids, and fasting glucose assessed yearly (3).
- Counseling them on achieving and maintaining a healthy weight, physical activity, following a diet consistent with the Dietary Guidelines for Americans or the DASH diet.
- Informing them that history of preeclampsia increases their risk of future HTN, cardiovascular disease, and stroke.
- Providing information on avoiding any use of alcohol, tobacco, marijuana or illegal substances, as well as offering substance use referrals. The WIC Substance Use Prevention Manual is available for additional guidance and referral resources (https://wicworks.fns.usda.gov/resources/wic-substance-use-prevention-guide).
- Referring them to their provider to discuss whether a calcium or folic acid supplement is appropriate, if intake of these nutrients seems inadequate.
- Referring to local home visiting programs, if available, for health monitoring and support.

References

1. American College of Obstetricians and Gynecologists [Internet]. Washington (DC): American College of Obstetricians and Gynecologists; c2013. Hypertension in pregnancy. 2013 [cited 2018 July]; [100 pages]. Available from: www.acog.org/~/media/Task%20Force%20and%20Work%20Group%20Reports/public/HypertensionPregnancy.pdf.
2. Khaing W, Vallibhakara SA, Tantrakul V, et al. Calcium and vitamin D supplementation for prevention of preeclampsia: a systematic review and network meta-analysis. Nutrients. 2017 Oct [cited 2019 Mar 5];9(10):1141. Available from: https://www.mdpi.com/2072-6643/9/10/1141.
3. Duhig K, Vandermolen B, Shennan A. Recent advances in the diagnosis and management of pre-eclampsia [version 1; referees: 2 approved]. F1000 Faculty Review. 2018 Aug 15 [cited 2019 Mar 5];7(F1000 Faculty Rev)242. Available from: https://doi.org/10.12688/f1000research.12249.1.

4. Centers for Disease Control and Prevention [Internet]. Atlanta (GA): Centers for Disease Control and Prevention, 2018. High blood pressure during pregnancy fact sheet. 2018 May 16 [cited 2018 July]. Available from: www.cdc.gov/bloodpressure/pregnancy.htm.

5. Mol BWJ, Roberts CT, Thangaratinam S, et al. Pre-eclampsia. The Lancet. 2015 Sept 2 [cited 2019 Mar 5];387(10022):999-1011. Available from: https://doi.org/10.1016/S0140-6736(15)00070-7.

6. Wen SW, Guo Y, Rodger M, et al. Folic acid supplementation in pregnancy and the risk of pre-eclampsia – a cohort study. PLoS ONE. 2016 Feb 22 [cited 2019 Mar 5];11(2): e0149818. Available from: https://doi.org/10.1371/journal.pone.0149818.

7. National Heart, Lung, and Blood Institute [Internet]. Bethesda (MD): National Institutes of Health. High blood pressure. [cited 2018 July]. Available from: www.nhlbi.nih.gov/health-topics/high-blood-pressure.

8. Lowensohn R, Stadler DD, Naze C. Current concepts of maternal nutrition. Obstetrical and Gynecological Survey. 2016 July [cited 2019 Mar 5];71(7):413-26. Available from: https://journals.lww.com/obgynsurvey/Fulltext/2016/07000/Current_Concepts_of_Maternal_Nutrition.18.aspx.

9. Wang Y, Zhao N, Qiu J, et al. Folic acid supplementation and dietary folate intake, and risk of preeclampsia. European Journal of Clinical Nutrition. 2015 Jan 28 [cited 2019 Mar 5];69:1145-50. Available from: https://www.nature.com/articles/ejcn2014295.

10. Demirci J, Schmella M, Glasser M, et al. Delayed lactogenesis II and potential utility of antenatal milk expression in women developing late-onset preeclampsia: a case series. BMC Pregnancy and Childbirth. 2018 Dec [cited 2019 Mar 5];18(1):68. Available from: https://doi.org/10.1186/s12884-018-1693-5.

11. Feltner C, Weber RP, Stuebe A, Grodensky CA, Orr C, Viswanathan M. Breastfeeding Programs and Policies, Breastfeeding Uptake, and Maternal Health Outcomes in Developed Countries. Comparative Effectiveness Review No. 210. (Prepared by the RTI International–University of North Carolina at Chapel Hill Evidence-based Practice Center under Contract No. 290-2015-00011-I.) AHRQ Publication No. 18-EHC014-EF. Rockville (MD): Agency for Healthcare Research and Quality. 2018 July [cited 2019 April 24]. Available from: https://effectivehealthcare.ahrq.gov/sites/default/files/pdf/cer-210-breastfeeding-report_1.pdf.

12. Cordero L, Valentine CJ, Samuels P, et al. Breastfeeding in women with severe preeclampsia. Breastfeeding Medicine. 2012 Dec 10 [cited 2019 Mar 5];7(6):457-63. Available from: https://doi.org/10.1089/bfm.2012.0019.

Clarification

Self-reporting of "History of …" conditions should be treated in the same manner as self-reporting of current conditions requiring a physician's diagnosis, i.e., the applicant may report to the CPA that s/he was diagnosed by a physician with a given condition at some point in the past. As with current conditions, self-diagnosis of a past condition should never be confused with self-reporting.

311 History of Preterm or Early Term Delivery

Definition/Cut-off Value

History of preterm and/or early term delivery is defined as follows (1, 2):

- Preterm: Delivery of an infant born ≤36 6/7 weeks.
- Early Term: Delivery of an infant born ≥37 0/7 and ≤38 6/7 weeks.

Category	Pregnancy
Pregnant Women	Any history of preterm or early term delivery
Breastfeeding/Non-Breastfeeding	Most recent pregnancy

Participant Category and Priority Level

Category	Priority
Pregnant Women	I
Breastfeeding Women	I
Non-Breastfeeding Women	III, IV, V or VI

Justification

Women with a history of preterm delivery have an increased risk of spontaneous preterm delivery in a subsequent pregnancy compared to women with no history of prior spontaneous preterm delivery (3). Prior spontaneous preterm delivery is highly associated with recurrence in subsequent pregnancies. A history of one previous preterm birth is associated with a recurrent risk of 17-37%; the risk increases with the number of prior preterm births and decreases with the number of term deliveries (4).

Typically a pregnancy lasts about 40 weeks. Premature or preterm birth, however, is defined as a birth that occurs between 20 and 37 weeks of pregnancy, according to the American College of Obstetricians and Gynecologists (ACOG) (5). In the past, the period from 3 weeks before until 2 weeks after the estimated date of delivery was considered a "term" pregnancy, with the expectation that a baby would have similar health outcomes if they were born any time during this interval. In 2013, ACOG released a committee opinion that the label "term" should be replaced with the designations *early term* (≥37 0/7 weeks and ≤38 6/7 weeks gestation) and *full term* (≥39 0/7 weeks and ≤40 6/7 weeks gestation) to more accurately describe these groups of infants (1).

Preterm Delivery

Prematurity affects about 12% of all live births in the U.S., and about 50% of these preterm births were preceded by preterm labor (6). In 2011, the annual rate of premature births in the United States reached

11.7%, nearly two times the rate in European nations (6). Preterm births also account for approximately 70% of newborn deaths and 36% of infant deaths (5).

Despite advances in neonatal care, preterm birth remains a leading cause of infant death in the United States (7). More infants die from pre-term related problems than any other single cause (6). Preterm birth strains society's healthcare resources due to its long-term effects on the health of the newborn (6). Premature infants may have physical problems that have nutritional implications, including immature sucking, swallowing and immature digestion and absorption of carbohydrates and lipids (7). Preterm infants are at risk for a number of illnesses/health conditions that range from minor to severe complications depending on the circumstances. (See risk 142 *Preterm or Early Term Delivery* for more details.)

Several factors have been found to increase the risk of preterm delivery. Epidemiologic studies have consistently reported low socioeconomic status, nonwhite race, maternal age of ≤ 18 years or ≥ 40 years, and low pre-pregnancy underweight as risk factors (4). Studies suggest even modest restrictions in maternal nutrition around the time of conception can lead to premature births and long-term adverse health effects for offspring (8). Other factors associated with a risk of preterm birth may be identified before pregnancy, at conception, or during pregnancy include (8, 9):

- Low maternal weight gain during pregnancy
- Maternal infections
- Maternal hypertension
- Gestational diabetes
- Smoking
- Indoor pollution
- Maternal stress
- Poor housing quality
- Teen pregnancy
- Sexually transmitted diseases
- Low psychosocial health status
- Previous or present pregnancy complications
- Multiple fetuses
- Lack of perceived social support

A recent study indicated that maternal obesity is also an independent risk factor for preterm delivery (10). Complications associated with obesity (BMI ≥ 30) prior to conception that increase the risk for preterm delivery include (11):

- Gestational Diabetes Mellitus
- Hypertension
- Preeclampsia
- Cesarean Delivery

- Postpartum weight retention

Additional concerns related to obesity include potential intrapartum, operative, and postoperative complications and difficulties related to anesthesia management. Obese women are also less likely to initiate and sustain breastfeeding (11).

Breastfeeding is recommended as the normative standard for infant feeding and nutrition for all infants, especially preterm babies. Breastfeeding preterm infants has been associated with positive health outcomes for these infants, including:

- Improved motor maturity and cognitive ability (12, 13, 14)
- Reduced risk of necrotizing enterocolitis (15, 16)
- Reduced risk of retinopathy of prematurity and retinal detachment (17)

Additionally, mothers of preterm infants produce milk that is designed to meet the baby's particular needs during the first few weeks of breastfeeding. It is higher in protein and minerals, such as salt, and contains different types of fat that the baby will be able to digest and absorb more easily compared to the milk of mothers of full term babies. The fat in human milk also helps to enhance the development of the baby's brain and neurologic tissues, which is especially important for premature infants. Human milk is also easier for babies to digest than formula and avoids exposing the baby's immature intestinal lining to the cow's milk proteins found in premature infant formula. Preterm infants who are breastfed are less likely to develop intestinal infections than babies who are formula fed, and the colostrum produced in the first few days contains high concentrations of antibodies that will also help the baby fight infection. (16)

Breastfeeding preterm infants, especially if they are in the NICU, may present unique challenges for breastfeeding dyads. These mothers will benefit from extra breastfeeding support due to the delay of direct breastfeeding, reliance on breast pumps, and the stress of having a sick newborn. Even if the baby cannot breastfeed directly from the breast at first, the mother can be encouraged to express her milk to ensure that her supply is maintained. Supportive care for infants in the NICU may include the use of a feeding tube. Expressed human milk can be passed through the tube, so it is important for the mother to discuss her feeding decisions with her baby's doctor.

Early Term

Up to 10% of babies in the United States are scheduled for early term deliveries via labor-inducing medication or cesarean section before 39 weeks of gestation despite neither the mother nor the baby being at risk if the pregnancy continues (18). Elective deliveries like this are sometimes requested for reasons such as wanting to schedule the date of the infant's birth, physician preference, or for relief of symptoms at the end of the pregnancy (18).

Research shows that a fetus will experience a significant amount of development and growth of the lungs, brain, and liver between 37 and 39 weeks of gestation. The brain develops at its fastest rate at the end of the pregnancy, at a rate of up to one third between weeks 35 and 39. Additionally, layers of fat are added under the infant's skin during the last few weeks of pregnancy which helps them keep warm after birth. According to ACOG, non-medically warranted deliveries prior to 39 weeks should be avoided (19). Early term delivery puts an additional strain on society as the early term infant will likely require a longer hospital stay and may have long term healthcare needs (18). Factors that can increase the risk of a woman delivering an early term infant are the same and are stated above for preterm birth.

When a woman delivers an early term infant or chooses an early elective delivery, she is at increased risk for postpartum depression, cesarean delivery, and other complications requiring longer hospital stays (18). Steps pregnant women can take in order to decrease the prevalence of pre-term births include (18):

- Seek regular prenatal care throughout pregnancy.
- Maintain a healthy diet, including daily prenatal vitamins.
- Cease consumption of alcohol, drugs, or other dangerous toxins during pregnancy.
- Avoid stress.
- Contact their health care provider with all questions or concerns.

Implications for WIC Nutrition Services

Pregnant women who come from low or inadequate income households are at a greater risk for poor physical and mental health due to poor eating habits. WIC services may assist women at risk of preterm and early term births by providing them with proper nutrition.

Early prevention is the primary way to stop preterm labors. WIC can assist in reducing preterm deliveries by increasing prevention strategies. WIC can improve outcomes through:

- Recommending healthy maternal weight gain and providing nutrition education that addresses the WIC food package and other healthy foods that contribute to a balanced diet.
- Promoting early and regular prenatal care.
- Encouraging use of prenatal vitamins, as prescribed by the health care provider.
- Recommending adherence to Dietary Guidelines for Americans.

WIC staff may find the below listed resources helpful in providing nutrition counseling**:**

- *Additional Considerations for Some Adults-Physical Activity for Women During Pregnancy and the Postpartum Period*: http://health.gov/paguidelines/guidelines/chapter7.aspx.
- *Women, Infants, and Children-About WIC, How WIC Helps*: http://www.fns.usda.gov/wic/about-wic-how-wic-helps.
- *WIC Works Resource Systems*: https://wicworks.fns.usda.gov/.

References

1. American College of Obstetricians and Gynecologists. Definition of term pregnancy. Committee Opinion No.579. Obstet Gynecol. 2013 Nov;122:1139-40.
2. Ob-Gyns redefine meaning of "term pregnancy" [Internet]. Washington, DC: American College of Obstetricians and Gynecologists; c2013 [updated 2013 Oct 22; cited 2016 Dec 6]. Available from: http://www.acog.org/About-ACOG/News-Room/News-Releases/2013/Ob-Gyns-Redefine-Meaning-of-Term-Pregnancy.
3. Mercer M, Moawad A, Meis P, Iams JD, Das A, Caritis SN. The preterm prediction study: effect of gestational age and cause of the perterm on subsequent obstetric outcome. Am J Obstet Gynecol. 1999 Nov;181:1219-21.
4. Hoffman HJ, Bakketeig LS. Risk factors associated with the occurrence of preterm birth. Clin Obstet Gynecol 1984; 27:539-52.

5. ACOG.org [Internet]. Washington, DC: The American College of Obstetricians and Gynecologists; c2016 [updated 2016 Nov; cited 2016 Dec 6]. Available from: http://www.acog.org/Patients/FAQs/Preterm-Premature-Labor-and-Birth.
6. Dag M, Lie TR, Markestad T. Long-term medical and social consequences of preterm birth. N Engl J Med. 2008 Jul 17. Web. 07 Apr. 2014.
7. Iams JD. Prevention of preterm parturition. N Engl J of Med. 2014;370(3):254-261.
8. Wang P, Liou S, Cheng C. Prediction of maternal quality of life on preterm birth and low birthweight: a longitudinal study. BMC Pregnancy and Childbirth [serial online]. June 2, 2013;13:124. Available from: MEDLINE, Ipswich, MA. Accessed April 28, 2014.
9. Ludwig JD, Miller M. Interpreting the WIC debate. J Pol anal Manage. 2005; 24(4): 691-701.
10. Cnattinqius S, Villamor E, Johansson S, Edstedt, Bonamy AK, Persson M, et al. Maternal obesity and risk of preterm delivery. JAMA 2013 Jun 12:309(22).
11. American College of Obstetricians and Gynecologists. Practice Bulletin. Obesity in pregnancy. Dec 2015.
12. Feldman R, Eidelman A. Direct and indirect effects of breast milk on the neurobehavioral and cognitive development of premature infants. Developmental Psychobiology. 2003 Sept;43(2):109-19.
13. Vohr B, Poindexter B, Dusick A, McKinley LT, Higgins RD, Langer JC, Poole KW. Persistent beneficial effects of breast milk ingested in the neonatal intensive care unit on outcomes of extremely low birth weight infants at 30 months of age. Pediatrics. 2007 Oct;120(4):e953-59.
14. Blaymore Bier J, Oliver T, Ferguson AE, Vohr B. Human Milk Improves Cognitive and Motor Development of premature infants during infancy. J Hum Lact. 2002 Nov;18(4)361-67.
15. Boyd CA, Quigley MA, Brocklehurst P. Donor breast milk versus infant formula for preterm infants: systematic review and meta-analysis. Arch Dis Child Fetal Neonatal Ed. 2007 May;92:F169-75.
16. Healthychildren.org [Internet]. Elk Grove Village: American Academy of Pediatrics; c2011 [updated 2015 Nov 21; cited 2016 Dec 6]. Available from: https://www.healthychildren.org/English/ages-stages/baby/breastfeeding/Pages/Providing-Breastmilk-for-Premature-and-Ill-Newborns.aspx.
17. Okamoto T, Shirai M, Kokubo M, Takahashi S, Kajino M, Takase M, Sakata H, Oki J. Human milk reduces the risk of retinal detachment in extremely low-birthweight infants. Pediatr Int. 2007 Oct;49(6):894-897.
18. National Institute for Health Care Management. Born too early-improving maternal and child health by reducing early elective deliveries. NIHCM Issue Brief, March 2014. [cited 2016 Dec 6]. Available from: http://www.nihcm.org/pdf/Early_Elective_Delivery_Prevention_Brief_2014.pdf.
19. Elective delivery before 39 weeks [Internet]. Washington, DC: American College of Obstetricians and Gynecologists; c2013 [updated 2013 June; cited 2016 Dec 6]. Available from: http://www.acog.org/Patients/FAQs/Elective-Delivery-Before-39-Weeks.

312 History of Low Birth Weight

Definition/Cut-off Value

History of low birth weight is defined as the birth of an infant weighing ≤ 5 lb. 8 oz. (≤ 2500 grams) for the following:

Category	Pregnancy
Pregnant Women	Any history of low birth weight
Breastfeeding/Non-Breastfeeding	Most recent pregnancy

Participant Category and Priority Level

Category	Priority
Pregnant Women	I
Breastfeeding Women	I
Non-Breastfeeding Women	III, IV, V or VI

Justification

A woman's history of a delivery of a low birth weight (LBW) baby is the most reliable predictor for LBW in her subsequent pregnancy (1). The risk for LBW is 2-5 times higher than average among women who have had previous LBW deliveries and increases with the number of previous LBW deliveries (1). This is true for histories in which the LBW was due to premature birth, fetal growth restriction (FGR) or a combination of these factors. The extent to which nutritional interventions (dietary supplementation and counsel) can decrease risk for repeat LBW depends upon the relative degree to which poor nutrition was implicated in each woman's previous poor pregnancy outcome. Nutritional deficiencies and excesses have been shown to result in LBW and pregnancy loss. The pregnant woman's weight gain is one of the most important correlates of birth weight and of FGR (2, 3).

References

1. Institute of Medicine, Committee to Study the Prevention of Low Birth Weight. Preventing low birth weight. National Academy Press, Washington, D.C.; 1985.
2. Institute of Medicine. Nutrition during pregnancy. National Academy Press, Washington, D.C.; 1990.
3. Kramer MS. Intrauterine growth and gestational duration determinants. Pediatrics 1987; 80:502-11.

321 History of Spontaneous Abortion, Fetal or Neonatal Loss

Definition/Cut-off Value

History of spontaneous abortion, fetal or neonatal loss are defined as follows:

Category	Definition
Pregnant Women	Any history of fetal or neonatal death or 2 or more spontaneous abortions.
Breastfeeding Women	Most recent pregnancy in which there was a multifetal gestation with one or more fetal or neonatal deaths but with one or more infants still living.
Non-Breastfeeding Women	Spontaneous abortion, fetal or neonatal loss in most recent pregnancy.

Spontaneous abortion, fetal and neonatal death are defined as follows:

Term	Definition
Spontaneous Abortion (SAB)	The spontaneous termination of a gestation at < 20 weeks or of a fetus weighing < 500 grams.
Fetal Death	The spontaneous termination of a gestation at ≥ 20 weeks.
Neonatal Death	The death of an infant within 0-28 days of life.

Presence of condition diagnosed, documented, or reported by a physician or someone working under a physician's orders, or as self reported by applicant/participant/caregiver. See Clarification for more information about self-reporting a diagnosis.

Participant Category and Priority Level

Category	Priority
Pregnant Women	I
Breastfeeding Women	I
Non-Breastfeeding Women	III, IV, V or VI

Justification

Pregnancy

Previous fetal and neonatal deaths are strongly associated with preterm low birth weight (LBW) and small for gestational age (SGA) and the risk increases as the number of previous poor fetal outcomes goes up.

Spinnillo et al found that the risk for future small for gestational age outcomes increased two fold if a woman had 2 or more SAB. Adverse outcomes related to history of SAB include recurrent SAB, low birth weight (including preterm and small for gestational age infants), premature rupture of membranes, neural tube defects and major congenital malformations. Nutrients implicated in human and animal studies include energy, protein, folate, zinc, and vitamin A.

Postpartum women

A SAB has been implicated as an indicator of a possible neural tube defect in a subsequent pregnancy. Women who have just had a SAB or a fetal or neonatal death should be counseled to increase their folic acid intake and delay a subsequent pregnancy until nutrient stores can be replenished.

The extent to which nutritional interventions (dietary supplementation and counseling) can decrease the risk for repeat poor pregnancy outcomes depends upon the relative degree to which poor nutrition was implicated in each woman's previous poor pregnancy outcome. WIC Program clients receive foods and services that are relevant and related to ameliorating adverse pregnancy outcomes. Specifically, WIC food packages include good sources of implicated nutrients. Research confirms that dietary intake of nutrients provided by WIC foods improve indicators of nutrient status and/or fetal survival in humans and/or animals.

References

1. American College of Obstetricians and Gynecologists. Preterm Labor. Technical Bulletin 206. Washington, DC: ACOG, 1995.
2. Carmi R, Gohar J, Meizner I, Katz M. Spontaneous abortion--high risk factor for neural tube defects in subsequent pregnancy [see comments]. Am. J. Med. Genet. 1994; 51:93-7.
3. Institute of Medicine, Committee to Study the Prevention of Low Birth Weight. Preventing low birth weight. National Academy Press, Washington, D.C.; 1985.
4. Institute of Medicine. Nutrition during pregnancy. National Academy Press, Washington, D.C.; 1990.
5. Kramer MS. Intrauterine growth and gestational duration determinants. Pediatrics 1987; 80:502-11.
6. Paz JE, Otano L, Gadow EC, Castilla EE. Previous miscarriage and stillbirth as risk factors for other unfavorable outcomes in the next pregnancy. Br. J. Obstet. Gynecol. 1992; 99:808-12.
7. Shapiro S, Ross LF, Levine HS. Relationship of selected prenatal factors to pregnancy outcome and congenital anomalies. Am. J. Public Health 1965; 55; 2:268-282.
8. Spinillo A, Capuzzo E, Piazzi G, Nicola S, Colonna L, Iasci A. Maternal high-risk factors and severity of growth deficit in small for gestational age infants. Early Hum. Dev. 1994; 38:35-43.
9. Thorn DH. Spontaneous abortion and subsequent adverse birth outcomes. Am. J. Obstet. Gyn. 1992; 111-6.

Clarification

Self-reporting of a diagnosis by a medical professional should not be confused with self-diagnosis, where a person simply claims to have or to have had a medical condition without any reference to professional diagnosis. A self-reported medical diagnosis ("My doctor says that I have/my sons or daughter has…") should prompt the CPA to validated the presence of the condition by asking more pointed questions related to that diagnosis.

Note: A woman who becomes pregnant within 16 months after a SAB (her first) would qualify for risk #332, Closely Spaced Pregnancies.

331 Pregnancy at a Young Age

Definition/Cut-off Value

Pregnancy at a young age is defined as conception at ≤ 20 years of age for the following (1):

Category	Pregnancy
Pregnant Women	Current pregnancy
Breastfeeding/Non-Breastfeeding	Most recent pregnancy

Participant Category and Priority Level

Category	Priority
Pregnant Women	I
Breastfeeding Women	I
Non-Breastfeeding Women	III, IV, V or VI

Justification

Pregnancy in women under the age of 20 is associated with adverse maternal and neonatal outcomes such as anemia, eclampsia, postpartum depression, maternal death, low birth weight, preterm delivery and stillbirth (1, 2). Pregnancy before the age of 20 years, which may also be referred to as adolescent/teen pregnancy, can have long-term impacts and is associated with lower socioeconomic and education status and increased health care costs (3). As the adolescent mother has not yet completed her own growth, there may be suboptimal nutrient levels available to support both her growth and that of the fetus (4). Studies indicate that there is competition for nutrients between the still growing adolescent mother and her rapidly developing fetus which is also known as 'nutrient partitioning'. This may result in compromised growth and development of the mother and/or fetus (5).

The mother and infant are at greater risk of the adverse outcomes listed below due to adolescent pregnancy.

Increased Risk of Adverse Outcomes to Mother and Infant due to Adolescent Pregnancy (6, 7, 8)

Mother at Increased Risk of:	Infant at Increased Risk of:
• Repeat teen pregnancy • Sexually transmitted disease • Anemia • Cesarean delivery • Lack of early prenatal care	• Very low birth weight & low birth weight • Congenital malformations • Sudden Unexplained Infant Death (SUID) • Low Apgar Score

Mother at Increased Risk of:	Infant at Increased Risk of:
• Preeclampsia • Substance misuse • Not completing high school • Socioeconomic disadvantage • Depression (in comparison with adults)	• Prematurity • Developmental delays • Behavior disorders

Nutritional Impact

Adolescence is a period of rapid growth and development and, thus, increased nutritional needs. Pregnancy further increases energy and nutrient demands in adolescents. Some studies indicate that adolescents enter pregnancy with poor nutritional status due to unhealthy eating behaviors such as skipping meals, inappropriate weight control practices, and frequent consumption of fast food (9). Nutritional surveys across the lifespan indicate that the highest prevalence of nutritional deficiencies occurs during adolescence. A systematic review reported that the nutrient intakes of pregnant adolescents appeared to be low in several nutrients (as discussed below) which are vital for fetal growth and development during pregnancy (10).

Iron

Iron is a component of hemoglobin important in the transfer of oxygen from the lungs to organs. Iron deficiency anemia is one of the most common nutrient deficiencies during pregnancy, and its impact is amplified for pregnant adolescents. According to the Centers for Disease Control and Prevention (CDC) 2003-2010 National Health and Nutritional Examination Survey data, among non-pregnant females 12 to 19 years of age, 9-11% had iron deficiency, and 2-3% had iron deficiency anemia (11). Compared to pregnant adult women, pregnant adolescents have higher iron requirements as adolescents experience rapid expansion of blood volume due to normal adolescent growth. The CDC recommends supplements of 15-30 mg per day of iron for most women during pregnancy. However, pregnant adolescents who are diagnosed with iron deficiency are often prescribed doses of iron as high as 60-120 mg/day (12). The risk of iron deficiency increases further with each additional pregnancy due to the demand of normal growth, pregnancy, and the inability to replace blood loss experienced in childbirth (13). For more information about iron needs during pregnancy please see risk #201 *Low Hematocrit or Hemoglobin*.

Calcium

Calcium is required during pregnancy for the development of the fetal skeleton. In a pregnant adolescent, the maternal diet needs to contain enough calcium to mineralize two skeletons, as an adolescent is still in the process of attaining peak bone mass and continued skeletal growth. Low calcium intake in adolescents is associated with low bone density and increased later risk of osteoporosis for the mother (14). The Recommended Daily Allowance (RDA) for calcium for adolescents is 1300 mg per day; however, studies indicate that the average calcium intakes among 12- 19 year-old females in the U.S. is about 800 mg per day (15). This may be due to the consumption of low-calcium beverages, such as soft drinks and fruit drinks that are frequently chosen instead of milk (16). Although the RDA for calcium does not increase during pregnancy, if an adolescent has inadequate calcium intake during pregnancy it can lead to negative consequences for both the mother and infant, including increased risk of maternal hypertension and preeclampsia (14).

Folate

During pregnancy, folic acid is needed for cell division; during lactation it is required for the synthesis and secretion of milk. If the dietary supply of folate is low, circulating levels begin to decline during the fifth month of pregnancy and continue to decline until several weeks after delivery (17). Folate deficiency during pregnancy may result in intrauterine growth restriction, congenital anomalies, or spontaneous abortion. Although prenatal vitamins contain folic acid, vitamin adherence has been reported to be low among adolescents (18). Smoking and alcohol use can negatively influence the folate levels in pregnant adolescents, as they both lower red blood cell folate concentrations (17).

Vitamin B12

Vitamin B12 is essential for normal neurological function and red blood cell formation during pregnancy. Low levels of vitamin B12, especially in pregnant adolescents, may lead to spontaneous abortion, pregnancy loss, intrauterine growth restriction, low birthweight (<2500 g), and neural tube defects. Folate supplementation may mask the adverse effects of low vitamin B12. Therefore, along with adequate supplementation of folate, it is also recommended that pregnant adolescents have their vitamin B12 status monitored. Vitamin B12 is mainly found in animal sources (meat and dairy products), therefore pregnant teens who follow strict vegetarian/vegan diets or have other diet restrictions are at risk of deficiency. Some studies have indicated that daily maternal supplementation with 50 µg of daily oral vitamin B12 during pregnancy and early lactation significantly improved maternal plasma and breast milk measures of vitamin B12 status, as well as multiple measures of infant vitamin B12 status. (19, 20)

Zinc

Zinc is important in the preconception period for optimal reproductive health and immune function. It also plays a vital role during embryo development, fetal growth, and lactation, causing the requirement for zinc to increase during pregnancy and lactation. Pregnant adolescents are vulnerable to developing zinc deficiency, which can affect both fetal and maternal growth (15). Additionally, low iron intake is linked with inhibition of zinc absorption. Therefore, health care providers may advise pregnant adolescents to take both a zinc and iron supplement. Studies indicate that zinc supplementation may have a modest effect on reducing the risk of preterm birth (21).

Weight Gain during Teen Pregnancy

The National Academies of Sciences, Engineering and Medicine guidelines recommend maternal weight gain of between 11-40 lbs. during pregnancy based on pre-pregnancy body mass index (BMI) (22). There are no specific/separate weight gain recommendations for teen pregnancy. The risk of preterm delivery and low birthweight delivery decreases with adequate weight gain in pregnancy. Studies indicate that pregnant adolescents who have similar pregnancy weight gains as adult counterparts and deliver low birthweight infants may have experienced weight gains attributed to normal adolescent growth and development rather than appropriate pregnancy weight gains (23).

Breastfeeding Promotion and Support

In a review of studies examining breastfeeding among adolescent mothers, the findings showed that most adolescent mothers intended to breastfeed. Yet, breastfeeding initiation ranged from 39% to 69%. Almost half of adolescent mothers stopped within 1 month. During the prenatal period, the promotion of positive maternal perceptions about breastfeeding was found to be important to support the intention to breastfeed. In the early postpartum period, positive support from partners and health-care professionals was essential to sustaining positive maternal attitudes toward the initiation and continuation of

breastfeeding. In addition, the perceived benefits of breastmilk motivated the mother to continue feeding for a longer duration because of the value of her infant's health. (24)

Psychosocial Impact

Pregnancy may lead to increased psychological stress for the adolescent, especially in the case of unplanned pregnancies, and thus may increase the risk of postpartum depression and long term depression (25). Research indicates that the combination of poverty and existing distress is a predictor of teen pregnancy (26). The related psychological and emotional stress may be related to factors that include the additional perinatal and economic responsibilities, adjustment in lifestyle, and changes in the family dynamic. The impact of any stress may continue into adulthood or be lifelong. Studies suggest that adolescents who stay in school to age 18 are less likely to give birth than those who leave school with less than 12 years of education (26, 27). A 2016 Cochrane review suggests that primary prevention interventions (e.g., school, community, home, clinic or faith-based) have been shown to lower the rate of unintended pregnancies among adolescents (27). Interventions that may help adolescent mothers stay in school are more likely to complete high school during pregnancy and postpartum. Strong school connections, family assistance, or commitment in completing educational goals may also reduce multiparity in adolescents (26, 28).

Implications for WIC Nutrition Services

WIC staff can provide the following nutrition services to women under 20 years of age:

- Educate on how the WIC food package helps to provide important nutrients needed during pregnancy and how to incorporate WIC foods into their total diet to get a balanced diet.
- Promote the mom-focused WIC Breastfeeding Support website to learn more about breastfeeding
- Offer individualized referrals based on assessed needs and interests, including referrals to prenatal care, home visiting programs, WIC Peer Counselors, parenting and childbirth programs, and other health and social services.
- Monitor weight gain as needed and educate about appropriate maternal weight gain based on BMI.
- Encourage:
    - Adequate prenatal care.
    - Consumption of prenatal vitamins, as recommended by their health care provider.
    - Consumption of adequate amounts of iron, zinc and calcium-rich foods in order to meet the recommended intake.
- Advise that the pregnant adolescents speak with their healthcare providers to ensure that their folate and vitamin B12 levels are within recommended range.
- Discuss infant feeding plans and provide information to support breastfeeding goals, as appropriate.

References

1. Maiden K, Gunter WD, Martin SS, et al. Teen mothers, unintended pregnancies, and costs across Delaware. Del Med J. 2014 April [cited 2020 May 28]; 86(4):109–16. Available from: https://pubmed.ncbi.nlm.nih.gov/25000643/

2. Ganchimeg T, Ota E, Morisaki N, et al. Pregnancy and child birth outcomes among adolescent mothers: a World Health Organization multicountry study. BJOG. 2014 Mar [cited 2020 May 28]; 121:40–48. Available from: https://pubmed.ncbi.nlm.nih.gov/24641534/

3. Kingston D, Heaman M, Fell D, et al. Comparison of adolescent, young adult, and adult women's maternity experiences and practices. Pediatrics. 2012 may [cited 2020 May 28]; 1228–1237., 129:e. Available from: https://pediatrics.aappublications.org/content/129/5/e1228.

4. Malabarey OT, Balayla J, Klam SL, et al. Pregnancies in young adolescent mothers: a population-based study on 37 million births. J Pediatr Adolesc Gynecol. 2012 Apr [2020 May 28]; 25(2):98–102. Available from: https://pubmed.ncbi.nlm.nih.gov/22088316/.

5. Jones RL, Cederberg HM, Wheeler SJ, et al. Relationship between maternal growth, infant birthweight and nutrient partitioning in teenage pregnancies. BJOG. 2009 Dec 2 [cited 2020 May 28]. Available from: https://doi.org/10.1111/j.1471-0528.2009.02371.x.

6. Martin JA, Hamilton BE, Osterman MJK. Births in the United States, 2018. Washington (DC): US Dept of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics Data Brief, 2019; (346):1–8.

7. Markovitz BP, Cook R, Flick LH, Leet TL. Socioeconomic factors and adolescent pregnancy outcomes: distinctions between neonatal and post-neonatal deaths?. BMC Public Health. 2005 Jul 25 [cited 2020 May 28]; 5(79). Available from: https://bmcpublichealth.biomedcentral.com/articles/10.1186/1471-2458-5-79.

8. Torres R, Goyal D, Burke-Aaronson AC, Gay CL, Lee KA. Patterns of Symptoms of Perinatal Depression and Stress in Late Adolescent and Young Adult Mothers. J Obstet Gynecol Neonatal Nurs. 2017 [cited 2020 May 28]; 46(6):814–823. Available from: https://www.sciencedirect.com/science/article/pii/S0884217517303581.

9. Nielsen JN, Gittelsohn J, Anliker J, O'Brien K. Interventions to improve diet and weight gain among pregnant adolescents and recommendations for future research. J Am Diet Assoc. 2006 Nov [cited 2020 May 28]; 106(11): 1825-1840. Available from: https://doi.org/10.1016/j.jada.2006.08.007

10. Hall Moran V, Edwards J, Dykes F, Downe S. A systematic review of the nature of support for breast-feeding adolescent mothers. Midwifery. 2007 Jun [cited 2020 May 28];23(2):157-71. Available from: https://doi.org/10.1016/j.midw.2006.06.005.

11. Sekhar DL, Murray-Kolb LE, Kunselman AR, et al. Differences in risk factors for Anemia between adolescent and adult women. J Womens Health (Larchmt). 2016 May;25(5):505-13. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4876539/.

12. Peña-Rosas JP, De-Regil LM, Dowswell T, et al. Daily oral iron supplementation during pregnancy. Cochrane Database Syst Rev. 2012 Dec 12 [cited 2020 May 28]. Available from https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD004736.pub5/full?cookiesEnabled.

13. Ru Y, Pressman EK, Cooper EM, et al. Iron deficiency and anemia are prevalent in women with multiple gestations. Am J Clin Nutr. 2016 Oct [cited 2020 May 28];104(4):1052-1060. Available from: https://academic.oup.com/ajcn/article/104/4/1052/4557112.

14. Hacker NA, Fung EB, King JC. Role of calcium during pregnancy: maternal and fetal needs, Nutrition Reviews. 2012 July 1 [cited 2020 May 28];70(7):397–409. Available from: https://academic.oup.com/nutritionreviews/article/70/7/397/1846543.

15. Kocyłowski R, Lewicka I, Grzesiak M, et al. Assessment of dietary intake and mineral status in pregnant women. Arch Gynecol Obstet. 2018 Mar 14 [cited 2020 May 28]; 297(6):1433–1440. Avialbe from: https://link.springer.com/article/10.1007/s00404-018-4744-2.

16. Watts AW, Miller J, Larson NI, et al. Multicontextual correlates of adolescent sugar-sweetened beverage intake. Eat Behav. 2018 Aug [cited 2020 May 28]; 30:42–48. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6314180/.

17. Baker PN, Wheeler SJ, Sanders TA, et al. A prospective study of micronutrient status in adolescent pregnancy. The American Journal of Clinical Nutrition. 2009 April [cited 2020 may 28];89(4): 1114–11. Available from: https://academic.oup.com/ajcn/article/89/4/1114/4596749

18. Lee S, Young BE, Cooper EM, et al. Nutrient inadequacy is prevalent in pregnant adolescents, and prenatal supplement use may not fully compensate for dietary deficiencies. Infant, Child, Adol Nutrition. 2014 June 6(3): 152-9. Available from: https://journals.sagepub.com/doi/pdf/10.1177/1941406414525993.

19. Finkelstein JL, Layden AJ, Stover PJ. Vitamin B-12 and perinatal health. Adv Nutr. 2015 Sep 15 [cited 2020 May 25];6(5):552-63. Available from: https://academic.oup.com/advances/article/6/5/552/4616703

20. Duggan C, Srinivasan K, Thomas T, et al. Vitamin B-12 supplementation during pregnancy and early lactation increases maternal, breast milk, and infant measures of vitamin B-12 status. J Nutr. 2014 May [cited 2020 May 28];144(5):758–764. Available from: https://academic.oup.com/jn/article/144/5/758/4578283?papetoc.

21. Ugwuja EI, Nnabu RC, Ezeonu PO, et al. The effect of parity on maternal body mass index, plasma mineral element status and new-born anthropometrics. Afr Health Sci. 2015 Sep [cited 2020 May 28];15(3):986-92. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4765461/.

22. Institute of Medicine [Internet]. Rasmussen KM, Yaktine AL, eds. Weight gain during pregnancy: reexamining the guidelines. Washington (DC): National Academies, 2009. 2009 [cited 2020 May 28]. Available from: https://www.cbsnews.com/htdocs/pdf/052809_pregnancy.pdf

23. Nielsen JN, Gittelsohn J, Anliker J, et al. Interventions to improve diet and weight gain among pregnant adolescents and recommendations for future research. J Am Diet Assoc. 2006 Nov [cited 2020 May 28];106(11):1825-40. Available from https://www.ncbi.nlm.nih.gov/books/NBK72501/.

24. Kanhadilok S, McGrath JM. An integrative review of factors influencing breastfeeding in adolescent mothers. J Perinat Educ. 2015 [cited 2020 May 28]; 24(2): 119–127. Available from: https://connect.springerpub.com/content/sgrjpe/24/2/119.

25. McGuinness TM, Medrano B, Hodges A. Update on adolescent motherhood and postpartum depression. J Psychosoc Nurs Ment Health Serv. 2013 [cited 2020 May 28]; 51(2):15–18. Available from: https://doi.org/10.3928/02793695-20130109-02.

26. Agnafor S, Bladh M, Svedin CG, et al. Mental health in young mothers, single mothers and their children. BMC Psychiatry. 2019 Mar [cited 2020 July 28]; 19(112):310-26. Available from: https://bmcpsychiatry.biomedcentral.com/articles/10.1186/s12888-019-2082-y.

27. Oringanje C, Meremikwu MM, Eko H, et al. Interventions for preventing unintended pregnancies among adolescents. Cochrane Database Syst Cochrane Database Syst Rev. 2016 Feb 3 [cited 2020 May 28]. Available from: http://www.scielo.org.za/scielo.php?script=sci_arttext&pid=S0256-95742020000100004,

28. Barnet B, Arroyo C, Devoe M, et al. Reduced school dropout rates among adolescent mothers receiving school-based prenatal care. Arch Pediatr Adolesc Med. 2004 Mar [cited 2020 May 28]; 158(3):262-8. Available from: https://jamanetwork.com/journals/jamapediatrics/fullarticle/485646.

332 Short Interpregnancy Interval

Definition/Cut-off Value

Short Interpregnancy Interval (IPI), formerly known as *Closely Spaced Pregnancies*, is defined as an interpregnancy interval of less than 18 months from the date of a live birth to the conception of the subsequent pregnancy for the following:

Category	Pregnancy
Pregnant Women	Current pregnancy
Breastfeeding/Non-Breastfeeding Women	Most recent pregnancy

Note: The evidence-based information supporting this criterion is specific to live births and did not include women who had miscarriages or stillbirths. Thus, the definition for this criterion is specific only to women who experienced live births. Women whose pregnancies did not result in a live birth may be assigned, as appropriate, Risk #321 *History of Spontaneous Abortions, Fetal or Neonatal Loss*.

Participant Category and Priority Level

Category	Priority
Pregnant Women	I
Breastfeeding Women	I
Non-Breastfeeding Women	III, IV, V, or VI

Justification

Adverse maternal and infant health outcomes have been associated with short Interpregnancy Intervals (IPIs). While there is no standard definition for short IPI, an IPI less than 18 months has been associated with increased risk for adverse outcomes (1, 2). An interval of 18 to 24 months has been associated with the lowest relative risk (2). Evidence associated with the lowest relative risk for an IPI following a miscarriage or abortion is still unclear (see Clarification Section for more information) therefore only health effects associated with a short IPI following a live birth were reviewed for this criterion.

Historically, the World Health Organization (WHO) and other international authorities had recommended at least 2-3 years between pregnancies and the United States Agency for International Development (USAID) had suggested an interval of 3-5 years. Given the inconsistency, various countries and regional programs requested the WHO to further review the research and provide recommendations. As a result, the report from the 2005 WHO Technical Consultation and Scientific Review of Birth Spacing recommended an interval of at least 24 months after a live birth to reduce the risk of adverse maternal, perinatal, and infant outcomes. (3). A more recent review of data suggests that there are increased risks for adverse perinatal and maternal outcomes with an IPI less than 18 months (1, 2 ,4) and increased risks for perinatal (1, 4) and maternal (4, 5, 6) outcomes longer than 59 months while 18 to 24 months was associated with the lowest relative risk (2). Parallel to recent findings, Healthy People 2020 has proposed a 10% improvement in reducing the proportion of pregnancies conceived within 18 months of a previous birth (7).

Outcomes associated with short IPI have included maternal complications such as uterine rupture in women attempting a vaginal birth after a previous cesarean delivery (also referred to as VBAC) (8, 9); and perinatal and neonatal complications such as preterm birth (1, 2, 10), low birth weight (1, 2), small for gestational age (1, 2), birth defects (11), and autism (12, 13).

Short interpregnancy interval has been identified as a risk for increasing uterine rupture in women attempting a VBAC delivery (8, 9, 14). Yet when comparing short interpregnancy interval to labor type – induced labor and spontaneous, there was a decrease rate in VBAC success in women who were induced, and no difference with spontaneous labor (15). Given the lack of a specific IPI recommendation for women with a previous cesarean delivery and the inconsistencies in study designs there appears to be no specific guidelines for interval length after a cesarean delivery (16). The short interpregnancy interval definition cut-off of 18 months, however, appears to be inclusive of women who delivered by cesarean with their previous pregnancy.

Factors contributing to adverse outcomes and short IPI remain controversial. It was thought that socioeconomic factors contributed to adverse outcomes. However, when controlled for possible cofounders, short IPI remained an independent risk factor (1, 2). Nutrition-related hypothetical causal mechanisms have been proposed to explain the effects short IPIs have on health, yet research remains inconclusive (4). The Maternal Depletion Syndrome hypothesized that mothers who have a short IPI often do not have adequate time to replenish macro- and micro-nutrients which may lead to the mother and fetus competing for nutrients (17). However, a recent systematic review of the literature found no evidence to support this hypothesis (4). Studies to support the folate depletion theory have had differing results (11, 18). When folate intake is inadequate, concentrations begin to decrease in the fifth month of pregnancy and for several weeks after birth (19). Women who did not take folic acid supplementation during pregnancy, compared to women who did, were at greater risk of fetal growth restriction with a short (less than six months) IPI and, this risk was found to decrease as IPI increased (18). Of interest, a retrospective Canadian study of 46,243 women found an association between IPI (less than six months) and folate-independent anomalies, however not for folate-dependent anomalies such as neural tube defects, cleft lip and palate, and cardiovascular defects (11). In addition, the association between short IPI and anemia was found inconclusive (2).

Implications for WIC Nutrition Service

Findings from a small pilot study found coordination of primary health care and social support services reduced adverse pregnancy outcomes and the average number of pregnancies conceived within 18 months among low-income African-American who previously delivered a very low birth weight baby (20). Results from a 2007 U.S. survey found that among women of childbearing age, those aged 18-24 years were the least aware of the need for folic acid prior to pregnancy and least likely to report daily use of supplements containing folic acid. Of equal concern, only 17% of women aged 18-24 years were likely to hear about folic acid from their healthcare provider. (21)

Initiations of healthcare referrals for family planning, early prenatal care, and folic acid supplementation have the potential to improve health outcomes for women, infants, and children. Given that half of all pregnancies nationwide are unintended (22), WIC can help to reduce the risk of adverse pregnancy outcomes by:

- Encouraging postpartum women and their partner to meet with their healthcare provider to discuss developing a reproductive plan and birth spacing, as appropriate. http://www.cdc.gov/preconception/documents/rlphealthproviders.pdf

- Encouraging folic acid supplementation. http://www.cdc.gov/features/folicacidbenefits/
- Encouraging healthful eating patterns consistent with the Dietary Guidelines for Americans. http://www.cnpp.usda.gov/DietaryGuidelines

References

1. Conde-Agudeloa A, Rosas-Bermúdez A, Kafury-Goeta AC. Birth spacing and risk of adverse perinatal outcomes: a meta-analysis. JAMA. 2006;295(15):1809-1823.
2. Shachar BZ and Deirdre JL. Interpregnancy Interval and Obstetrical Complications. Obstet Gynecol Surv. 2012;67(9):584-596.
3. World Health Organization. Report of a WHO technical consultation on birth spacing. Geneva, Switzerland, 13–15 June 2005. 2006;1-44.
4. Conde-Agudelo A, Rosas-Bermudez A, Castaño F, Norton MH. Effects of birth spacing on maternal, perinatal, infant, and child health: a systematic review of causal mechanisms. Stud Fam Plann. 2012;43(2):93-114.
5. Conde-Agudelo A, Belizán JM. Maternal morbidity and mortality associated with interpregnancy interval: cross sectional study. BMJ. 2000;321(7271):1255-9.
6. Conde-Agudelo A, Rosas-Bermúdez A, Kafury-Goeta AC. Effects of birth spacing on maternal health: a systematic review. Am J Obstet Gynecol. 2007;196(4):297-308.
7. U.S. Department of Health and Human Services. Office of Disease Prevention and Health Promotion. Healthy People 2020. [cited 2015 Feb 1]. Available from: http://www.healthypeople.gov/2020/topicsobjectives2020/objectiveslist.aspx?topicId=13.
8. Shipp TD, Zelop CM, Repke JT, Cohen A, Lieberman E. Interdelivery Interval and Risk of Symptomatic Uterine Rupture. Obstet Gynecol. 2001;97:175–7.
9. Stamilio DM, DeFranco E, Pare´ E, Odibo AO, Peipert JF, Allsworth JE, et al. Short Interpregnancy Interval: Risk of Uterine Rupture and Complications of Vaginal Birth After Cesarean Delivery. Obstet Gynecol. 2007;110:1075–82.
10. Shachar BZ, Mayo J, Lyell D, Stevenson D, Shaw G. Interpregnancy interval length and risk of preterm birth, a large US study. American Journal of Obstetrics & Gynecology. 2014;210(1)Suppl:S373. Abstract. Poster Session V, Number 760.
11. Chen I, Jhangri GS, Chandra S. Relationship between interpregnancy interval and congenital anomalies. Am J Obstet Gynecol. 2014;210(6):564.e1–564.e8.
12. Cheslack-Postava K, Liu K, Bearman PS. Closely Spaced Pregnancies Are Associated With Increased Odds of Autism in California Sibling Births. Pediatrics. 2011;127(2):246-53.
13. Gunnes N, Surén P, Bresnahan M, Hornig M, Lie KK, Lipkin WI, et al. Interpregnancy Interval and Risk of Autistic Disorder. Epidemiology. 2013;24:906–912.
14. Bujold E, and Gauthier R J. Risk of Uterine Rupture Associated With an Interdelivery Interval Between 18 and 24 Months. Obstet Gynecol. 2010;115(5):1003–6.
15. Huang WH, Nakashima DK, Rumney PJ, Keegan KA Jr, Chan K. Interdelivery interval and the success of vaginal birth after cesarean delivery. Obstet Gynecol. 2002;99(1):41-4.

16. The American College of Obstetricians and Gynecologists, Women's Health Care Physicians. ACOG Practice bulletin no. 115: Vaginal birth after previous cesarean delivery. Obstet Gynecol. 2010;116(NO.2 Pt 1):450-63.

17. King JC. The Risk of Maternal Nutritional Depletion and Poor Outcomes Increases in Early or Closely Spaced Pregnancies. J. Nutr. 2003;133:1732S–1736S.

18. van Eijsden M, Smits LJ, van der Wal MF, Bonsel GJ. Association between short interpregnancy intervals and term birth weight: the role of folate depletion. Am. J. Clin. Nutr. 2008;88(1):147-53.

19. Smits LJ, Essed GG. Short interpregnancy intervals and unfavorable pregnancy outcome: role of folate depletion. Lancet. 2001;358:2074-7.

20. Dunlop AL, Dubin C, Raynor BD, Bugg GW Jr, Schmotzer B, Brann AW Jr. Interpregnancy primary care and social support for African-American women at risk for recurrent very-low-birthweight delivery: a pilot evaluation. Matern Child Health J. 2008;12(4):461-8.

21. Centers for Disease Control and Prevention. Use of Supplements Containing Folic Acid Among Women of Childbearing Age --- United States, 2007. MMWR. 2008;57(01);5-8.

22. Finer LB, Zolna MR. Shifts in intended and unintended pregnancies in the United States, 2001-2008. Am J Public Health. 2014;104: S43–S48.

23. Conde-Agudeloa A, Belizána JM, Bremanb R, Brockmanb SC, Rosas-Bermudez A. Effect of the interpregnancy interval after an abortion on maternal and perinatal health in Latin America. Int J Gynaecol Obstet. 2005;89(1):S34–S40.

24. Love ER, Bhattacharya, Siladitya; Smith NC, Bhattacharya Sohinee. Effect of interpregnancy interval on outcomes of pregnancy after miscarriage: retrospective analysis of hospital episode statistics in Scotland. BMJ. 2010;341:c3967.

25. Bhattacharya, Sohinee; Smith N. Pregnancy following miscarriage: what is the optimum interpregnancy interval? Women's Health. 2011;7(2):139-141.

Clarification

Study results for an optimal Interpregnancy Interval (IPI) following a termination or miscarriage have been inconsistent (3, 10, 23, 24). The WHO Technical Consultation on Birth Spacing Report recommended a minimum interval of at least six months between a miscarriage or induced abortion and the next pregnancy. This recommendation was based on a large retrospective cross-sectional study, a review of 258,108 hospital records from several Latin American countries between 1985-2002, that found women whose previous pregnancy resulted in a spontaneous or induced abortion and had an IPI shorter than 6 months had an increased risk for adverse maternal and perinatal outcomes (21). Given several limitations in the study the WHO cautioned against generalizing the results to other regions or even within the Latin American region since service operations and conditions may differ from the study sample (3). However, more recently a review of approximately a million California births found a decreased risk for preterm birth for women with an IPI of less than six months after a terminated pregnancy (10). An overview of the research found that there may be little benefit from delaying pregnancy after an uncomplicated miscarriage, and to that end pregnancy spacing recommendations following a miscarriage should be individually tailored to the person. (25)

334 Lack of or Inadequate Prenatal Care

Definition/Cut-off Value

Prenatal care beginning after the 1st trimester (after 13th week), or based on an Inadequate Prenatal Care Index published in a peer reviewed article such as the one by Kessner et al. (4).

First prenatal visit in the third trimester (7-9 months) or:

Weeks Gestation	Number of Prenatal Visits (2)
14 - 21	0 or unknown
22 - 29	1 or less
30 - 31	2 or less
32 - 33	3 or less
34 or more	4 or less

Participant Category and Priority Level

Category	Priority
Pregnant Women	I

Justification

Women who do not receive early and adequate prenatal care are more likely to deliver premature, growth retarded, or low birth weight infants (3). The Kessner Index can be used to assess the adequacy of prenatal care for a woman with an uncomplicated pregnancy. Women with medical or obstetric problems, as well as younger adolescents, may need closer management; the frequency of prenatal visits should be determined by the severity of identified problems (1). Several studies have reported significant health and nutrition benefits for pregnant women enrolled in the WIC Program (3).

References

1. American Academy of Pediatrics, American College of Obstetricians and Gynecologists. Guidelines for Perinatal Care. Washington, D.C.: AAP, ACOG; 1997.
2. Centers for Disease Control and Prevention. Prenatal Nutrition Surveillance System User's Manual. Atlanta: CDC, 1994.
3. Institute of Medicine. WIC nutrition risk criteria a scientific assessment. National Academy Press, Washington, D.C.; 1996.
4. Kessner DM, Singer J, Kalk CE, Schlesinger ER. Infant Death: An analysis by maternal risk and health care. Contrasts in Health Status; Vol. I. Washington, DC: Institute of Medicine, National Academy of Sciences; 1973.

Clarification

The Centers for Disease Control and Prevention (CDC) defines a trimester as a term of three months in the prenatal gestation period with the specific trimesters defined as follows in weeks:

- First Trimester: 0-13 weeks
- Second Trimester: 14-26 weeks
- Third Trimester: 27-40 weeks

Further, CDC begins the calculation of weeks starting with the first day of the last menstrual period. If that date is not available, CDC estimates that date from the estimated date of confinement (EDC). This definition is used in interpreting CDC's Prenatal Nutrition Surveillance System data, comprised primarily of data on pregnant women participating in the WIC Program.

335 Multi-fetal Gestation

Definition/Cut-off Value

More than one (> 1) fetus in a current pregnancy (Pregnant Women) or the most recent pregnancy (Breastfeeding and Non-Breastfeeding Women).

Participant Category and Priority Level

Category	Priority
Pregnant Women	I
Breastfeeding Women	I
Non-Breastfeeding Women	III, IV, V or VI

Justification

Multi-fetal gestations are associated with low birth weight, fetal growth restriction, placental and cord abnormalities, preeclampsia, anemia, shorter gestation and an increased risk of infant mortality. Twin births account for 16% of all low birth weight infants. The risk of pregnancy complications is greater in women carrying twins and increases markedly as the number of fetuses increases (1, 2).

For twin gestations, the 2009 IOM recommendations provide provisional guidelines: normal weight women should gain 37-54 pounds; overweight women, 31-50 pounds; and obese women, 25-42 pounds (3). There was insufficient information for the IOM committee to develop even provisional guidelines for underweight women with multiple fetuses. A consistent rate of weight gain is advisable. A gain of 1.5 pounds per week during the second and third trimesters has been associated with a reduced risk of preterm and low-birth weight delivery in twin pregnancy (2). In triplet pregnancies the overall gain should be around 50 pounds with a steady rate of gain of approximately 1.5 pounds per week throughout the pregnancy (2). Education by the WIC nutritionist should address a steady rate of weight gain that is higher than for singleton pregnancies.

Pregnant or breastfeeding women with twins have greater requirements for all nutrients than women with only one infant. Postpartum, non-breastfeeding women delivering twins are at greater nutritional risk than similar women delivering only one infant. All three groups of women would benefit greatly from the nutritional supplementation provided by the WIC Program.

References

1. Brown JE and Carlson M. Nutrition and multifetal pregnancy. J Am Diet Assoc. 2000; 100:343-348.
2. Institute of Medicine. WIC nutrition risk criteria: a scientific assessment. National Academy Press, Washington, D.C.; 1996.
3. Institute of Medicine. Weight gain during pregnancy: reexamining the guidelines (Prepublication Copy). National Academy Press, Washington, D.C.; 2009. www.nap.edu. Accessed June 2009.

Additional References

1. Brown JE, Schloesser PT. Pregnancy weight status, prenatal weight gain, and the outcome of term twin gestation. Am. J. Obstet. Gynecol. 1990; 162:182-6.
2. Suitor CW, editor. Maternal weight gain: a report of an expert work group. Arlington, Virginia: National Center for Education in Maternal and Child Health; 1997. Sponsored by Maternal and Child Health Bureau, Health Resources and Services Administration, Public Health Service, U.S. Department of Health and Human Services.
3. Williams RL, Creasy RK, Cunningham GC, Hawes WE, Norris FD, Tashiro M. Fetal growth and perinatal viability in California. Obstet. Gynecol. 1982; 59:624-32.
4. Worthington-Roberts, BS. Weight gain patterns in twin pregnancies with desirable outcomes. Clin.Nutr. 1988; 7:191-6.

336 Fetal Growth Restriction

Definition/Cut-off Value

Fetal Growth Restriction (FGR) (replaces the term Intrauterine Growth Retardation (IUGR)), may be diagnosed by a physician with serial measurements of fundal height, abdominal girth and can be confirmed with ultrasonography. FGR is usually defined as a fetal weight $< 10^{th}$ percentile for gestational age.

Presence of condition diagnosed, documented, or reported by a physician or someone working under a physician's orders, or as self reported by applicant/participant/caregiver. See Clarification for more information about self-reporting a diagnosis.

Participant Category and Priority Level

Category	Priority
Pregnant Women	I

Justification

Fetal Growth Restriction (FGR) usually leads to low birth weight (LBW) which is the strongest possible indicator of perinatal mortality risk. Severely growth restricted infants are at increased risk of fetal and neonatal death, hypoglycemia, polycythemia, cerebral palsy, anemia, bone disease, birth asphyxia, and long term neurocognitive complications. FGR may also lead to increased risk of ischemic heart disease, hypertension, obstructive lung disease, diabetes mellitus, and death from cardiovascular disease in adulthood. FGR may be caused by conditions affecting the fetus such as infections and chromosomal and congenital anomalies. Restricted growth is also associated with maternal height, prepregnancy weight, birth interval, and maternal smoking. WIC's emphasis on preventive strategies to combat smoking, improve nutrition, and increase birth interval, may provide the guidance needed to improve fetal growth.

References

1. Altman DG, Hytten FE. Intrauterine growth retardation: let's be clear about it. Br. J. Obstet. Gynaecol. 1989; 96:1127-32.
2. Barros FC, Huttly SR, Victora CG, Kirkwood BR, Vaughan JP. Comparison of the causes and consequences of prematurity and intrauterine growth retardation: a longitudinal study in southern Brazil. Pediatrics 1992; 90:238-44.
3. Institute of Medicine. Nutrition during pregnancy. National Academy Press, Washington, D.C.; 1990.
4. Institute of Medicine. Nutrition during pregnancy; part I, weight gain and part II, nutrient supplements. National Academy Press, Washington, D.C. 1990.
5. Institute of Medicine. WIC nutrition risk criteria a scientific assessment. National Academy Press, Washington, D.C.; 1996.
6. Kramer MS, Olivier M, McLean FH, Dougherty GE, Willis DM, Usher RH. Determinants of fetal growth and body proportionality. Pediatrics 1990; 86:18-26.

7. Kramer MS, Olivier M, McLean FH, Willis DM, Usher RH. Impact of intrauterine growth retardation and body proportionality on fetal and neonatal outcome. Pediatrics 1990; 86:707-13.
8. Stein ZA, Susser M. Intrauterine growth retardation: epidemiological issues and public health significance. Semin. Perinatol. 1984; 8:5-14.
9. Williams SR. Nutrition and diet therapy. St. Louis, Missouri: Times Mirror/Mosby College Pub, 1989.
10. Worthington-Roberts BS, Williams SR. Nutrition During Pregnancy and Lactation. St. Louis: Mosby, 1989.

Clarification

Self-reporting of a diagnosis by a medical professional should not be confused with self-diagnosis, where a person simply claims to have or to have had a medical condition without any reference to professional diagnosis. A self-reported medical diagnosis ("My doctor says that I have/my son or daughter has…") should prompt the CPA to validate the presence of the condition by asking more pointed questions related to that diagnosis.

337 History of Birth of a Large for Gestational Age Infant

Definition/Cut-off Value

History of birth of a large for gestational age infant is defined as follows:

Category	Definition
Pregnant Women	Any history of giving birth to an infant weighing greater than or equal to 9 lbs. (4000 grams).
Breastfeeding/Non-Breastfeeding Women	Most recent pregnancy, or history of giving birth to an infant weighing greater than or equal to 9 lbs. (4000 grams).

Presence of condition diagnosed, documented, or reported by a physician or someone working under a physician's orders, or as self reported by applicant/participant/caregiver. See Clarification for more information about self-reporting a diagnosis.

Participant Category and Priority Level

Category	Priority
Pregnant Women	I
Breastfeeding Women	I
Non-Breastfeeding Women	III, IV, V or VI

Justification

Women with a previous delivery of an infant weighing greater than 9 lbs. (4000 grams) are at an increased risk of giving birth to a large for gestational age infant (1). Macrosomia may be an indicator of maternal diabetes (current or gestational) or a predictor of future diabetes (2).

The incidence of maternal, fetal, and neonatal complications is high with neonates weighing greater than 9 lbs. (4000 grams). Risks for the infant include dystocia, meconium aspiration, clavicular fracture, brachia plexus injury, and asphyxia (3).

References

1. Boyd ME, Usher RH, McLean FH. Fetal macrosomia: prediction, risks, proposed management. Obstet. Gynecol. 1983; 61:715-22.
2. Institute of Medicine. WIC nutrition risk criteria a scientific assessment. Washington (DC): National Academy Press; 1996. p. 117.
3. Institute of Medicine. Nutrition during pregnancy. Washington, (DC): National Academy Press; 1990. p. 190.

Clarification

Self-reporting of "History of …" conditions should be treated in the same manner as self-reporting of current conditions requiring a physician's diagnosis, i.e., the applicant may report to the CPA that s/he was diagnosed by a physician with a given condition at some point in the past. As with current conditions, self-diagnosis of a past condition should never be confused with self-reporting.

338 Pregnant Woman Currently Breastfeeding

Definition/Cut-off Value

Pregnant woman who is currently breastfeeding.

Participant Category and Priority Level

Category	Priority
Pregnant Women	I

Justification

Generally, it is considered safe for most women to continue breastfeeding while pregnant and can be sustained for as long as mutually desired by the mother and child (1). The assignment of this risk is not intended to discourage women from continuing breastfeeding during pregnancy, but rather to highlight the need to review the mother's medical history and diet along with her breastfeeding goals.

Incidence rates of breastfeeding while pregnant among U.S. mothers have not been reported recently. The National Health and Nutrition Examination Survey (NHANES) III indicated that between 1988 and 1994 only 5% of North American breastfeeding women were pregnant (2).

Research on breastfeeding during pregnancy, especially among U.S. populations, is very limited; however, some studies have examined the relationship that this practice has on birth outcomes, such as preterm delivery, miscarriage, and birth weight. During breastfeeding, stimulation of the nipples causes the secretion of the hormone oxytocin, which can result in contractions of the uterus (3). It has been suggested that these contractions may induce labor and therefore increase the risk of delivering prematurely in some women; however, this is not a concern for the typical low risk pregnancy (1, 4, 5). In a small retrospective study of 57 U.S. mothers with an unknown previous pregnancy outcome, most did not notice any uterine contractions specific to breastfeeding. The women that did notice uterine contractions specific to breastfeeding gave birth to healthy babies (6).

Studies of pregnancy-breastfeeding overlap among women with a history of preterm delivery or miscarriage are presently lacking in the scientific literature. As a result, these women should be encouraged to talk with their health care provider about their breastfeeding goals and report any uterine contractions (1). For more information on premature delivery, see risk #142 *Preterm or Early Term Delivery* or risk #311 *History of Preterm or Early Term Delivery*.

Several studies of pregnancy-breastfeeding overlap have been conducted with women without a history of preterm labor or miscarriage, and no statistically significant increased risk of premature delivery were reported (7, 8). One retrospective study compared the outcomes of pregnancies in mothers with no history of premature delivery or miscarriage that had one full-term infant and continued breastfeeding during pregnancy to a control group of comparable age and pregnancy history that stopped breastfeeding at least three months before becoming pregnant. Fewer pregnancies (7.3%) in the breastfeeding group resulted in spontaneous abortion than the control group (8.4%) (7). In a systematic review of all of the relevant literature published between 1990 and 2015, none of the studies reviewed reported significant differences in the numbers of premature births between pregnant mothers who breastfed and non-breastfeeding pregnant mothers, even when breastfeeding duration, the number of feedings, or birth interval were

controlled for (9). These results provide evidence for continued support of breastfeeding during pregnancy for mothers with no previous history of preterm labor or miscarriage.

Several studies have also examined the effect of breastfeeding during pregnancy on the birth weight of the infant. These studies reported similar mean birth weights between infants born to mothers who breastfed during pregnancy and those who did not. (5, 8, 10, 11)

When a woman is pregnant or breastfeeding, she has a higher need for certain vitamins and minerals and may have greater caloric needs as well. The same is true for a woman who is pregnant while breastfeeding. It is important to note that caloric needs must be individualized based on current weight, physical activity, and recommended maternal weight gain for weight status (i.e., underweight, normal weight, overweight, or obese). For more information about maternal weight gain, see risk #131 *Low Maternal Weight Gain* or risk #133 *High Maternal Weight Gain*.

Implications for WIC Nutrition Services

WIC staff can support pregnant women who are breastfeeding by:

- Considering personal feelings about breastfeeding while pregnant as well as personal breastfeeding goals with the currently breastfed child.
- Referring mothers who have a history of premature labor or miscarriage and those who are concerned about uterine contractions to their health care providers.
- Providing nutrition education that supports an overall healthy diet, including:
    - Limiting calories from added sugars and saturated fats.
    - Choosing a variety of fruits and vegetables, whole grains, and fat-free or low-fat dairy products.
    - Eating protein-rich foods such as poultry, fish, beans, eggs, nuts, and lean meats. Pregnant women, including those who are breastfeeding, should avoid eating shark, swordfish, king mackerel, or tilefish due to concern for high levels of mercury. White (albacore) tuna should be limited to no more than 6 ounces per week (12).
    - Drinking plenty of fluids. During breastfeeding, fluid needs may increase, and mothers may notice that they are thirstier than usual. Women should drink enough water and other fluids to quench their thirst. A common suggestion is to drink a glass of water with every breastfeeding session (13).
- Monitoring weight status throughout the pregnancy to ensure appropriate weight gain.
- Providing tips for reducing nipple soreness or breast tenderness if women report these concerns. Hormonal changes during pregnancy lead to nipple soreness and breast tenderness in some women (3).
- Informing women that the older child that is breastfeeding may notice some changes in the human milk and wean on his/her own. Although human milk continues to be nutritionally sound throughout pregnancy, the composition of it may change, which might change the way the milk tastes. For some women, their milk production may also decrease as their pregnancy progresses. These factors can lead the breastfeeding child to wean on his/her own before the baby is born. (1)
- Issuing Food Package VII to the mother until her older infant turns one, as long as she is partially (mostly) breastfeeding.

- Providing anticipatory guidance on tandem nursing, which is the practice of breastfeeding two or more children of different ages at the same time. This may ease the older child's adjustment to the new baby, address the mother's own desire to maintain closeness with the older child, and even make child care easier in some cases as both children are fed and comforted on the breast. This may also allow the mother and children to fulfill the American Academy of Pediatrics' recommendation to continue breastfeeding for as long as mutually desired by the mother and child (14).

References

1. American Academy of Pediatrics [Internet]. Itasca (IL): American Academy of Pediatrics, c2011. Nursing during pregnancy. 2009 Nov 2 [cited 2018 Dec 11]. Available from: https://www.healthychildren.org/English/ages-stages/baby/breastfeeding/Pages/Nursing-During-Pregnancy.aspx.
2. Briefel RR, Bialostosky K, Kennedy-Stephenson J, et al. Zinc and health: current status and future directions zinc Intake of the U. S. population: findings from the third national health and nutrition examination survey, 1988–1994. J Nutr 2000 May [cited 2019 Mar 5];130(5 S Suppl):1367S–73S.
3. Mohrbacher, N and Stock, J. The breastfeeding answer book. 3rd edition. Schuamburg, IL: La Leche League International; c2003. Chapter 6, Pregnancy and tandem nursing; p. 407.
4. Kavanagh J, Kelly AJ, Thomas J. Breast stimulation for cervical ripening and induction of labour. 2005 July 20 [cited 2019 Mar 5]. In: The Cochrane Database Systematic Reviews [Internet]. London (UK): John Wiley & Sons, Ltd. c2010 - . Available from: DOI: 10.1002/14651858.CD003392.pub2.
5. Ayrim A, Gunduz S, Akcal B, et al. Breastfeeding throughout pregnancy in Turkish women. Breastfeed Med. 2014 Apr [cited 2019 Mar 5];9(3): 157-60. Available from: https://www.ncbi.nlm.nih.gov/pubmed/24160359.
6. Moscone SR and Moore MJ. Breastfeeding during pregnancy. J Hum Lact. 1993 Jun [cited 2019 Mar 5];9(2):83-8. Available from: https://www.ncbi.nlm.nih.gov/pubmed/8251083/.
7. Ishii, H. Does breastfeeding induce spontaneous abortion? J Obstet Gynaecol Res. 2009 Oct 20 [cited 2019 Mar 5];35(5):864-8. Available from: https://doi.org/10.1111/j.1447-0756.2009.01072.x.
8. Albadran MM. Effect of breastfeeding during pregnancy on the occurrence of miscarriage and preterm labour. Iraqui JMS. 2013 Sept [cited 2019 Mar 5];11(3):285–9. Available from: https://www.iasj.net/iasj?func=fulltext&aId=80356.
9. Lopez-Fernandez G, Barrios M, Goberna-Tricas J, Gomez-Benito J. Breastfeeding during pregnancy: A systematic review. Women and Birth. 2017 Dec [cited 2019 Mar 5];30(6):e292-e300. Available from: https://doi.org/10.1016/j.wombi.2017.05.008.
10. Madarshahian F, Hassanabadi M. A comparative study of breastfeeding during pregnancy: impact on maternal and newborn outcomes. J Nurs Res. 2012;20:74–80.
11. Merchant K, Martorell R, Haas J. Consequences for maternal nutrition of reproductive stress across consecutive pregnancies. J Nutr. 1990 Oct 1 [cited 2019 Mar 5];52(61):616-20. Available from: https://doi.org/10.1093/ajcn/52.4.616.
12. United States Department of Agriculture [Internet]. Washington (DC): United States Department of Agriculture. Making Healthy Choices in Each Food Group. 2018 Apr 27 [cited 2018 Dec 11]. Available from: https://www.choosemyplate.gov/moms-making-healthy-food-choices.

13. United States Department of Agriculture. Washington (DC): United States Department of Agriculture. Nutritional Needs while Breastfeeding. [cited 2018 Dec 11]. Available from: https://www.choosemyplate.gov/moms-breastfeeding-nutritional-needs.

14. American Academy of Pediatrics. Itasca (IL): American Academy of Pediatrics, c2019. AAP Reaffirms Breastfeeding Guidelines. [cited 2018 Dec 11]. Available from: https://www.aap.org/en-us/about-the-aap/aap-press-room/pages/aap-reaffirms-breastfeeding-guidelines.aspx.

339 History of Birth with Nutrition Related Congenital or Birth Defect

Definition/Cut-off Value

A woman who has given birth to an infant who has a congenital or birth defect linked to inappropriate nutritional intake, e.g., inadequate zinc, folic acid, excess vitamin A.

Category	Definition
Pregnant Women	Any history of birth with nutrition-related congenital or birth defect.
Breastfeeding/Non-Breastfeeding	Most recent pregnancy.

Presence of condition diagnosed, documented, or reported by a physician or someone working under a physician's orders, or as self reported by applicant/participant/caregiver. See Clarification for more information about self-reporting a diagnosis.

Participant Category and Priority Level

Category	Priority
Pregnant Women	I
Breastfeeding Women	I
Non-Breastfeeding Women	III, IV, V or VI

Justification

The single greatest risk factor for a pregnancy with a neural tube defect is a personal or family history of such a defect. More than 50% of recurrences can be prevented by taking folic acid before conception. Recent studies suggest that intake of folic acid may also be inversely related to the occurrence of cleft lip and palate. The WIC Program provides nutrition education and folic acid-rich foods to women to help prevent future birth defects.

Recurrent birth defects can also be linked to other inappropriate nutritional intake prior to conception or during pregnancy, such as inadequate zinc (LBW) or excess vitamin A (cleft palate or lip). The food package and nutrition education provided to WIC participants help women at risk make food choices that provide appropriate nutrient levels.

References

1. Federal Register, Part III, DHHS, FDA, 21 CFR Part 101, Food Labeling: Health Claims and Label Statements, Folate and Neural Tube Defects. Proposed and Final Rule. March 5, 1996; 61; 44:8752-8781.

2. Institute of Medicine. WIC nutrition risk criteria a scientific assessment. National Academy Press, Washington, D.C.; 1996.

Clarification

Self-reporting of "History of …" conditions should be treated in the same manner as self-reporting of current conditions requiring a physician's diagnosis, i.e., the applicant may report to the CPA that s/he was diagnosed by a physician with a given condition at some point in the past. As with current conditions, self-diagnosis of a past condition should never be confused with self-reporting.

341 Nutrient Deficiency or Disease

Definition/Cut-off Value

Any currently treated or untreated nutrient deficiency or disease. These include, but are not limited to, Protein Energy Malnutrition, Scurvy, Rickets, Beriberi, Hypocalcemia, Osteomalacia, Vitamin K Deficiency, Pellagra, Xerophthalmia, and Iron Deficiency.

Presence of condition diagnosed, documented, or reported by a physician or someone working under a physician's orders, or as self-reported by applicant/participant/caregiver. See Clarification for more information about self-reporting a diagnosis.

Participant Category and Priority Level

Category	Priority
Pregnant Women	I
Breastfeeding Women	I
Non-Breastfeeding Women	III, IV, V, or VI
Infants	I
Children	III

Justification

Nutrient deficiencies or diseases can be the result of poor nutritional intake, chronic health conditions, acute health conditions, medications, altered nutrient metabolism, or a combination of these factors, and can impact the levels of both macronutrients and micronutrients in the body. They can lead to alterations in energy metabolism, immune function, cognitive function, bone formation, and/or muscle function, as well as growth and development if the deficiency is present during fetal development and early childhood.

The Centers for Disease Control and Prevention (CDC) estimates that less than 10% of the United States population has nutrient deficiencies; however, nutrient deficiencies vary by age, gender, and/or race and ethnicity (1). For certain segments of the population, nutrient deficiencies may be as high as one third of the population (1).

Intake patterns of individuals can lead to nutrient inadequacy or nutrient deficiencies among the general population. Intakes of nutrients that are routinely below the Dietary Reference Intakes (DRI) can lead to a decrease in how much of the nutrient is stored in the body and how much is available for biological functions. DRIs are based on age and sex and include Recommended Dietary Allowance (RDA), Adequate Intake (AI), Estimated Average Requirement (EAR) and Tolerable Upper Intake Level (UL). DRIs are established by the National Academies of Science, Engineering and Medicine and include the following definitions:

- RDA - Indicates the average daily intake of particular nutrients to meet the requirements of 97-98% of healthy people.
- AI - Established to assume adequate intake when there is insufficient evidence to develop an RDA.

- EAR - The average daily intake of a nutrient that is thought to meet the needs of 50% of healthy individuals. EARs are used to assess the adequacy of nutrient intakes among populations rather than the individual.
- UL - The highest nutrient intake that is considered to be safe and does not lead to adverse health effects in the general population (2).

Macronutrient deficiencies include deficiencies in protein, fat, and/or calories, and can lead to stunting, pronounced wasting (marasmus) or a disproportionately large abdomen (a sign of kwashiorkor). Marasmus is a disease of severe wasting due to a prolonged inadequate intake of protein, carbohydrate, and fat. Kwashiorkor is a disease that results from a prolonged inadequate intake of protein. Essential fatty acid deficiencies, which would include omega-3 fatty acid deficiency, are thought to be rare among the general population (3, 4). Signs of an essential fatty acid deficiency may include a dry scaly rash, decreased growth in infants and children, lowered immune response, and impaired wound healing (3).

Micronutrient deficiencies would include deficiencies in vitamins and minerals in the body. According to National Health and Nutrition Examination Survey (NHANES) data, the most common nutrient deficiencies from 2003-2006 in the general United States population were vitamin B6, iron, vitamin D, vitamin C, and vitamin B12 (1). Because NHANES does not assess the status of all vitamins and minerals, there may be other micronutrient deficiencies that are present in the population without an estimated prevalence.

According to NHANES data from 2005-2012, a significant proportion of women who participate in WIC have inadequate nutrient intakes of vitamin E (96-100%). Additionally, greater than 50% of pregnant women participants reported inadequate intakes of iron and between 10-50% reported inadequate intakes of magnesium, folate, zinc, vitamin A, vitamin C, and vitamin B6 (5). Micronutrient deficiencies during pregnancy are not only a concern for the mother, but are of great concern to the developing fetus that is at risk of certain birth defects related to inadequate levels of certain nutrients including B vitamins, vitamin K, magnesium, copper, and zinc (6). Iodine deficiency during pregnancy can lead to irreversible adverse effects on fetal growth and development. Iodine deficiency is the leading cause of intellectual disability worldwide. According to NHANES data from 2005-2008, 56.9% of the pregnant women surveyed had urinary iodine concentrations below the established threshold of 150mcg/L. This finding suggests that greater than half of pregnant women have insufficient intakes of iodine (7). Because intake patterns of pregnant women can exclude or limit specific food groups, it is not uncommon to have multiple nutrient deficiencies during pregnancy (8). For example, iron deficiency usually does not occur alone, but it often occurs in conjunction with other vitamin and mineral deficiencies (9).

Intakes of nutrients were also found to be low among postpartum and breastfeeding women participating in WIC. Among women who were breastfeeding and participating in WIC, more than 50% had inadequate intakes of vitamin A, and 10-50% had inadequate intakes of magnesium, zinc, vitamin C, vitamin B6, folate, copper, and calcium (5). Greater than 50% of postpartum women who were not breastfeeding were found to have inadequate intakes of magnesium, vitamin A, and calcium, while 10-50% had inadequate intakes of vitamin C, folate, copper, zinc, thiamin, vitamin B6, vitamin B12, iron, and riboflavin (5).

According to NHANES data from 2011-2012, formula fed infants had an average usual intake of choline that was below the AI for that nutrient; however, intakes of other vitamins and minerals were estimated to be adequate (5). Intakes of vitamin D, iron, and zinc among breastfed infants can be of concern if appropriate and timely complementary foods and/or vitamin and mineral supplements are not provided to the infant. According to NHANES data from 2009-2012, at least 10% of infants receiving human milk between 6 and 12 months of age had inadequate intakes of iron and zinc (5). Concentrations of vitamin D in human milk have

been found to be low. Therefore, it has been recommended by the American Academy of Pediatrics (AAP) to provide all infants who are taking less than 32 ounces of formula a day a vitamin D supplement of 400 IU daily (10, 11). Additionally, infants who are born to mothers who are vitamin D deficient are more likely to be deficient themselves. (For more information see risk 411 *Inappropriate Nutrition Practices for Infants*.)

For children participating in the WIC program, the prevalence of inadequate intakes of nutrients was found to be less than 5% for each nutrient, except vitamin E, which was found to be inadequate in the diets of 34.9% of children between 2 and 5 years of age (5). Additionally, it has been estimated that one in four children does not meet the RDA for iron, and one in ten does not meet the RDA for calcium (12).

In addition to health risks associated with low nutrient status, some micronutrients pose a health risk at levels higher than the established UL. For this reason, individuals with nutrient deficiency diseases, or who are concerned that they may have a nutrient deficiency disease, should be followed by their medical provider (especially if supplements are required for treatment).

Populations who may be at greater risk of nutrient deficiencies or diseases include:

- Individuals who have intakes below the established RDA, AI, or EAR for the nutrient.
- Individuals who experience food insecurity.
- Individuals who are experiencing homelessness.
- Women who have a short interpregnancy interval.
- Individuals who have recently left their previous country of residence.
- People with a gastrointestinal disease that can limit absorption of nutrients (i.e. celiac disease or Crohn's disease) or individuals with a history of gastrointestinal surgery (including gastric bypass). For example, individuals who have had a portion of their stomach removed or their distal ileum removed during a weight-loss or other surgery are at a greater risk of developing a vitamin B12 deficiency (13).
- Individuals with other medical conditions that influence nutrient status (i.e. cystic fibrosis, renal disease, genetic disorders).
- Individuals on medications that are known to interact with the absorption or excretion of certain vitamins and minerals.
- People with substance use disorders (including alcohol) may be more likely to have deficiencies due to poor intake and/or the effects of the substance. People who have high intakes of alcohol are at greater risk of developing a magnesium deficiency (14, 15).
- People who smoke are more likely to have a vitamin C deficiency due to the increase in oxidative stress.

Nutrient deficiencies or diseases can be subclinical or clinical. Subclinical deficiencies involve changes to the concentrations of the micronutrient in the blood or tissues. Clinical deficiencies involve noticeable changes to the appearance of skin, nails, hair, oral cavity, and bone formation as well as major disturbances in the function of cells and tissues in the body. At either stage of a nutrient deficiency, blood work is often taken to confirm a deficiency. Blood work to detect nutrient deficiencies can be misleading, as some nutrients, such as magnesium, may have an overall deficiency in the body but be at a normal level in the blood (15). Other methods can be used to assess for nutrient deficiency disease, such as a physical

nutrition assessment. Because it can be difficult to be tested for, and diagnosed with, a nutrient deficiency or a nutrient deficiency disease can go undetected and untreated.

The table below provides information regarding specific nutrients that are more commonly of concern among the WIC population; however, additional nutrient deficiency diseases may occur in the population. Detailed fact sheets about each nutrient can be found at the National Institutes of Health Office of Dietary Supplements website: https://ods.od.nih.gov/factsheets/list-all/.

Nutrient	Function	Signs and Symptoms of Deficiency
Vitamin A	Involved in immune function, vision, cell growth and cell communication.	Night blindness and xerophthalmia (16).
Vitamin B6	Involved in greater than 100 enzyme reactions in the body and involved in protein metabolism.	Microcytic anemia, scaling of the lips and cracks in the corners of the mouth, swollen tongue, depression, and confusion (17).
Vitamin B12	Involved in red blood cell formation, neurological function, and DNA synthesis.	Megaloblastic anemia, fatigue, weakness, constipation, loss of appetite, and weight loss (13).
Vitamin C	Involved in the formation of collagen, certain neurotransmitters, and protein synthesis.	Development of scurvy which would include: fatigue, inflammation of the gums, and weakened connective tissue (14).
Vitamin D	Promotes calcium absorption and proper bone formation, involved in cell growth, immune function, and reduces inflammation.	Development of rickets in children or osteomalacia in adults, and fatigue (18).
Calcium	Involved in muscle function, nerve transmission, and proper bone formation.	Development of osteoporosis (19).
Folate	Involved in the synthesis of RNA and DNA and is required for cell division and the prevention of Neural Tube Defects.	Megaloblastic anemia (20).
Iodine	A component of thyroid hormones that regulate protein synthesis, metabolism, and enzyme activity.	Stunted growth and neurodevelopmental deficits (7).
Iron	A component of hemoglobin and therefore important in the transfer of oxygen from the lungs to organs, and involved in the synthesis of hormones as well as normal growth and development.	Microcytic, hypochromic anemia; impaired cognitive function, poor body temperature regulation, depressed immune function, and spoon like shape of nails (9).
Magnesium	Involved in more than 300 enzyme	Loss of appetite, fatigue, weakness, nausea,

Nutrient	Function	Signs and Symptoms of Deficiency
Magnesium (continued)	reactions, protein synthesis, muscle function, nerve function, blood sugar control, and blood pressure control.	vomiting, numbness, tingling, muscle cramps, seizures, personality changes, and abnormal heart rhythms (15).
Zinc	Involved in cell metabolism, enzyme activity, immune function, protein synthesis, wound healing, DNA synthesis, and cell division.	Stunted growth, depressed immune function, hair loss, eye and skin lesions, delayed wound healing, and taste alterations (21).

Implications for WIC Nutrition Services

The WIC food package is designed to include foods that contain specific nutrients to improve the health status of program participants, address inadequate intakes, and, ultimately, prevent nutrient deficiencies. Nutrition education combined with the WIC food package can help decrease the likelihood that an individual would develop a nutrient deficiency or disease. For individuals who currently have a nutrient deficiency or disease, WIC staff can:

- Encourage improved intake of whole grains, legumes, dairy, lean protein, fruits, and vegetables.
- Emphasize appropriate portion size and variety to avoid nutrient to nutrient interaction. (For example, excessive calcium intake inhibits the absorption of iron.)
- Provide education on foods that contain the specific nutrient(s) of concern.
- Provide education on preparing foods that are part of the WIC food package.
- Refer individuals who report food insecurity to appropriate resources in the community like the Supplemental Nutrition Assistance Program (SNAP) and/or food pantries.
- Reinforce the medical and dietary treatment plans provided by the medical provider, and refer participants to medical providers for medical follow-up care.
- Refer individuals who smoke to tobacco cessation programs.

References

1. Centers for Disease Control and Prevention [Internet]. Georgia: [updated 2016 Mar; cited 2016 Dec 5]. CDC's second nutrition report: a comprehensive biochemical assessment of the nutrition status of the U.S. population; [about 4 screens]. Available from: https://www.cdc.gov/nutritionreport/pdf/4Page_%202nd%20Nutrition%20Report_508_032912.pdf.
2. Institute of Medicine. Dietary reference intakes: the essential guide to nutrient requirements. Washington, DC: The National Academies Press; 2006, doi:https://doi.org/10.17226/11537.
3. Linus Pauling Institute [Internet]. Oregon: [updated 2014 May; cited 2016 Dec 5]. Essential fatty acids; [about 12 pages]. Available from: http://lpi.oregonstate.edu/mic/other-nutrients/essential-fatty-acids.
4. National Institutes of Health [Internet]. Maryland: [updated 2016 Nov 2; cited 2016 Dec 2]. Omega-3 fatty acids fact sheet for health professionals; [about 13 pages]. Available from: https://ods.od.nih.gov/factsheets/Omega3FattyAcids-HealthProfessional/.

5. National Academies of Sciences, Engineering, and Medicine. Review of WIC food packages: improving balance and choice: final report. Washington, DC: The National Academies Press; 2017, doi:https://doi.org/10.17226/23655.

6. Association of State Public Health Nutritionists. The role of nutrition in infant mortality: a public health perspective. ASPHN Brief 2013.

7. National Institutes of Health [Internet]. Maryland: [updated 2011 Jun 24; cited 2016 Dec 2]. Iodine fact sheet for health professionals; [about 10 pages]. Available from: https://ods.od.nih.gov/factsheets/Iodine-HealthProfessional/.

8. Linus Pauling Institute [Internet]. Oregon: [updated 2016 Aug; cited 2016 Dec 5]. Pregnancy and lactation; [about 12 pages]. Available from: http://lpi.oregonstate.edu/mic/life-stages/pregnancy-lactation.

9. National Institutes of Health [Internet]. Maryland: [updated 2016 Feb 11; cited 2016 Dec 2]. Iron fact sheet for health professionals; [about 14 pages]. Available from: https://ods.od.nih.gov/factsheets/Iron-HealthProfessional/.

10. American Academy of Pediatrics [Internet]. Illinois: [updated 2010 Mar 22; cited 2016 Dec 2]. Vitamin D supplementation for infants; [about 2 pages]. Available from: https://www.aap.org/en-us/about-the-aap/aap-press-room/pages/Vitamin-D-Supplementation-for-Infants.aspx.

11. Centers for Disease Control and Prevention [Internet]. Georgia: [updates 2015 Jun 17; cited 2016 Dec 5]. Vitamin D supplementation; [about 2 pages]. Available from: https://www.cdc.gov/breastfeeding/recommendations/vitamin_d.htm.

12. Hamner, H, Perrine C, Scanlon. Usual intake of key minerals among children in the second year of life, NHANES 2003-2012. Nutrients. 2016; 8:468.

13. National Institutes of Health [Internet]. Maryland: [updated 2016 Feb 11; cited 2016 Dec 2]. Vitamin B12 fact sheet for health professionals; [about 12 pages]. Available from: https://ods.od.nih.gov/factsheets/VitaminB12-HealthProfessional/.

14. National Institutes of Health [Internet]. Maryland: [updated 2016 Feb 11; cited 2016 Dec 2]. Vitamin C fact sheet for health professionals; [about 14 pages]. Available from: https://ods.od.nih.gov/factsheets/VitaminC-HealthProfessional/.

15. National Institutes of Health [Internet]. Maryland: [updated 2016 Feb 11; cited 2016 Dec 2]. Magnesium fact sheet for health professionals; [about 13 pages]. Available from: https://ods.od.nih.gov/factsheets/Magnesium-HealthProfessional/.

16. National Institutes of Health [Internet]. Maryland: [updated 2016 Aug 31; cited 2016 Dec 2]. Vitamin A fact sheet for health professionals; [about 13 pages]. Available from: https://ods.od.nih.gov/factsheets/VitaminA-HealthProfessional/.

17. National Institutes of Health [Internet]. Maryland: [updated 2016 Feb 11; cited 2016 Dec 2]. Vitamin B6 fact sheet for health professionals; [about 12 pages]. Available from: https://ods.od.nih.gov/factsheets/VitaminB6-HealthProfessional/.

18. National Institutes of Health [Internet]. Maryland: [updated 2016 Feb 11; cited 2016 Dec 2]. Vitamin D fact sheet for health professionals; [about 14 pages]. Available from: https://ods.od.nih.gov/factsheets/VitaminD-HealthProfessional/.

19. National Institutes of Health [Internet]. Maryland: [updated 2016 Nov 17; cited 2016 Dec 2]. Calcium fact sheet for health professionals; [about 20 pages]. Available from: https://ods.od.nih.gov/factsheets/Calcium-HealthProfessional/.

20. National Institutes of Health [Internet]. Maryland: [updated 2016 Apr 20; cited 2016 Dec 2]. Folate fact sheet for health professionals; [about 16 pages]. Available from: https://ods.od.nih.gov/factsheets/Folate-HealthProfessional/.

21. National Institutes of Health [Internet]. Maryland: [updated 2016 Feb 11; cited 2016 Dec 2]. Zinc fact sheet for health professionals; [about 12 pages]. Available from: https://ods.od.nih.gov/factsheets/Zinc-HealthProfessional/.

Clarification

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342 Gastrointestinal Disorders

Definition/Cut-off Value

Disease(s) and/or condition(s) that interferes with the intake or absorption of nutrients. The diseases and/or conditions include, but are not limited to:

Gastrointestinal Disorders	
Gastroesophageal reflux disease (GERD)	Peptic ulcer
Post-bariatric surgery	Short bowel syndrome
Inflammatory bowel disease, including ulcerative colitis or Crohn's disease	Liver disease
Pancreatitis	Biliary tract disease

Presence of gastrointestinal disorders diagnosed, documented, or reported by a physician or someone working under a physician's orders, or as self reported by applicant/participant/caregiver. See Clarification for more information about self-reporting a diagnosis.

Participant Category and Priority Level

Category	Priority
Pregnant Women	I
Breastfeeding Women	I
Non-Breastfeeding Women	III, IV, V or VI
Infants	I
Children	III

Justification

Gastrointestinal disorders increase nutritional risk in a number of ways, including restricted food intake, abnormal deglutition, impaired digestion of food in the intestinal lumen, generalized or specific nutrient malabsorption, or excessive gastrointestinal losses of endogenous fluids and nutrients. Frequent loss of nutrients through vomiting, diarrhea, malabsorption, or infections can result in malnourishment and lowered disease resistance (1, 2). Nutrition management plays a prominent role in the treatment of gastrointestinal disorders.

Gastroesophageal Reflux Disease (GERD)

GERD is irritation and inflammation of the esophagus due to reflux of gastric acid into the esophagus (3). Nutritional care of GERD includes avoiding eating within 3 hours before going to bed; avoiding fatty foods, chocolate, peppermint, and spearmint, which may relax the lower esophageal sphincter; and coffee and

alcoholic beverages, which may increase gastric secretion (4). Consumption of these items may need to be limited depending on individual tolerance.

Peptic Ulcer

Peptic ulcer normally involves the gastric and duodenal regions of the gastrointestinal tract (4). Because the primary cause of peptic ulcers is Helicobacter pylori infection, the focus of treatment is the elimination of the bacteria with antibiotic and proton pump inhibitor therapy. Dietary advice for persons with peptic ulcers is to avoid alcohol, coffee (with and without caffeine), chocolate, and specific spices, such as black pepper (4, 5).

Post-bariatric Surgery

Many types of surgical procedures are used for the intervention of morbid obesity. These procedures promote weight loss by restricting dietary intakes, e.g., adjustable gastric banding (AGB), and/or bypassing some portion of intestine to cause incomplete digestion and/or malabsorption of nutrients, e.g., Roux-y gastric bypass (RYGB). Therefore, the risks for developing nutritional deficiencies after bariatric surgery are greatly increased. Since gastric bypass individuals have both a decreased availability of gastric acid and intrinsic factor, vitamin B12 deficiency can develop without supplementation. Taking daily nutritional supplements and eating foods high in vitamins and minerals are important aspects of the nutritional management for the individuals who have had bariatric surgery (6).

Short Bowel Syndrome (SBS)

SBS is the result of extensive small bowel resection. SBS in infants is mostly the result of small bowel resection for the treatment of congenital anomalies, necrotizing enterocolitis, and congenital vascular. In adults, Crohn's disease, radiation enteritis, mesenteric vascular accidents, trauma, and recurrent intestinal obstruction are the most common conditions treated by small bowel resection and resulting in SBS (4). The loss of a large segment of the small bowel causes malabsorption syndrome. Total parenteral nutrition usually is started within the first few days after intestinal resection. Gradual supplementation with enteral feeding promotes intestinal adaptation in order to wean from parenteral nutrition therapy. Supplementation with fat soluble vitamins and vitamin B12 may be needed (7). The pediatric client's nutritional status must be assessed and growth closely monitored (8).

Inflammatory Bowel Disease (IBD)

Inflammatory bowel disease includes Crohn's disease and ulcerative colitis. Weight loss, growth impairment, and malnutrition are the most prevalent nutritional problems observed in IBD. Nutritional support is essential. Exclusive elemental nutrition has been used in attaining the remission of Crohn's disease. However, symptoms tend to recur promptly after resuming the conventional diet (9).

Liver Disease

Since the liver plays an essential role in the metabolic processes of nutrients, liver disorders have far-reaching effects on nutritional status. Acute liver injury is often associated with anorexia, nausea and vomiting. Therefore, inadequate nutritional intakes are common. Decreased bile salt secretion is associated with the maldigestion and impaired absorption of fat and fat-soluble vitamins. Defects in protein metabolism associated with chronic liver failure include decreased hepatic synthesis of albumin, coagulation factors, urea synthesis and metabolism of aromatic amino acids. For nutritional therapy, an important consideration should be the balance between preventing muscle wasting and promoting liver regeneration without causing hepatic encephalopathy. It is recommended that persons with chronic liver disease consume the same amount of dietary protein as that required by normal individuals (0.74g/kg) (10).

Pancreatic Disease

In chronic pancreatitis, there is a reduced secretion of pancreatic enzymes leading to malabsorption. In severe cases, tissue necrosis can occur. It is suggested that for patients with pancreatitis, a high carbohydrate, low-fat, low protein diet may be helpful (11).

Biliary Tract Diseases

Common diseases of the biliary tract are:

- Cholelithiasis (gallstones, without infection).
- Choledocholithiasis (gallstone in the bile duct causing obstruction, pain and cramps).
- Cholecystitis (inflammation of gallbladder caused by bile duct obstruction).

Obesity or severe fasting may increase risk for these disorders. Since lipids stimulate gallbladder contractions, a low fat diet with 25% to 30% of total calories as fat is recommended. Greater fat limitation is undesirable as some fat is required for stimulation and drainage of the biliary tract. Supplementation with fat-soluble vitamins may be needed for persons with fat malabsorption or a chronic gall bladder condition (12).

WIC nutritionists can provide counseling to support the medical nutrition therapy given by clinical dietitians, and monitor compliance with therapeutic dietary regimens. They can also review and provide WIC-approved medical foods or formulas prescribed by the health care providers. In certain circumstances, WIC staff may recommend an appropriate medical food or formula to the health care provider. They should also make referrals to an appropriate health care provider for medical nutrition therapy by a clinical dietitian when indicated.

References

1. Institute of Medicine. WIC nutrition risk criteria: a scientific assessment. National Academy Press, Washington, D.C.; 1996.
2. American Dietetic Association, Pediatric Nutrition Practice Group. Pediatric manual of clinical dietetics. Chicago: Pediatric Nutrition Dietetic Practice Group, American Dietetic Association, 1998.
3. Stenson W. The esophagus and stomach. In: Maurice ES, Olson JA, Shike M, Ross AC, editors. Modern nutrition in health and disease. 9th Ed. Lippincott Williams & Wilkins 1999. p. 1125-1133.
4. Beyer PL. Medical nutrition therapy for upper gastrointestinal tract disorders. In: Mahan LK, Escott-Stump S, editors. Krause's food nutrition and diet therapy. 11th Ed. Philadelphia: Saunders; 2004. p. 688-690.
5. American Dietetic Association. Nutrition Care Manual. Gastrointestinal disease; Peptic ulcers; 2006. http://www.nutritioncaremanual.org. Accessed 1/08.
6. Allied Health Sciences Section Ad Hoc Nutrition committee: Aills L, Blankenship J, Buffington C, Furtado M and Parrott J. Bariatric nutrition: suggestions for the surgical weight loss patient. Review. Surgery for Obesity and Related Diseases 2008 May 17.

7. Scolapio JS, Fleming R. Short Bowel Syndrome. In: Maurice ES, Olson JA, Shike M, Ross AC, editors. Modern nutrition in health and disease. 9th Ed. Lippincott Williams & Wilkins; 1999. p. 1135-1140.

8. Farrell M. Gastrointestinal disorders of infancy and childhood (with nutrition support and probiotics) In: Ekvall SW, Ekvall VK. editors. Pediatric nutrition in chronic diseases and developmental disorders. 2nd ed. Oxford University Press; 2005. p. 248-249.

9. Griffiths A. Inflammatory bowel disease. In: Maurice ES, Olson JA, Shike M, Ross AC, editors. Modern nutrition in health and disease. 9th Ed. Lippincott Williams & Wilkins; 1999. p. 1141-1149.

10. Lieber CS. Nutrition in liver disorders. In: Maurice ES, Olson JA, Shike M, Ross AC, editors. Modern nutrition in health and disease. 9th Ed. Lippincott Williams & Wilkins; 1999. p. 1177-1189.

11. Raimondo M, Dimagno EP. Nutrition in pancreatic disorders. In: Maurice ES, Olson JA, Shike M, Ross AC, editors. Modern nutrition in health and disease. 9th Ed. Lippincott Williams & Wilkins; 1999. p. 1169-1176.

12. Hasse JM, Matarese JE. Medical nutrition therapy for liver, biliary system and exocrine pancreas disorders. In: Mahan LK, Escott-Stump S, editors. Krause's food nutrition and diet therapy. 11th Ed. Philadelphia: Saunders; 2004. p. 758-760.

Clarification

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343 Diabetes Mellitus

Definition/Cut-off Value

Diabetes mellitus consists of a group of metabolic diseases characterized by inappropriate hyperglycemia resulting from defects in insulin secretion, insulin action or both (1).

Presence of diabetes mellitus diagnosed, documented, or reported by a physician or someone working under a physician's orders, or as self reported by applicant/participant/caregiver. See Clarification for more information about self-reporting a diagnosis.

Participant Category and Priority Level

Category	Priority
Pregnant Women	I
Breastfeeding Women	I
Non-Breastfeeding Women	III, IV, V or VI
Infants	I
Children	III

Justification

Diabetes mellitus may be broadly described as a chronic, systemic disease characterized by:

- Abnormalities in the metabolism of carbohydrates, proteins, fats, and insulin; and
- Abnormalities in the structure and function of blood vessels and nerves (2).

The chronic hyperglycemia of diabetes is associated with long-term damage, dysfunction, and failure of various organs, especially the eyes, kidneys, nerves, heart, and blood vessels (1, 2) and includes type 1 diabetes mellitus, type 2 diabetes mellitus, and Maturity Onset Diabetes of the Young (MODY). MODY is a series of familial disorders characterized by early onset and mild hyperglycemia. Specific genetic defects have been identified on chromosomes 7, 12, and 20 (2). MODY is often diagnosed before the age of 25 years. It is caused by dominantly inherited defect of insulin secretion. Persons with MODY are often non-obese and without metabolic syndrome (3).

The two major classifications of diabetes are type 1 diabetes (beta-cell destruction, usually leading to absolute insulin deficiency); and type 2 diabetes (ranging from predominantly insulin resistance with relative insulin deficiency to a predominantly insulin secretory defect with insulin resistance) (1). The Expert Committee on Diagnosis and Classification of Diabetes Mellitus, working under the sponsorship of the American Diabetes Association, has identified the criteria for the diagnosis of diabetes mellitus (1, 2) (see clarification).

Long-term complications of diabetes include retinopathy with potential loss of vision, nephropathy leading to renal failure; peripheral neuropathy with risk of foot ulcers, amputations, and Charcot joints; and, autonomic neuropathy causing gastrointestinal, genitourinary, cardiovascular symptoms and sexual

dysfunction. Patients with diabetes have an increased incidence of atherosclerotic cardiovascular, peripheral arterial and cerebrovascular diseases. Hypertension and abnormalities of lipoprotein metabolism are often found in people with diabetes (1).

WIC nutrition services can reinforce and support the medical and dietary therapies (such as Medical Nutrition Therapy) that participants with diabetes receive from their health care providers (4).

References

1. American Diabetes Association. Diagnosis and classification of diabetes mellitus. Diabetes Care. Jan 2008; 31 Suppl 1:S55-60.
2. Franz MT, Ratner RE. Diabetes and Complications. In: Pathophysiology of the diabetes disease state: a Core Curriculum for Diabetes Educators American Association of Diabetes Educators. 5th Ed. 2003.
3. Dean L, McEntrye J. The genetic landscape of diabetes. 2004; Bethesda: NCBI, 2004. http://www.ncbi.nlm.nih.gov/books/bv.fcgi?call=bv.veiw..showtoc&rid=diabetes.toc&depth=1.
4. American Diabetes Association. Nutrition recommendations and interventions for diabetes: a position statement of the American Diabetes Association. Diabetes Care. 2006; 29: 2140-2157:S48-S65.

Clarification

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Diabetes mellitus is sometimes described by both patients and health professionals as "a little bit of sugar" or "high sugar." In reality, "sugar" is only one component of the pathology and clinical manifestations of the multifaceted syndrome of diabetes mellitus (2).

Diabetes mellitus is diagnosed by a licensed medical provider using any one of the following three methods:

1. Fasting plasma glucose $\geq$ 126 mg/dL (7.0 mmo1/L). Fasting is defined as no caloric intake for at least 8 hours.
2. Symptoms of hyperglycemia plus casual plasma glucose concentration $\geq$ 200 mg/dl (11.1 mmo1/L).
   - Casual implies any time of day without regard to time since last meal.
   - The classic symptoms of hyperglycemia include polyuria, polydipsia, and unexplained weight loss.
3. Two-hour plasma glucose $\geq$ 200mg/dL (11.1 mmo1/L) during a 75-g oral glucose tolerance test (OGTT) (1).

In the absence of unequivocal hyperglycemia, these criteria should be confirmed by repeat testing on a different day. The third measure (OGTT) is not recommended for routine clinical use.

344 Thyroid Disorders

Definition/Cut-Off Value

Thyroid dysfunctions that occur in pregnant and postpartum women, during fetal development, and in childhood are caused by the abnormal secretion of thyroid hormones. The medical conditions include, but are not limited to, the following:

Thyroid Dysfunction	Definition
Hyperthyroidism	Excessive thyroid hormone production (most commonly known as Graves' disease and toxic multinodular goiter).
Hypothyroidism	Low secretion levels of thyroid hormone (can be overt or mild/subclinical). Most commonly seen as chronic autoimmune thyroiditis (Hashimoto's thyroiditis or autoimmune thyroid disease). It can also be caused by severe iodine deficiency.
Congenital Hyperthyroidism	Excessive thyroid hormone levels at birth, either transient (due to maternal Grave's disease) or persistent (due to genetic mutation).
Congenital Hypothyroidism	Infants born with an under active thyroid gland and presumed to have had hypothyroidism in-utero.
Postpartum Thyroiditis	Transient or permanent thyroid dysfunction occurring in the first year after delivery based on an autoimmune inflammation of the thyroid. Frequently, the resolution is spontaneous.

Presence of condition diagnosed, documented, or reported by a physician or someone working under physician's orders, or as self reported by applicant/participant/caregiver. See Clarification for more information about self-reporting a diagnosis.

Participant Category and Priority Level

Category	Priority
Pregnant Women	I
Breastfeeding Women	I
Non-Breastfeeding Women	III, IV, V or VI
Infants	I
Children	III

Justification

The thyroid gland manufactures three thyroid hormones: thyroxine (T_4), triiodothyronine (T_3), and calcitonin. The thyroid hormones regulate how the body gets energy from food (metabolism). Iodine is an essential component of the T_4 and T_3 hormones (1) and must come from the diet. (Note: In nature, iodine does not exist as a free element; rather, it forms compounds such as sodium iodide (2, 3). For more information see Clarification section.) Iodine is available from various foods, and is present naturally in soil and sea water. A dysfunctional thyroid gland can become enlarged (goiter) as a result of an overproduction of thyroid hormones (hyperthyroidism) or conversely, from insufficient thyroid hormone production (hypothyroidism). Thyroid hormones influence virtually every organ system in the body.

Maternal needs for dietary iodine and thyroid hormone medication (if prescribed) increase during pregnancy as maternal thyroid hormones and iodine are transferred to the fetus along with an increased loss of iodine through the maternal kidneys (3). Concurrently, the fetus is unable to produce thyroid hormones during the first trimester and is entirely dependent on the maternal supply of thyroid hormones. As a result, maternal production of T_4 must increase by at least 50% during pregnancy (4). If the pregnant woman is receiving thyroid hormone therapy, often a 30% - 50% increase in thyroid hormone medication is also needed.

Hyperthyroidism

Hyperthyroidism is a condition in which the thyroid gland is overactive, manufacturing too much thyroid hormone (T_4 and T_3). An excessive consumption of iodine (> 1000 µg/d) may cause fetal and maternal hyperthyroidism (5). In other circumstances, the thyroid might develop nodules which secrete excessive amounts of thyroid hormone regardless of iodine status (5). Enlargement of the thyroid gland (goiter) is a common symptom, as well as weight loss, fatigue, muscle weakness and an irregular heartbeat.

Hyperthyroidism is relatively uncommon in pregnancy (4). However, when it occurs, uncontrolled hyperthyroidism (especially in the second half of pregnancy) may result in infection, miscarriage, preterm delivery, preeclampsia, or congestive heart failure. Fetal complications may include prematurity, small for gestational age, fetal or neonatal thyrotoxicosis, or death (6). Postpartum maternal hyperthyroidism is likely in women with prenatal hyperthyroidism (7).

The primary medical therapy for hyperthyroidism is radioactive iodine therapy which is contraindicated during pregnancy and lactation (7). If hyperthyroidism occurs during this period, low doses of thiomide (antithyroid drug) are given instead.

Hypothyroidism

Hypothyroidism is a condition in which the thyroid gland does not make enough thyroid hormone. Maternal and fetal hypothyroidism may occur when preconception maternal iodine stores are insufficient and there is inadequate maternal iodine intake in early pregnancy. In this instance, the maternal iodine balance may become negative and may never be restored, even with eventual iodine supplementation (4).

Mothers with iodine deficiency during the first half of pregnancy may produce offspring with severe, irreversible brain damage (8). Maternal thyroid deficiency has been associated with neonatal developmental problems which may cause lasting changes in the brain structure and cognitive function.

Uncontrolled hypothyroidism in the second half of pregnancy can cause maternal complications such as anemia, preeclampsia, miscarriage, premature delivery, and postpartum thyroid disease. Fetal or neonatal

complications include prematurity, low birth weight, congenital anomalies, poor neuropsychological development, and stillbirth (6).

When iodine nutrition status is adequate, autoimmune thyroid disease (AITD) – also called Hashimoto's thyroiditis - is the most common type of hypothyroidism during pregnancy (4). Pregnant women with AITD are at increased risk of miscarriage and postpartum thyroid disease (including thyroiditis, hyperthyroidism and hypothyroidism). There is an increased risk of permanent and significant impairment in cognitive function for their infants (9).

Congenital Hyperthyroidism and Hypothyroidism

Congenital hyperthyroidism is rare in neonates. Transient congenital hyperthyroidism is caused by maternal Graves disease. Thyroid stimulating immunoglobulin passes from the mother to the fetus via the placenta and causes thyrotoxicosis in the fetus and subsequently, the neonate. After the baby is born, improvement is rapid if the condition is treated using antithyroid drugs and the hyperthyroidism will subside within several weeks (10). Persistent congenital hyperthyroidism is a familial non-autoimmune disease. It is caused by a genetic mutation resulting in an increase in the constitutive activity of the TSH receptor (11).

Congenital hypothyroidism due to maternal iodine deficiency is a leading cause of preventable mental retardation (10). Over-treatment of thyroid hormone, during pregnancy, as well as prolonged maternal iodine therapy (more than two weeks of therapy or more than 1000 µg/iodine) can also cause congenital hypothyroidism (6). The condition is exacerbated by coexisting selenium and vitamin A deficiencies or iron deficiency (5). Treatment for neonatal hypothyroidism should be started as soon as possible, as every day of delay may result in loss of IQ. Unless treated shortly after birth (within the first 18 days of life), the resulting mental retardation will be irreversible (10).

Postpartum Thyroiditis

Postpartum thyroiditis, an autoimmune inflammation of the thyroid, occurs within the first year after delivery or sometimes after termination of pregnancy. It can be a transient thyroid dysfunction with a brief thyrotoxic phase followed by hypothyroidism, usually with a spontaneous resolution (10). Smoking is a significant precipitating factor in the onset of postpartum thyroiditis (9). Women with a past history of postpartum thyroiditis have a risk of long-term permanent hypothyroidism and recurrence of postpartum thyroiditis in subsequent pregnancies (12). Tests for this condition consist of radioactive products necessitating a temporary cessation of breastfeeding (usually up to 3 days).

Implications for WIC Nutrition Services

Individuals with thyroid disorders can benefit from WIC foods and WIC nutrition services can reinforce and support the medical and dietary therapy prescribed by the participants' health care provider. The following nutrition education messages may be appropriate depending on the type of thyroid disorder:

- Encourage iodine sufficiency, unless contraindicated, with an adequate intake of foods high in iodine such as iodized table salt, bread, saltwater fish, kelp, egg yolks (because of iodine supplementation in chicken feed), milk and milk products (because of the treatment of cows with supplemental dietary iodine) (5). It is important to note that the salt used in manufactured foods is not iodized.
- Advise women to review the iodine content of their prenatal supplement. It is recommended that all prenatal vitamin-mineral supplements for use during pregnancy and lactation contain at least

150 micrograms of iodine a day (13). Currently, less than 50 percent of prenatal vitamins on the market contain iodine (5, 7).

- Promote breastfeeding, as there are no contraindications to breastfeeding and thyroid hormone replacement therapy as long as normal thyroxine levels in the maternal plasma are maintained. Breast milk provides iodine to the infant and is influenced by the dietary intake of the pregnant and lactating mother (14). Hyperthyroidism can develop for the first time during the postpartum period, but the mother's ability to lactate is not affected. However, if a woman with untreated hypothyroidism breastfeeds, her milk supply may be insufficient. In such instances, replacement thyroid hormone therapy is necessary to help increase milk production.
- Weight management - hyperthyroidism: The elevated plasma levels of thyroid hormones may cause increased energy expenditure and weight loss along with increased appetite. Following medical treatment, individuals with hyperthyroidism usually regain their typical body weight with a concurrent decrease in appetite (4). Therefore, the monitoring of weight status and dietary adequacy are recommended.
- Weight management – hypothyroidism: Many individuals with hypothyroidism experience an increase in weight due to both a decrease in basal metabolic rate and an excessive accumulation of water and salt. Most of the weight gained is due to the excess water and salt retention. After medical treatment, a small amount of weight may be lost, usually less than 10% of body weight (15). Once hypothyroidism has been treated and thyroid hormones are within normal levels, it is less likely that the weight gain is solely due to the thyroid. If an overweight condition persists, weight control therapy may be necessary.
- Recommend the cautionary use of soy formula and the avoidance of foods or supplements rich in soy, fiber, or iron when therapeutic thyroid medications are prescribed, since soy, iron, calcium, fiber and phytates may interfere with the absorption of oral thyroid hormone therapy (16, 17).
- Discourage smoking as the compound thiocynate found in tobacco smoke inhibits iodine transport (9).

References

1. National Academy of Sciences. Institute of Medicine. Food and Nutrition Board. Dietary reference intakes: The essential guide to nutrient requirements. 2001.
2. Los Alamos National Labs Chemistry Division Periodic Table. http://periodic.lanl.gov/elements/53.html. Accessed December 2009.
3. WebElements: The periodic table on the web. http://www.webelements.com/iodine/. Accessed December 2009.
4. Smallridge RC, Glinoer D, Hollowell JG, Brent G. Thyroid function inside and outside of pregnancy: What do we know and what don't we know? Thyroid. 2005;15(1):54-59.
5. Lee SL, Ananthakrishnan S, Pearce EN. Iodine deficiency. [updated July 27, 2006]. Available from: http://www.emedicine.com/med/topic1187.htm.
6. Nguyen PH. Autoimmune thyroid disease and pregnancy. [updated December 21, 2004;cited 2007 Sept 7]. Available from: http://www.emedicine.com.

7. American Association of Clinical Endocrinologists (AACE) Thyroid Task Force. AACE Medical guidelines for clinical practice for the evaluation and treatment of hyperthyroidism and hypothyroidism. 2006 Amended Version. Endocrine Practice 2002;8(6):457-469.
8. LaFranchi SH, Haddow JE, Hollowell JG. Is thyroid inadequacy during gestation a risk factor for adverse pregnancy and developmental outcomes? Thyroid 2005;15(1):60-71.
9. Muller AF, Drexhage HA, Berghout A. Postpartum thyroiditis and autoimmune thyroiditis in women of childbearing age: Recent insights and consequences for antenatal and postnatal care. Endocrine Reviews. 2001 Oct; 22(5):605-630.
10. Association for Clinical Biochemistry, British Thyroid Association, British Thyroid Foundation. UK guidelines for the use of thyroid function tests. 2006 July;1-86.
11. Polak M, Legac I, Vuillard E, Guibourdenche J, Castanet M, Luton D.Congenital hyperthyroidism: The fetus as a patient. Horm Res. 2006;65:235-242 (DOI: 10.1159/000092454).
12. O'Malley B, Hickey J, Nevens E. Thyroid dysfunction – weight problems and the psyche: The patients' perspective. J Hum Nutr Dietet. 2000 May;13:243-248.
13. American Thyroid Association. American Thyroid Association statement on early maternal thyroidal insufficiency: Recognition, clinical management and research directions. Consensus statement #2. Thyroid. 2005;15(1):77-79.
14. Riordan J. Breastfeeding and human lactation, 3rd ed. Jones & Bartlett Publishers, Inc., 2005; p. 157, 461.
15. American Thyroid Association. Thyroid and weight, 2005. Available from: http://www.thyroid.org.
16. American Academy of Pediatrics. American Thyroid Association, Lawson Wilkins Endocrine Society. Update of newborn screening and therapy for congenital hypothyroidism. Pediatrics. 2006; Jun;117(6): 2290-2303.
17. American Academy of Pediatrics Committee on Nutrition. Use of Soy protein-based formulas in infant feeding. Pediatrics. 2008;121(5):1062-1068 (doi:10.1542/peds.2008-0564).

Additional Reference

1. Hashimoto's Thyroiditis online reference: http://www.medicinenet.com/hashimotos_thyroiditis/article.htm.

Clarification

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Iodine (I_2) is an element. In the ambient temperature, it is volatile and forms blue-violet gas. In nature, it does not exist as free element. Instead, it forms compounds, such as sodium **iodide** (NaI), and potassium **iodide** (KI). To prevent iodine deficiency, potassium iodide is added to the salt (most commonly to table salt) to form iodized salt (2, 3).

345 Hypertension and Prehypertension

Definition/Cut-off Value

Hypertension is defined as high blood pressure which may eventually cause health problems and includes chronic hypertension during pregnancy, preeclampsia, eclampsia, chronic hypertension with superimposed preeclampsia, and gestational hypertension (1, 2, 3).

Prehypertension is defined as being at high risk for developing hypertension, based on blood pressure levels.

Presence of condition diagnosed, documented, or reported by a physician or someone working under a physician's orders, or as self-reported by applicant/participant/caregiver. See Clarification for more information about self-reporting a diagnosis.

Participant Category and Priority Level

Category	Priority
Pregnant Women	I
Breastfeeding Women	I
Non-Breastfeeding Women	III, IV, V or VI
Infants	I
Children	III

Justification

Hypertension (HTN), commonly referred to as high blood pressure, occurs when the force of blood against artery walls is high enough that it may eventually cause health problems. Hypertension is measured in terms of both systolic blood pressure (pressure in blood vessels when the heart contracts) and diastolic blood pressure (pressure in blood vessels when the heart rests between contractions). Two main factors in the body increase levels of blood pressure – a higher volume of blood being pumped by the heart and narrower arteries. Untreated HTN leads to many degenerative diseases, including congestive heart failure, end-stage renal disease, and peripheral vascular disease. People with HTN are often asymptomatic; diagnosis is based on measuring levels of blood pressure. (1)

Blood pressure levels in adults are typically classified as follows, with the first number representing systolic blood pressure and the second number diastolic blood pressure (2, 3):

- Normal blood pressure: <120/<80 mmHg (millimeters of mercury)
- Prehypertension: consistent readings of 120-139/80-89 mmHg
- Hypertension: consistent readings of ≥140/≥90 mmHg

About 75 million adults in the United States (1 in every 3) have HTN, and about the same number have prehypertension. Unfortunately, only half of adults in the United States with HTN have their blood pressure under control, and HTN leads to at least 410,000 deaths in the United States annually. (2)

Hypertension is considered either primary/essential (there is no identifiable cause) or secondary (there is an identifiable cause). Some identifiable causes include sleep apnea, kidney problems, diabetes, some tumors, thyroid problems, inflammation, and blood vessel defects. In addition, several medications (e.g., some birth control, cold medicines, decongestants, pain relievers) as well as illegal substances can significantly raise blood pressure. (1)

Risk factors for HTN include the following (1, 2):

- Age (Risk increases with age.)
- Race/ethnicity (In the United States, people of African descent experience disproportionately higher rates of HTN compared to other races/ethnicities. Causes for this racial disparity in rates of HTN are complex and multifactorial [4, 5].)
- Family history
- Overweight or obesity (This causes more blood to be pumped by the heart.)
- Physical inactivity (This is associated with a higher heart rate, which increases the force of blood against arteries.)
- Tobacco use (This increases blood pressure during use. Chemicals in tobacco also lead to narrowing of arteries.)
- Second-hand exposure to tobacco smoke
- Excessive sodium intake (This causes fluid retention, which increases blood pressure.)
- Inadequate potassium intake (This causes an excessive amount of sodium in the blood.)
- Excessive alcohol intake (This can damage the heart over time.)
- Stress
- Prehypertension
- Pregnancy
- Male gender

Hypertension is a serious condition that can lead to a variety of health problems, including the following (1, 3):

- Cardiac pathologies, including heart attack, stroke, aneurysm, and heart failure
- Metabolic syndrome
- Chronic kidney disease
- Eye damage and vision loss
- Memory/understanding problems and dementia
- Gestational diabetes, preeclampsia, and perinatal mortality

Management of HTN includes lifestyle modifications and medication. In prehypertensive individuals, implementing lifestyle changes can prevent or delay the onset of HTN. In hypertensive individuals, dietary intervention is not only effective in reducing blood pressure but also in delaying or avoiding drug treatment.

Lifestyle changes to manage HTN and prehypertension include the following:

- Have blood pressure checked at least yearly or as recommended by one's healthcare provider. For those at risk of HTN, regular monitoring of blood pressure is crucial. Blood pressure levels greater than 180/120 mmHg are extremely dangerous and require immediate medical attention (3).
- Consume a diet consistent with the Dietary Guidelines for Americans or follow the Dietary Approaches to Stop Hypertension (DASH) eating plan. Details regarding the DASH eating plan can be found on the National Heart, Lung, and Blood Institute's website, www.nhlbi.nih.gov/health-topics/dash-eating-plan.
- Engage in regular physical activity.
- Achieve and maintain a healthy weight.
- Limit alcohol and avoid any use of tobacco, marijuana or illegal substances.

If lifestyle changes alone do not sufficiently reduce blood pressure, medications may be prescribed. These include angiotensin-converting enzyme (ACE) inhibitors, angiotensin II receptor blockers (ARBs), calcium channel blockers, and/or diuretics (3).

Pregnant Women

Hypertension occurs in 6-8% of all pregnancies in the United States. Any HTN during pregnancy can lead to preeclampsia, eclampsia, stroke, pregnancy induction, and/or placental abruption. Because HTN during pregnancy can tighten the mother's blood vessels (including those in the umbilical cord), it can reduce oxygen and nutrients to the infant, potentially causing prematurity, low birth weight, and fetal growth restriction. (6)

Hypertensive disorders of pregnancy are categorized as follows:

- **Chronic Hypertension during Pregnancy**:
    - Definition: Hypertension is present before pregnancy or is diagnosed before 20 weeks gestation (6, 7).
    - It increases the risk of developing more severe HTN during pregnancy, gestational diabetes, and perinatal mortality. In infants, it may lead to fetal growth restriction and, additionally, exposure to antihypertensive medications may cause fetal growth restriction and malformation. (7)
    - Treatment includes frequent, regular monitoring of blood pressure**.** It is typically suggested that women with well-controlled blood pressure who exercised regularly before pregnancy continue moderate physical activity during pregnancy, unless contraindicated. Women should check with their healthcare provider for individualized guidance. (7)
- **Preeclampsia**:
    - Definition: Onset of hypertension during pregnancy, typically with proteinuria, and usually after 20 weeks gestation. For some women, proteinuria does not occur; for these women, preeclampsia is diagnosed as hypertension with thrombocytopenia, impaired liver function, renal insufficiency, pulmonary edema, and/or cerebral or visual disturbances. (7)

- The most common type of hypertensive disorder during pregnancy, preeclampsia occurs in 3.4% of pregnancies in the United States and is associated with one maternal death per 100,000 live births in developed countries (7, 8). Worldwide, it leads to the death of over 60,000 women annually (9).
- Risk factors include history of preeclampsia, chronic HTN, chronic kidney disease, history of thrombocytopenia, in vitro fertilization, diabetes, auto-immune disorders (such as lupus), uterine artery notching, family history of preeclampsia, obesity, polycystic ovarian syndrome, giving birth for the first time, multifetal pregnancy, pregnancy interval greater than 10 years, and being older than 40 years (6, 7, 9, 10, 11). Low dietary and serum calcium levels are also associated with preeclampsia (9).
- Clinical signs include any of the following: proteinuria, low blood platelet count, abnormal kidney or liver function, and fluid in the lungs. Symptoms can include sudden weight gain, swelling of face or hands, upper abdominal pain, difficulty breathing, changes in vision (including seeing spots), severe headache, nausea, and/or vomiting. (7)
- For pregnant women, preeclampsia can lead to pulmonary edema (fluid build-up in the lungs), heart attack, stroke, acute respiratory distress syndrome (difficulty breathing due to fluid leaking into the lungs), coagulopathy (blood unable to clot), severe renal failure, retinal injury, liver rupture, placental abruption, hemolysis (breakdown of red blood cells), caesarean delivery, and/or death. Women with preeclampsia are at greater risk for postpartum depression, future HTN, heart attack, stroke, congestive heart failure, and metabolic disease; these risks increase with repeated incidence of preeclampsia and with preterm delivery (7, 8, 10, 12). The infant of a woman with preeclampsia is at greater risk for caesarean delivery, preterm birth, low birth weight, small for gestational age, and/or stillbirth (8, 12). For the children of mothers who had preeclampsia, they are at heightened risk of bronchopulmonary dysplasia (form of chronic lung disease), cerebral palsy, cardiovascular dysfunction, learning disabilities, and lower IQ (10, 12).
- Currently, there is inconclusive evidence on preventative measures for preeclampsia in future pregnancies. However, when dietary calcium is inadequate, research indicates adequate dietary calcium or supplementation (1.5-2 grams/day) may help prevent preeclampsia (7, 8, 9, 13). Dietary folate and folic acid supplementation during pregnancy has also been associated with lower risk of preeclampsia (12, 14).
- Treatment for preeclampsia depends on severity and other individual factors. For women with preeclampsia without severe features (hypertension with proteinuria after 20 weeks gestation), the American College of Obstetricians and Gynecologists (ACOG) currently suggests that strict bed rest *not* be routinely prescribed (although there may be situations in which different levels of rest, including bed rest and hospitalization, may be indicated) (7). For women with severe preeclampsia, treatment should occur in an inpatient setting, and ACOG recommends early delivery of the infant to prevent additional harm to the mother and infant (7, 10). The only known cure for preeclampsia during pregnancy is the delivery of the infant and placenta (10, 12).

- It is important to note that *postpartum* preeclampsia can occur, regardless of whether it was present during pregnancy. It is usually diagnosed within 48 hours of delivery but can occur up to 6 weeks postpartum. Thus, women during this period should monitor for preeclampsia symptoms and contact their healthcare provider immediately if they occur. (6, 7)

- **Chronic Hypertension with Superimposed Preeclampsia**:
  - Definition: Hypertension is present before pregnancy, and preeclampsia develops during pregnancy. It is classified as either "with severe features" (hypertension with proteinuria before 20 weeks gestation with organ problems) or "without severe features" (hypertension with proteinuria after 20 weeks gestation). (6, 7)

- **Eclampsia:**
  - Definition: Eclampsia is the presence of new-onset grand mal seizures in a woman with preeclampsia. Eclampsia can occur before, during, or after labor. It may be preceded by severe headaches, blurred vision, sensitivity to light, abdominal pain, hyperreflexia (over-reactive reflexes), and altered mental status. (7)
  - Eclampsia is a critical situation and can lead to maternal death. Treatment typically includes parenteral magnesium sulfate in an inpatient setting. Once the mother's condition is stabilized, ACOG recommends the delivery of the infant. Treatment with magnesium sulfate may also be continued after delivery, if needed. (7)
  - Please note that due to the critical nature of eclampsia and its treatment in an inpatient setting, women with eclampsia are not encountered within a WIC setting.

- **Gestational Hypertension**:
  - Definition: Onset of hypertension during pregnancy, usually after 20 weeks gestation, and without proteinuria. It usually resolves after delivery but does increase the risk of developing chronic HTN. (6)

The term "pregnancy-induced hypertension" includes preeclampsia, eclampsia and gestational hypertension. Please note that a low-sodium diet and/or weight loss is not recommended as treatment for HTN *during* pregnancy.

Breastfeeding

A systematic study done by the Agency for Healthcare Research and Quality found that there is an inverse relationship between duration of breastfeeding and HTN: the longer a woman breastfeeds, the less risk she has for developing HTN (15). Similarly, women with hypertension should be encouraged to breastfeed, unless contraindicated (16). If postpartum women require antihypertensive medications, medications should be chosen that are compatible with breastfeeding, if possible. It is thus very important for the mother to discuss her breastfeeding status and goals with her healthcare provider to determine the best infant feeding and medication plan.

Children

Hypertension among children is a serious condition and may eventually lead to hypertension and chronic disease in adulthood. The definition of HTN is based on the normative distribution of blood pressure in healthy children. In 2017, the American Academy of Pediatrics (AAP) updated their pediatric HTN

diagnostic tools to account for the sex, age and height of the child. For more information about the definition and classification of HTN in children see the AAP *Clinical Practice Guideline for Screening and Management of High Blood Pressure in Children and Adolescents*: https://pediatrics.aappublications.org/content/140/3/e20171904.

Early detection of high blood pressure in children is crucial for preventing future health concerns. Thus, the AAP recommends that blood pressure be measured annually once children are three years old. For children under three years of age, healthcare providers should measure blood pressure at every visit if the child has a risk factor for developing HTN. (17)

The prevalence of HTN among children and adolescents in the United States is around 3.5%. About 2-4% U.S. children and adolescents experience persistently elevated blood pressure. Higher rates are experienced by boys and among Hispanic and non-Hispanic African American children compared to white children. (17)

For most children with HTN, there is no specific, identifiable cause (thus, it is considered primary HTN). Some children, however, do experience HTN as a direct result of medications, kidney disease, endocrine disorders, or congenital heart defects. Risk factors for elevated blood pressure and HTN among children include the following (17):

- Family history of HTN, including maternal HTN during pregnancy
- Overweight and obesity (including high weight-for-length in infants)
- History of prematurity, low birth weight, and/or small for gestational age
- High sodium intake

Hypertension during childhood has implications for both current and long-term health. Health outcomes of HTN occurring in children may include the following (17):

- Dyslipidemia and cardiovascular damage
- Learning disabilities, impaired neurocognition and executive functioning
- In adulthood: HTN, metabolic syndrome, and cardiovascular disease

For the management of HTN in children, the AAP recommends the following lifestyle changes:

- Achieve and maintain a healthy weight-for-length or BMI (body mass index).
- Follow an age-appropriate DASH-type eating plan.
- Participate in moderate to vigorous physical activity at least 3-5 days per week, 30-60 minutes per session.
- Get adequate sleep (more than 7 hours a night).

For more information about HTN among children, please see the Centers for Disease Control and Prevention's website *High Blood Pressure during Childhood and Adolescence* at: https://www.cdc.gov/bloodpressure/youth.htm.

Implications for WIC Nutrition Services

The WIC Program provides support to participants with hypertension/prehypertension by offering fruits, vegetables, whole grains, legumes, low-fat dairy, and fish, which are important components of the

DASH eating plan. WIC nutrition staff also offer nutrition education and counseling as well as referrals to smoking cessation and substance use treatment if needed, which are critical to the management of hypertension/prehypertension. In addition, WIC staff can assist participants by:

For Pregnant Women with Hypertension:

- Asking probing questions to determine the type of hypertension they have been diagnosed with during pregnancy.
- Encouraging them to start prenatal care as soon as possible and to attend all health care appointments. Health status and blood pressure should be monitored frequently by healthcare provider. The healthcare provider may also recommend regular self-monitoring of blood pressure.
- Informing them of the symptoms of preeclampsia and of the importance of contacting their healthcare provider immediately if they occur. Also, inform them that preeclampsia can occur postpartum.
- Counseling them on healthy weight gain, prenatal vitamin use, and a nutritious diet, including adequate calcium intake. For women with low calcium intake, refer them to their healthcare provider to discuss whether a calcium supplement is appropriate. Please note that a low-sodium diet and/or weight loss is not recommended as treatment for HTN *during* pregnancy.
- Encouraging them to discuss individualized physical activity recommendations with their healthcare provider.
- Informing them that hypertension during pregnancy increases their risk of future HTN, cardiovascular disease, and stroke.
- Providing information on avoiding any use of alcohol, tobacco, marijuana or illegal substances, as well as offering substance use referrals. The WIC Substance Use Prevention Manual is available for additional guidance and referral resources (https://wicworks.fns.usda.gov/resources/wic-substance-use-prevention-guide).
- Referring to local home visiting programs for health monitoring and support, if available.

For Postpartum Women with Hypertension:

- Asking probing questions to determine the type of hypertension they experienced during pregnancy and are now experiencing.
- Informing them of the symptoms of postpartum preeclampsia and of the importance of contacting their healthcare provider immediately if they occur.
- Providing breastfeeding promotion and support, unless contraindicated. Encourage women to discuss their breastfeeding status and goals with their healthcare provider, especially if medications are prescribed.
- Encouraging them to attend all health care appointments, including their 4-6 week postpartum visit; to develop a plan for future pregnancies; to discuss health conditions and medication needs with their healthcare provider; and to have their BMI, blood pressure, lipids, and fasting glucose assessed yearly (3).

- Counseling them on achieving and maintaining a healthy weight, physical activity, following a diet consistent with the Dietary Guidelines for Americans or the DASH diet.
- Providing information on avoiding any use of alcohol, tobacco, marijuana or illegal substances, as well as offering substance use referrals. The WIC Substance Use Prevention Manual is available for additional guidance and referral resources (https://wicworks.fns.usda.gov/resources/wic-substance-use-prevention-guide).
- Referring them to their healthcare provider to discuss whether a calcium or folic acid supplement is appropriate, if intake of these nutrients seems inadequate.
- Referring to local home visiting programs for health monitoring and support, if available.

For Children with Hypertension:

- Encouraging caregivers to take children to all health care appointments.
- Counseling caregivers on: healthy pediatric weight gain and, for children with high weight-for-length or obesity, discussing strategies for achieving and maintaining a healthy weight; age-specific, DASH-type eating habits; and the importance of adequate sleep and physical activity in children.

References

1. Mayo Clinic [Internet]. Rochester (MN): Mayo Clinic; c1998-2019. High blood pressure (hypertension). 2018 May 12 [cited 2018 July]. Available from: www.mayoclinic.org/diseases-conditions/high-blood-pressure/symptoms-causes/syc-20373410.
2. Centers for Disease Control and Prevention [Internet]. Atlanta (GA): Centers for Disease Control and Prevention. High blood pressure fact sheet. 2016 June 16 [cited 2018 July]. Available from: www.cdc.gov/dhdsp/data_statistics/fact_sheets/fs_bloodpressure.htm.
3. National Heart, Lung, and Blood Institute [Internet]. Bethesda (MD): National Institute of Health. High blood pressure. [cited 2018 July]. Available from: www.nhlbi.nih.gov/health-topics/high-blood-pressure.
4. Lackland DT. Racial differences in hypertension: implications for high blood pressure management. American Journal of Medical Science. 2014 Aug [cited 6 Mar 2018];348(2):135-8. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4108512/.
5. Ferdinand KC, Yadav K, Nasser SA, et al. Disparities in hypertension and cardiovascular disease in blacks: the critical role of medication adherence. Journal of Clinical Hypertension. 2017 May 22 [cited 2019 Mar 5];00:1-10. Available from: https://doi.org/10.1111/jch.13089.
6. Centers for Disease Control and Prevention [Internet]. Atlanta (GA): Centers for Disease Control and Prevention. High blood pressure during pregnancy fact sheet. 2018 May 16 [cited 2018 July]. Available from: www.cdc.gov/bloodpressure/pregnancy.htm.
7. American College of Obstetricians and Gynecologists [Internet]. Washington (DC): American College of Obstetricians and Gynecologists; c2013. Hypertension in pregnancy. 2013 [cited 2018 July]; [100 pages]. Available from: www.acog.org/~/media/Task%20Force%20and%20Work%20Group%20Reports/public/HypertensioninPregnancy.pdf.

8. Khaing W, Vallibhakara SA, Tantrakul V, et al. Calcium and vitamin D supplementation for prevention of preeclampsia: a systematic review and network meta-analysis. Nutrients. 2017 Oct [cited 2019 Mar 5];9(10):1141. Available from: https://www.mdpi.com/2072-6643/9/10/1141.

9. Duhig K, Vandermolen B, Shennan A. Recent advances in the diagnosis and management of pre-eclampsia [version 1; referees: 2 approved]. F1000 Faculty Review. 2018 Aug 15 [cited 2019 Mar 5];7(F1000 Faculty Rev)242. Available from: https://doi.org/10.12688/f1000research.12249.1.

10. Mol BWJ, Roberts CT, Thangaratinam S, et al. Pre-eclampsia. The Lancet. 2015 Sept 2 [cited 2019 Mar 5];387(10022):999-1011. Available from: https://doi.org/10.1016/S0140-6736(15)00070-7.

11. Espinoza J, Kusanovic JP, Bahado-Singh R, et al. Should bilateral uterine artery notching be used in the risk assessment for preeclampsia, small-for-gestational-age, and gestational hypertension? Journal of Ultrasound Medicine. 2010 Jul [cited 2019 Mar 6];29(7):1103-15. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3020574/.

12. Wen SW, Guo Y, Rodger M, White RR, Yang Q, Smith GN, Perkins SL, Walker MC. Folic acid supplementation in pregnancy and the risk of pre-eclampsia – a cohort study. PLoS ONE. 2016 Feb 22[cited 2019 Mar 6];11(2): e0149818. Available from: https://doi.org/10.1371/journal.pone.0149818.

13. Lowensohn R, Stadler DD, Naze C. Current concepts of maternal nutrition. Obstetrical and Gynecological Survey. 2016 July [cited 2019 Mar 5];71(7):413-26. Available from: https://journals.lww.com/obgynsurvey/Fulltext/2016/07000/Current_Concepts_of_Maternal_Nutrition.18.aspx.

14. Wang Y, Zhao N, Qiu J, et al. Folic acid supplementation and dietary folate intake, and risk of preeclampsia. European Journal of Clinical Nutrition. 2015 Jan 28 [cited 2019 Mar 5];69:1145-50. Available from: https://www.nature.com/articles/ejcn2014295.

15. Feltner C, Weber RP, Stuebe A, Grodensky CA, Orr C, Viswanathan M. Breastfeeding Programs and Policies, Breastfeeding Uptake, and Maternal Health Outcomes in Developed Countries. Comparative Effectiveness Review No. 210. (Prepared by the RTI International–University of North Carolina at Chapel Hill Evidence-based Practice Center under Contract No. 290-2015-00011-I.) AHRQ Publication No. 18-EHC014-EF. Rockville (MD): Agency for Healthcare Research and Quality. 2018 July [cited 2019 April 24]. Available from: https://effectivehealthcare.ahrq.gov/sites/default/files/pdf/cer-210-breastfeeding-report_1.pdf.

16. American College of Obstetricians and Gynecologists [Internet]. Washington (DC): American College of Obstetricians and Gynecologists, Task Force on Hypertension in Pregnancy. Hypertension in pregnancy. 2013 [cited 2019 April 24]. Available from: https://www.acog.org/~/media/Task%20Force%20and%20Work%20Group%20Reports/public/HypertensioninPregnancy.pdf

17. Flynn JT, Kaelber DC, Baker-Smith SM, et al. Subcommittee on Screening and Management of High Blood Pressure in Children. Clinical practice guideline for screening and management of high blood pressure in children and adolescents. Pediatrics. 2017 [cited 2018 July]; 140(3):e20171904. Available from: pediatrics.aappublications.org/content/early/2017/08/21/peds.2017-1904.

Clarification

Self-reporting of a diagnosis by a medical professional should not be confused with self-diagnosis, where a person simply claims to have or to have had a medical condition without any reference to professional diagnosis. A self-reported medical diagnosis ("My doctor says that I have/my son or daughter has…") should prompt the CPA to validate the presence of the condition by asking more pointed questions related to that diagnosis.

346 Renal Disease

Definition/Cut-off Value

Any renal disease including pyelonephritis and persistent proteinuria, but excluding urinary tract infections (UTI) involving the bladder. Presence of condition, documented, or reported by a physician or someone working under a physician's orders, or as self reported by applicant/participant/caregiver. See Clarification for more information about self-reporting a diagnosis.

Participant Category and Priority Level

Category	Priority
Pregnant Women	I
Breastfeeding Women	I
Non-Breastfeeding Women	III, IV, V or VI
Infants	I
Children	III

Justification

Renal disease can result in growth failure in children and infants. In pregnant women, fetal growth is often limited and there is a high risk of developing a preeclampsia-like syndrome. Women with chronic renal disease often have proteinuria, with risk of azotemia if protein intake becomes too high.

References

1. Institute of Medicine. WIC nutrition risk criteria a scientific assessment. National Academy Press, Washington, D.C.; 1996.

Clarification

Self-reporting of a diagnosis by a medical professional should not be confused with self-diagnosis, where a person simply claims to have or to have had a medical condition without any reference to professional diagnosis. A self-reported medical diagnosis ("My doctor says that I have/my son or daughter has…") should prompt the CPA to validate the presence of the condition by asking more pointed questions related to that diagnosis.

347 Cancer

Definition/Cut-off Value

A chronic disease whereby populations of cells have acquired the ability to multiply and spread without the usual biologic restraints. The current condition, or the treatment for the condition, must be severe enough to affect nutritional status.

Presence of condition diagnosed, documented, or reported by a physician or someone working under a physician's orders, or as self reported by applicant/participant/caregiver. See Clarification for more information about self-reporting a diagnosis.

Participant Category and Priority Level

Category	Priority
Pregnant Women	I
Breastfeeding Women	I
Non-Breastfeeding Women	III, IV, V or VI
Infants	I
Children	III
** Some cancer treatments may contraindicate breastfeeding.*	

Justification

An individual's nutritional status at the time of diagnosis of cancer is associated with the outcome of treatment. The type of cancer and stage of disease progression determines the type of medical treatment, and if indicated, nutrition management. Individuals with a diagnosis of cancer are at significant health risk and under specific circumstances may be at increased nutrition risk, depending upon the stage of disease progression or type of ongoing cancer treatment.

References

1. Institute of Medicine. WIC nutrition risk criteria a scientific assessment. National Academy Press, Washington, D.C.; 1996.

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348 Central Nervous System Disorders

Definition/Cut-off Value

Conditions which affect energy requirements, ability to feed self, or alter nutritional status metabolically, mechanically, or both. These include, but are not limited to:

Central Nervous System Disorders	
Epilepsy	Cerebral palsy (CP)
Neutral tube defects (NTDs), such as spina bifida	Parkinson's disease
Multiple sclerosis (MS)	

Presence of condition diagnosed, documented, or reported by a physician or someone working under a physician's orders, or as self reported by applicant/participant/caregiver. See Clarification for more information about self-reporting a diagnosis.

Participant Category and Priority Level

Category	Priority
Pregnant Women	I
Breastfeeding Women	I
Non-Breastfeeding Women	III, IV, V or VI
Infants	I
Children	III

Justification

Epileptics are at nutrition risk due to alterations in nutritional status from prolonged anti-convulsion therapy, inadequate growth, and physical injuries from seizures (1). The ketogenic diet has been used for the treatment of refractory epilepsy in children (2). However, children on a ketogenic diet for six months or more have been observed to have slower gain in weight and height (3, 4). Growth monitoring and nutrition counseling to increase energy and protein intakes while maintaining the ketogenic status are recommended (4). In some cases, formula specifically prepared for children on a ketogenic diet is necessary. Women on antiepileptic drugs (AEDs) present a special challenge. Most AEDs have been associated with the risk of neural tube defects on the developing fetus. Although it is unclear whether folic acid supplementation protects against the embryotoxic and teratogenic effects of AEDs, folic acid is recommended for women with epilepsy as it is for other women of childbearing age (5-7).

Oral motor dysfunction is associated with infants and children with cerebral palsy (CP). These infants and children often have poor growth due to eating impairment, such as difficulty in spoon feeding, biting, chewing, sucking, drinking from a cup and swallowing. Rejection of solid foods, choking, coughing, and

spillage during eating are common among these children (8, 9). Growth monitoring and nutrition counseling to modify food consistency and increase energy and nutrient intakes are recommended. Some children may require tube feeding and referral to feeding clinics, where available.

Limited mobility or paralysis, hydrocephalus, limited feeding skills, and genitourinary problems put children with neural tube defects (NTDs) at increased risk of abnormal growth and development. Ambulatory disability, atrophy of the lower extremities, and short stature place NTDs affected children at high risk for increased body mass index (10). Growth monitoring and nutrition counseling for appropriate feeding practices are suggested.

In some cases, participants with Parkinson's disease require protein redistribution diets to increase the efficacy of the medication used to treat the disease (11). Participants treated with levodopa-carbidopa may also need to increase the intake of B vitamins (12). Participants with Parkinson's disease will benefit from nutrition education/counseling on dietary protein modification, which emphasizes adequate nutrition and meeting minimum protein requirements. Additionally, since people with Parkinson's often experience unintended weight loss (13), it is important to monitor for adequate maternal weight gain.

Individuals with multiple sclerosis (MS) may experience difficulties with chewing and swallowing that require changes in food texture in order to achieve a nutritionally adequate diet (14). Obesity and malnutrition are frequent nutrition problems observed in individuals with MS. Immobility and the use of steroids and anti-depressants are contributing factors for obesity. Dysphagia, adynamia, and drug therapy potentially contribute to malnutrition. Both obesity and malnutrition have detrimental effects on the course of the disease. Adequate intakes of polyunsaturated fatty acids, vitamin D, vitamin B_{12} and a diet low in animal fat have been suggested to have beneficial effects in relapsing-remitting MS (15-17). Breastfeeding advice to mothers with MS has been controversial. However, there is no evidence to indicate that breastfeeding has any deleterious effect on women with MS. In fact, breastfeeding should be encouraged for the health benefits to the infant (18). In addition, mothers who choose to breastfeed should receive the necessary support to enhance breastfeeding duration.

As a public health nutrition program, WIC plays a key role in health promotion and disease prevention. As such, the nutrition intervention for participants with medical conditions should focus on supporting, to the extent possible, the medical treatment and/or medical/nutrition therapy a participant may be receiving. Such support may include: investigating potential drug-nutrient interactions; inquiring about the participant's understanding of a prescribed special diet; encouraging the participant to keep medical appointments; tailoring the food package to accommodate the medical condition; and referring the participant to other health and social services.

References

1. Institute of Medicine. Food and Nutrition Board. WIC nutrition risk criteria: A scientific assessment. Washington, DC: National Academy Press; 1996.
2. Nelson JK, Mayo C. Mayo clinic diet manual a handbook of nutrition practices. St. Louis: Mosby; 1994.
3. Peterson SJ, Tangney CC, Pimentel-Zablah EM, Hjelmgren B, Booth F, Berry-Kravis E. Changes in growth and seizure reduction in children on the ketogenic diet as a treatment for intractable epilepsy. JADA. 2005 May; 105(5):718-724.
4. Santoro KB, O'Flaherty T. Children and the ketogenic diet. JADA. 2005 May; 105(5):725-726.

5. Yerby MS. Management issues for women with epilepsy: neural tube defects and folic acid supplementation. Neurology. 2003 Sep; 1:61 (6 Suppl 2): S23-6.

6. Champel V, Radal M, Moulin-Vallez M, Jonville-Bera AP, Autret-Leca E. Should folic acid be given to women treated with valproic acid and/or carbamazepine? Folic acid and pregnancy in epilepsy. (Abstract) Rev Neurol (Paris). 1999 Mar; 155(3): 220-4.

7. Yerby MS. Clinical care of pregnant women with epilepsy: neural tube defects and folic acid supplementation. Epilepsia. 2003; 44 Suppl 3:33-40.

8. Fung EB, Samson-Fang L, Stallings VA, Conaway M, Liptak G, Henderson RC, Worley G, O'Donnell M, Calvert R, Rosenbaum P, Chumlea W, Stevenson RD. Feeding dysfunction is associated with poor growth and health status in children with cerebral palsy. JADA. 2002; 102(3):361-373.

9. Yilmaz S, Basar P, Gisel EG. Assessment of feeding performance in patients with cerebral palsy. Int J Rehabil Res. 2004 Dec; 27(4):325-329.

10. Ekvall SW. Pediatric nutrition in chronic diseases and developmental disorders: prevention, assessment, and treatment. New York Oxford University Press; 1993.

11. Karstaedt PJ, Pincus JH. Protein redistribution diet remains effective in patients with fluctuating parkinsonism. Arch Neurol. 1992 Feb; 49(2):149-151.

12. Valkovic P, Benetin J, Blazicek P, Valkovicova L, Gmitterova K, Kukumberg P. Reduced plasma homocysteine levels in levodopa/entacapone treated Parkinson patients. Parkinsonism Relat Disord. 2005 Jun; 11(4):253-6. Epub 2005 Apr 20.

13. Chen H, Zhang SM, Heman MA, Willett WC, Ascherio A. Weight loss in Parkinson's disease. Ann Neurol. 2003 May; 53(5):676-9.

14. Schapiro R. Managing the symptoms of multiple sclerosis. 4th Ed. New York: Demos Medical Publishing; 2003. Ch.13 Swallowing Difficulties.

15. Payne A. Nutrition and diet in the clinical management of multiple sclerosis. J Hum Nutr Dietet. 2001; 14:349-357.

16. Schwarz S, Leweling H. Multiple sclerosis and nutrition. Multiple Sclerosis. 2005; 11:24-32.

17. Mark BL, Carson JS. Vitamin D and autoimmune Disease-Implications for practice from the multiple sclerosis literature. JADA. 2006 Mar; 106(3): 418-424.

18. Gulick EE, Johnson S. Infant health of mothers with multiple sclerosis. West J Nurs Res. 2004 Oct; 26(6): 632-49.

Clarification

Self-reporting of a diagnosis by a medical professional should not be confused with self-diagnosis, where a person simply claims to have or to have had a medical condition without any reference to professional diagnosis. A self-reported medical diagnosis ("My doctor says that I have/my son or daughter has…") should prompt the CPA to validate the presence of the condition by asking more pointed questions related to that diagnosis.

349 Genetic and Congenital Disorders

Definition/Cut-off Value

Hereditary or congenital condition at birth that causes physical or metabolic abnormality. The current condition must alter nutrition status metabolically, mechanically, or both. May include, but is not limited to, cleft lip or palate, Down's syndrome, thalassemia major, sickle cell anemia (not sickle cell trait), and muscular dystrophy.

Presence of condition diagnosed, documented, or reported by a physician or someone working under a physician's orders, or as self reported by applicant/participant/caregiver. See Clarification for more information about self-reporting a diagnosis.

Participant Category and Priority Level

Category	Priority
Pregnant Women	I
Breastfeeding Women	I
Non-Breastfeeding Women	III, IV, V or VI
Infants	I
Children	III

Justification

For women, infants, and children with these disorders, special attention to nutrition may be required to achieve adequate growth and development and/or to maintain health.

Severe cleft lip and palate anomalies commonly cause difficulty with chewing, sucking and swallowing, even after extensive repair efforts (5). Surgery is required for many gastrointestinal congenital anomalies. (Examples are: trachea-esophageal fistula, esophageal atresia, gastroschisis, omphalocele, diaphragmatic hernia, intestinal atresia, and Hirschsprung's Disease.)

Impaired esophageal atresia and trachea-esophageal fistula can lead to feeding problems during infancy. The metabolic consequences of impaired absorption in short bowel-syndrome depend on the extent and site of the resection or the loss of competence. Clinical manifestations of short bowel syndrome include diarrhea, dehydration, edema, general malnutrition, anemia, dermatitis, bleeding tendencies, impaired taste, anorexia, and renal calculi. Total parenteral feedings are frequently necessary initially, followed by gradual and individualized transition to oral feedings. After intestinal resection a period of adaptation by the residual intestine begins and may last as long as 12-18 months (3). Even after oral feedings are stabilized, close follow-up and frequent assessment of the nutritional status of infants with repaired congenital gastro-intestinal anomalies is recommended (5).

Sickle-cell anemia is an inherited disorder in which the person inherits a sickle gene from each parent. Persons with sickle-cell trait carry the sickle gene, but under normal circumstances are completely asymptomatic. Good nutritional status is important to individuals with sickle-cell anemia to help assume

adequate growth (which can be compromised) and to help minimize complications of the disease since virtually every organ of the body can be affected by sickle-cell anemia (i.e., liver, kidneys, gall bladder, and immune system). Special attention should be given to assuring adequate caloric, iron, folate, vitamin E and vitamin C intakes as well as adequate hydration.

Muscular dystrophy is a familial disease characterized by progressive atrophy and wasting of muscles. Changes in functionality and mobility can occur rapidly and as a result children may gain weight quickly (up to 20 pounds in a 6 month period). Early nutrition education that focuses on foods to include in a balanced diet, limiting foods high in simple sugars and fat and increasing fiber intake can be effective in minimizing the deleterious effects of the disease.

References

1. American Dietetic Association, Pediatric Nutrition Practice Group. Pediatric manual of clinical dietetics. Chicago: Pediatric Nutrition Dietetic Practice Group, American Dietetic Association, 1998.
2. Ekvall S. Pediatric nutrition in chronic diseases and developmental disorders prevention, assessment, and treatment. New York: Oxford University Press 1993. p. 289-292.
3. Grand RJ, Sutphen JL, Dietz WH. Pediatric nutrition theory and practice. Boston: Butterworths, 1987.
4. Institute of Medicine. WIC nutrition risk criteria a scientific assessment. National Academy Press, Washington, D.C.; 1996.
5. Ohio Neonatal Nutritionists. Nutritional care for high risk newborns. Philadelphia, PA: G.F. Stickley Publishers, 1985.

Clarification

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351 Inborn Errors of Metabolism

Definition/Cut-Off Value

Inherited metabolic disorders caused by a defect in the enzymes or their co-factors that metabolize protein, carbohydrate, or fat.

Inborn errors of metabolism (IEM) generally refer to gene mutations or gene deletions that alter metabolism in the body, including but not limited to:

Inborn Errors of Metabolism*	
Amino Acid Disorders	Urea Cycle Disorders
Organic Acid Metabolism Disorders	Carbohydrate Disorders
Fatty Acid Oxidation Disorders	Peroxisomal Disorders
Lysosomal Storage Diseases	Mitochondrial Disorders
**For information about additional IEM, please see Clarification.*	

Presence of condition diagnosed, documented, or reported by a physician or someone working under physician's orders, or as self reported by applicant/participant/caregiver. See Clarification for more information about self-reporting a diagnosis.

Participant Category and Priority Level

Category	Priority
Infants	I
Children	III
Pregnant Women	I
Breastfeeding Women	I
Non-Breastfeeding Women	III, IV, V or VI

Justification

The inheritance of most metabolic disorders is rare. IEM disorders may manifest at any stage of life, from infancy to adulthood. Early identification of IEM correlates with significant reduction in morbidity, mortality, and associated disabilities for those affected (1).

All States screen newborns for IEM, although the type and number of IEM screened for may vary from State to State. Typically, infants are screened for amino acid disorders, urea cycle disorders, organic acid disorders, and fatty acid oxidation defects. A few States are working toward including lysosomal storage diseases and peroxisomal disorders among their newborn screening panels (2).

In most states, treatment of an IEM is referred to a specialized metabolic treatment facility. Please see Clarification for contact information for treatment facilities. IEM treatment is based on symptomatic therapy which may include the following strategies: substrate restriction; stimulation or stabilization of residual enzyme activity; replacement of deficient products; removal of toxic metabolites or blocking their production; and enzyme replacement therapy (3). Avoidance of catabolism is essential at all treatment stages.

Nutrition therapy is integral to the treatment of IEM. Nutrition therapy should both correct the metabolic imbalance and ensure adequate energy, protein, and nutrients for normal growth and development among affected individuals. Continual monitoring of nutrient intake, laboratory values, and the individual's growth are needed for evaluation of the adequacy of the prescribed diet (4). It is important that caregivers of infants and children with IEM ensure that the patient follows the prescribed dietary regimen. The below embedded links provide the most up-to-date information about the disease state as well as treatment.

Amino Acid Metabolism Disorders (3)

- Phenylketonuria (includes clinically significant hyperphenylalaninemia variants)
- Maple syrup urine disease
- Homocystinuria
- Tyrosinemia

Amino Acid Metabolism Disorders are characterized by the inability to metabolize a certain essential amino acid. The build-up of the amino acid that is not metabolized can be toxic. Treatment of amino acid disorders involves restricting one or more essential amino acids to the minimum required for growth and development and supplying the missing product due to the blocked reaction.

Carbohydrate Disorders (5)

- Galactosemia
- Glycogen storage disease type I
- Glycogen storage disease type II (See also Pompe disease)
- Glycogen storage disease type III
- Glycogen storage disease type IV (Andersen Disease)
- Glycogen storage disease type V
- Glycogen storage disease type VI
- Hereditary Fructose Intolerance (Fructose 1-phosphate aldolase deficiency, Fructose 1, 6, biphosphatase deficiency, fructose kinase deficiency)

This group of disorders includes an enzyme deficiency or its cofactor that affects the catabolism or anabolism of carbohydrate. Carbohydrate disorders are complex and affect neurological, physical, and nutritional status.

Fatty Acid Oxidation Defects (5)

- Medium-chain acyl-CoA dehydrogenase deficiency
- Long-chain 3-hydroxyacyl-CoA dehydrogenase deficiency

- Trifunctional protein deficiency type 1 (LCHAD deficiency)
- Trifunctional protein deficiency type 2 (mitochondrial trifunctional protein deficiency)
- Carnitine uptake defect (primary carnitine deficiency)
- Very long-chain acyl-CoA dehydrogenase deficiency

Fatty acid oxidation defects include any enzyme defect in the process of mitochondrial fatty acid oxidation (FAO) system. The biochemical characteristic of all FAO defects is abnormal low ketone production as a result of the increased energy demands. This results in fasting hypoglycemia with severe acidosis secondary to the abnormal accumulation of intermediate metabolites of FAO, which can result in death.

Organic Acid Disorders (AKA organic aciduria or organic acidemia) (6)

- Isovaleric acidemia
- 3-Methylcrotonyl-CoA carboxylase deficiency
- Glutaric acidemia type I
- Glutaric acidemia type II
- 3-hydroxy-3-methylglutaryl-coenzyme A lyase deficiency
- Multiple carboxylase deficiency (Biotinidase deficiency, Holocarboxylase synthetase deficiency)
- Methylmalonic acidemia
- Propionic acidemia
- Beta-ketothiolase deficiency

Organic Acid Disorders are characterized by the excretion of non-amino organic acids in the urine. Most of the disorders are caused by a deficient enzyme involving the catabolism of specific amino acid(s). As a result, the non-metabolized substance accumulates due to the blockage of the specific metabolic pathway, which is toxic to certain organs and may also cause damage to the brain (7).

Lysosomal Storage Diseases (6, 8)

- Fabry disease (α-galactosidase A deficiency)
- Gauchers disease (glucocerebrosidase deficiency)
- Pompe disease (glycogen storage disease Type II, or acid α-glucosidase deficiency)

Lysosomal storage diseases are a group of related conditions characterized by increased storage of undigested large molecule in lysosomes. Lysosome is a cellular organelle responsible for intracellular degradation and recycling of macromolecules. Due to a defect in a specific lysosomal enzyme, the macromolecule that normally would be metabolized is not broken down; instead, it accumulates in the lysosomes. This leads to tissue damage, organ failures and premature death. Common clinical features include bone abnormalities, organomegaly, developmental impairment and central, peripheral nervous system disorders.

Mitochondrial Disorders (6, 8)

- Leber hereditary optic neuropathy

- Mitochondrial encephalomyopathy, lactic acidosis, and stroke-like episodes (MELAS)
- Mitochondrial neurogastrointestinal encephalopathy disease (MNGIE)
- Myoclonic epilepsy with ragged-red fibers (MERRF)
- Neuropathy, ataxia, and retinitis pigmentosa (NARP)
- Pyruvate carboxylase deficiency

Mitochondrial Disorders are caused by the dysfunction of the mitochondrial respiratory chain, or electron transport chain (ETC). Mitochondria play an essential role in energy production. The ETC dysfunction increases free radical production, which causes mitochondrial cellular damage, cell death and tissue necrosis and further worsens ETC dysfunction and thus forms a vicious cycle. The disorders can affect almost all organ systems. However, the organs and cells that have the highest energy demand, such as the brain and muscles (skeletal and cardiac) are most affected. The clinical features vary greatly among this group of disorders, but most have multiple organ dysfunctions with severe neuropathy and myopathy.

Peroxisomal Disorders (6, 8, 9)

- Zellweger Syndrome Spectrum
- Adrenoleukodystrophy (x-ALD)

There are two types of peroxisomal disorders: single peroxisomal enzyme deficiencies and peroxisomal biogenesis disorders. These disorders cause severe seizures and psychomotor retardation (9). Peroxisomes are small organelles found in cytoplasm of all cells. They carry out oxidative reactions which generate hydrogen peroxides. They also contain catalase (peroxidase), which is important in detoxifying ethanol, formic acid and other toxins. Single peroxisomal enzyme deficiencies are diseases with dysfunction of a specific enzyme, such as acyl coenzyme A oxidase deficiency. Peroxisomal biogenesis disorders are caused by multiple peroxisome enzymes such as Zellweger syndrome and neonatal adrenoleukodystrophy.

Urea Cycle Disorders (6, 5)

- Citrullinemia
- Argininosuccinic aciduria
- Carbamoyl phosphate synthetase I deficiency

Urea Cycle Disorders occur when any defect or total absence of any of the enzymes or the cofactors used in the urea cycle results in the accumulation of ammonia in the blood. The urea cycle converts waste nitrogen into urea and excretes it from the kidneys. Since there are no alternate pathways to clear the ammonia, dysfunction of the urea cycle results in neurologic damages.

Implications for WIC Nutrition Services

WIC can provide exempt infant formulas and WIC-eligible medical foods, including those specifically formulated for IEM. Most of the dietary regimens for IEM require a combination of medical food (special formula in most cases) and standard infant formula or prescribed conventional foods. For example, participants with IEM related to essential amino acid metabolism (such as PKU, MSUD), who are not developmentally ready for conventional foods; require both medical food without the offending amino acid(s), and human milk or standard infant formula.

It is recommended that WIC nutritionists collaborate with the clinical dietitians at the metabolic treatment facility, where available, to prescribe WIC food packages (Food Package III) according to the therapeutic diet ordered by the metabolic team, monitor the compliance of the restricted diet, and follow up on the growth and developmental status of the participants with IEM.

Note: Infants with classic galactosemia cannot be breastfed due to lactose in human milk.

References

1. Metabolic backgrounder: The Ross metabolic formula system for meeting special nutrition needs. Columbus, OH: Ross Products Division; 2007.
2. Levy PA. Inborn Errors of Metabolism: part 1: Overview. Pediatr Rev. 2009Apr; 30(4):131-7.
3. Wilcken B. An introduction to nutritional treatment in Inborn errors of metabolism – different disorders, different approaches. Southeast Asian J Trop med Public Health. 2003; 34 Suppl 3: 198-201.
4. Hendricks KM, Duggan C. Manual of pediatric nutrition, 4th ed. 2005; 626-657.
5. Ekval S, Ekvall, VK, editors. Pediatric nutrition in chronic diseases and developmental disorders: prevention, assessment and treatment. 2nd ed. Oxford University Press; 2005. Part III. Chapters 37 -59.
6. GeneReviews are expert-authored, peer-reviewed, current disease descriptions that apply genetic testing to the diagnosis, management, and genetic counseling of patients and families with specific inherited conditions. Available at: http://www.ncbi.nlm.nih.gov/sites/GeneTests/review?db=GeneTests (last accessed 8/5/2010).
7. Stanley CA. Disorders of fatty acid oxidation. In: Fernandes J, et al editors. Inborn metabolic diseases. Berlin Springer; 2000. p. 141-150.
8. Agamanolis D. Inherited metabolic disorders in neuropathology: an illustrated interactive course for medical students and residents. Akron OH: Akron Children's Hospital, Northeastern Ohio University College of Medicine. Available at: http://www.neuropathologyweb.org/chapter10/chapter10aLSDgeneral.html.
9. Van Veldhoven, PP, Leuven KU. Biochemistry and genetic disorders of inherited disorders of peroxisomal fatty acid metabolism. J Lipid Res. 2010 June. Available at: http://www.jlr.org/cgi/rapidpdf/jlr.R005959v1.

Clarification

IEM not listed within this write-up may be found under: http://rarediseases.info.nih.gov/GARD. Please keep in mind these additional resources are not meant for medical advice nor to suggest treatment.

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The link below lists newborn screening coordinators. The coordinator can direct families to appropriate metabolic treatment facilities based on the newborn screening result: http://genes-r-us.uthscsa.edu/State_contacts.pdf.

352a Infectious Diseases - Acute

Definition/Cut-off Value

A disease which is characterized by a single or repeated episode of relatively rapid onset and short duration. Infectious diseases come from bacteria, viruses, parasites, or fungi and spread directly or indirectly from person to person (1). Infectious diseases may also be zoonotic, which are transmitted from animals to humans, or vector-borne, which are transmitted from mosquitoes, ticks, and fleas to humans (1, 2). These diseases and/or conditions include, but are not limited to (an extensive listing of infectious diseases can be found at: http://www.nlm.nih.gov/medlineplus/infections.html):

Most Common Acute Infectious Diseases	
Hepatitis A	Listeriosis
Hepatitis E	Pneumonia
Meningitis (Bacterial/Viral)	Bronchitis (3 episodes in last 6 months)
Parasitic Infections	

The infectious disease must be present within the past six months, and diagnosed, documented, or reported by a physician or someone working under a physician's orders, or as self-reported by applicant/participant/caregiver. See Clarification for more information about self-reporting a diagnosis.

Participant Category and Priority Level

Category	Priority
Pregnant Women	I
Breastfeeding Women	I
Non-Breastfeeding Women	III, IV, V, or VI
Infants	I
Children	III

Justification

Both chronic and acute infectious diseases can lead to: 1) poor appetite, 2) low nutrient absorption, 3) accelerated nutrient utilization, and/or 4) rapid nutrient loss, depending on the individual's nutritional state before becoming infected and the individual's diet during the improvement period (3). The following information pertains to some of the more prevalent and/or serious acute infectious diseases.

VIRAL HEPATITIS

Hepatitis is inflammation of the liver. It is most often caused by viruses, but can also be caused by excessive alcohol consumption, toxins, and medicines such as acetaminophen, as well as other medical conditions

linked to liver inflammation (4). Viral hepatitis is caused by a series of viruses labeled A, B, C, D, and E – with A, B, and C being the most common forms in the United States. Viral hepatitis A and E are the only forms that are acute and do not become chronic, whereas B, C, and D can both be acute and chronic in nature (5). (For more information on chronic infectious diseases see Risk #352b Infectious Diseases – Chronic.) Regardless of the type of hepatitis, infected individuals with signs of the infection will typically experience anorexia, nausea, vomiting, diarrhea, jaundice, epigastria pain, tiredness, and weakness, all of which affect one's diet and health (5). In addition, darker urine and pale stools may be present in infected individuals. It is important to note that viral hepatitis is the leading cause of liver cancer and the most frequent need for liver transplants in the United States (6).

Hepatitis A: Hepatitis A is an acute infection caused by exposure to the Hepatitis A virus. It is transmitted through the fecal-oral route, with transmission most commonly spread through close contact with an infected household member or sexual partner. Outbreaks can also be caused by fecal-contaminated food or water. Because the symptoms of all types of acute hepatitis infections are the same, suspected diagnosis must be confirmed through either positive laboratory testing, or epidemiologic link to a confirmed case. (7)

A large majority of those infected with Hepatitis A are asymptomatic, with 70% showing no clinical signs of infection. Hepatitis A does not progress to a chronic disease, and symptoms typically resolve without treatment in two months, however in 10-15% of cases periodic relapses can occur for up to six months. (8)

The Hepatitis A virus can survive for months outside of the body, therefore proper hygiene and food safety are important preventative measures. However, the most effective method of preventing infection is through vaccination, which has reduced the incidence of Hepatitis A by 95% since its introduction. Emphasis should be placed on preventing an unvaccinated child from close personal contact with someone who is at high risk, or suspected of Hepatitis A infection. (7)

Hepatitis E: Hepatitis E is an acute infection caused by exposure to the Hepatitis E virus. It is transmitted through the fecal-oral route, most commonly through ingestion of contaminated drinking water. However recent cases have been linked to uncooked/undercooked meat and shellfish, indicating the potential for foodborne exposure. While Hepatitis E is believed to be uncommon in the United States, those who frequently travel to developing countries with poor water and environmental sanitation are at risk of becoming infected. Diagnosis for Hepatitis E can be confirmed only by testing for the presence of antibodies to the virus or viral RNA. There are currently no serological tests approved for use in the United States. (9)

Hepatitis E symptoms typically resolve on their own, and there is currently no therapeutic treatment or approved vaccine for the disease. Supportive therapy should be offered and hospitalization recommended for severe cases. The predominant forms of prevention are good sanitation and only relying on clean drinking water when in areas at high risk for infection. (10)

Pregnant women are especially at risk when infected with Hepatitis E. While in general most people will recover completely and the death rate among confirmed cases is about 1%, the mortality rate can reach 10-30% for women in their third trimester. (9)

MENINGITIS

Characterized by an inflammation of the protective membranes known as the meninges, meningitis is typically caused by an infection of the fluid surrounding the brain and the spinal cord. Most commonly meningitis is caused by a bacterial or viral infection, but it can also result as a response to physical injury, cancer, or certain drugs. Due to the severity of meningitis and resulting treatment differing depending on the cause, it is important to correctly diagnose the agent responsible for the disease. (11)

Bacterial Meningitis: While most people with meningitis typically recover, bacterial meningitis is typically severe and can result in serious complications, including brain damage, hearing loss, or learning disabilities. The leading causes of bacterial meningitis in the United States include Haemophilus influenzae, Streptococcus pnemoniae, Listeria monocytogenes, and Neisseria meningitidis. The causes of meningitis vary by age group. In adults, including pregnant women, it is most commonly caused by Streptococcus pneumoniae, Neisseria meningitidis, and Listeria monocytogenes. The cause in newborns is most typically Group B Sterptococcus, E. coli, and Listeria. Infants and children most commonly develop meningitis in response to Streptococcus pneumoniae, Neisseria meningitidis, and Haemophilus influenzae type b. (12)

In addition, *Cronobactor* may cause severe meningitis in infants. Although *Cronobactor* infection is rare (the Centers for Disease Control and Prevention reports 4-6 infections in infants per year), meningitis due to *Cronobactor* occurs almost exclusively among infants in the first 2 months of life. *Cronobactor* infections have been associated with consumption of reconstituted powdered infant formula. In several outbreak investigations, *Cronobactor* has been found in powdered infant formula that had been contaminated in the factory. In other cases, the powdered infant formula might have been contaminated with *Cronobactor* after it was opened at home or elsewhere. It is recommended that manufacturer's preparation instructions be adhered to in order to prevent *Cronobactor* infection in infants consuming reconstituted powdered infant formula. (13)

Risk factors for bacterial meningitis include, but are not limited to, age, with infants at higher risk than other age groups; congregate living settings, with groups such as military personnel and college students at increased risk; medical conditions that weaken the immune system; and travel to the meningitis belt in sub-Saharan Africa. Transmission from an infected person usually requires prolonged, close, contact. Additionally, healthy people may carry the bacteria in their nose and throat without developing an illness and most healthy people who carry the disease never become sick. Pregnant women infected with any of the bacteria responsible for causing meningitis are capable of passing the bacteria to their baby, putting them at increased risk of developing meningitis. (12)

Meningitis symptoms are characterized by a sudden onset of fever, headache, and stiff neck. Other symptoms are also often present, including nausea, vomiting, sensitivity to light, and confusion. Diagnosis must be confirmed through laboratory testing of the blood or cerebrospinal fluid. Bacterial meningitis is effectively treated with antibiotics, though it is important to begin treatment as early as possible. (12)

The most effective method of preventing meningitis is vaccination. There are currently vaccines available for three types of meningitis causing bacteria - *Neisseria meningitidis* (meningococcus), *Streptococcus pneumoniae* (pneumococcus), and *Haemophilus influenzae* type b (Hib). Additionally for individuals in close contact with those with the disease, antibiotics may be recommended as a preventative measure. The risk of meningitis resulting from Listeria can be prevented by properly preparing and refrigerating food as well as avoiding certain foods. Women diagnosed with group B strep are also given antibiotics during labor to prevent transmission to their newborn. (12)

Viral Meningitis: Viral meningitis is the most common type of meningitis and is often less severe than bacterial caused cases. In the United States it is most commonly caused by non-polio enteroviruses, as well as others including the mumps, herpes, measles, influenza, and arboviruses. While few people infected with these viruses develop meningitis, the risk is especially high from summer to fall. Children younger than five and people with weakened immune systems are at higher risk of developing the disease, with infants younger that one month old and people with weakened immune systems more likely to develop severe illness. (14)

Transmission of a virus that can lead to meningitis may occur due to close contact with a person who has viral meningitis, however it is unlikely meningitis will develop. Symptoms in infants include fever, irritability, poor eating, sleepiness or trouble waking, and lethargy. Adults most commonly experience fever, headache, stiff neck, light sensitivity, sleepiness or trouble waking, nausea, vomiting, lack of appetite, and lethargy. As with bacterial meningitis, diagnosis requires lab tests to confirm the illness. (14)

Typically viral meningitis resolves without treatment in 7-10 days. However those with meningitis caused by the herpes virus or influenza may benefit from antiviral medication. While there are no vaccines available for the non-polio enteroviruses that can cause meningitis, the following steps can be taken to reduce the risk of infection:

- Washing hands often with soap and water, especially after changing diapers, using the toilet, or coughing or blowing your nose.
- Avoiding face touching with unwashed hands.
- Avoiding close contact with infected persons.
- Cleaning and disinfecting frequently touched household surfaces.
- Staying home when sick.

Additionally children should be vaccinated against the other viruses that can cause meningitis, including measles, mumps, chickenpox, and influenza. (14)

LISTERIOSIS

Listeriosis is a serious infection caused by the bacteria *Listeria monocytogenes*. It is most commonly transmitted through contaminated food; however it is also naturally present in the soil, water, and animals, including poultry and cattle (15). Listeria is especially dangerous due to its ability to grow in cold temperatures, unlike many other pathogens (16). Common food sources include ready-to-eat deli meats and hot dogs, unpasteurized milk and dairy products, raw sprouts and others. Symptoms include fever, stiff neck, confusion, weakness, vomiting, and diarrhea (17).

Pregnant women and newborns are at exceptionally high risk for listeriosis, with pregnant women 10-20 times as likely as the general population to become infected (18). It can lead to miscarriage, stillbirth, or lifelong health issues for the child (19). Additionally, those with weakened immune systems are also at heightened risk. Listeriosis is treated with antibiotics and for severe cases referral to a medical facility may be necessary. The best methods of prevention are associated with proper food safety, handling, and storage. Additionally, raw milk and raw dairy products should be avoided. There is currently no vaccine available. (17)

PNEUMONIA

Pneumonia is an infection of the lungs that can cause mild to severe illness. It can be caused by viruses, bacteria, and fungi. In the United States the most common causes of viral and bacterial pneumonia are respiratory synctal virus (RSV) and Streptococcus pneumonia (pneumococcus), respectively, however Human Parainfluenza Viruses are the leading cause of pneumonia in infants and children. Symptoms include fever, muscle aches, fatigue, enlarged lymph nodes in the neck, chest pain, sore throat, coughing, shortness of breath, and rapid breathing. (20)

Children younger than five years of age are considered at especially high risk of pneumonia. Additionally, pneumonia contracted during pregnancy has been associated with increased morbidity and mortality when compared with non-pregnant women. It can lead to negative outcomes including low birth weight, increased risk of pre-term birth, and serious complications for the mother including respiratory failure.

Treatment includes administering antimicrobial and antiviral drugs depending on the pathogen responsible for the infection. (21)

Vaccination is an effective way to prevent pneumonia, with several vaccinations available for both bacteria and viruses including pneumococcal, Haemophilus influenzae type b (Hib), pertussis (whooping cough), varicella (chickenpox), measles, and influenza vaccines. Good hygiene is also another effective method of prevention, including regular hand-washing and disinfecting frequently touched surfaces. (20)

BRONCHITIS

Acute bronchitis is diagnosed by a healthcare provider based on the signs and symptoms present in the patient. It is a condition that occurs when the airways in the lungs swell and produce mucus, resulting in a cough. Bronchitis typically occurs after a chest cold and is usually caused by a virus, with the most common being: Respiratory syncytial virus (RSV), Adenovirus, Influenza viruses, and parainfluenza. Symptoms include, but are not limited to coughing that produces mucus; soreness in the chest; fatigue; headache; body aches; fever; and sore throat. Most symptoms of acute bronchitis resolve on their own after two weeks, but the cough may last up to eight weeks in some cases. In severe cases, such as a fever above 100.4 degrees Fahrenheit, patients should seek assistance from a health care provider. (22)

Since bronchitis is almost never caused by bacteria, antibiotics are not needed or recommended. Furthermore, antibiotic treatment may cause harm in both children and adults (20). The best course of action is to provide symptom relief through rest, over-the-counter medicines, and other self-care methods. It is important to use pain relievers appropriate for the age of the child, and only acetaminophen for babies six months of age and younger (23). Bronchitis may be prevented by avoiding smoking, practicing good hygiene, and remaining current on all immunizations (22).

PARASITIC INFECTIONS

Parasites are organisms that live on or in a host organism and survive by getting their food at the detriment of the host. Pregnant women and children are most at risk from certain types of parasites including *Toxoplasma gondii* – found in uncooked meat; *Giardia intestinalis*; *Cryptosporidium;* lice; and pinworms (24). Toxoplasmosis, caused by *Toxoplasma gondii*, is considered to be the leading cause of death attributed to foodborne illness in the United States (25). To reduce the risk of parasitic infection, prevention includes good food safety and general good hygiene. Additionally environmental risk can be reduced by wearing gloves when coming into contact with soil, covering sandboxes, and teaching children the importance of hand washing (26).

Most healthy people will recover from parasites without treatment. However for pregnant women, newborns, and infants with toxoplasmosis, treatment can be administered as a combination of drugs such as pyrimethamine and sulfadiazine, plus folinic acid (27). This treatment will reduce the parasitic burden, but will not eliminate it completely as parasites can remain in tissues, which makes it hard for the medication to reach them. Lice and other dermal parasites can be treated with topical drugs, such as medicated shampoo (24).

Implications for WIC Nutrition Services

WIC can improve the management of acute infectious diseases through WIC foods, nutrition education, counseling, and referrals to community resources. The table below provides additional WIC nutrition services recommendations specific to the disease state that can help improve the health outcomes of participants with acute infectious diseases:

	WIC Nutrition Services Recommendations for Acute Infectious Diseases (9,10)
All Types of Infections	• Encourage sufficient calorie intake to ameliorate accelerated nutrient utilization. • Recommend the *Dietary Guidelines* to ensure healthy eating patterns. • Provide suggestions to address poor appetite. • Provide education on safe food handling and storage practices.
All Types of Hepatitis	• Recommend testing to pregnant women and high risk individuals. • Encourage abstinence from alcohol. • Provide information on high calorie, high protein and moderate fat diets. • Recommend high calorie consumption at breakfast as nausea is less common in the morning. • Recommend, in consultation with health care provider, consumption of high calorie and protein liquid formula between meals to boost calorie intake. • Encourage a bland diet with extra fluids depending on the severity of nausea and vomiting.
Hepatitis A	• Encourage the Hepatitis A vaccine for all children, previously unvaccinated adolescents through the age of 18, and high-risk adults. • Promote breastfeeding as being safe, but to avoid breastfeeding when nipples are cracked and bleeding – at which time, mothers should pump and discard milk to maintain supply. • Discourage the practice of pre-chewing food for infants, as blood may be present.
Hepatitis E	• Avoid contaminated water.
Meningitis	• Encourage vaccinations for both bacteria and viruses known to cause meningitis. • Provide education on proper food handling and storage practices. • Recommend use of manufacturer's instruction for the preparation of infant formula. • Provide education on good hygiene practices.
Listeriosis	• Recommend alternatives to raw milk and dairy products. • Emphasize importance of safe food handling, preparation and storage practices.
Pneumonia	• Recommend referral to a healthcare provider to administer appropriate antimicrobial or antiviral treatment.
Bronchitis	• Provide education on symptom relief and proper pain-medication practices for children. • Recommend smoking cessation. • Provide education on good hygiene practices. • Encourage appropriate vaccinations.
Parasitic Infections	• Recommend appropriate measures be taken when coming into contact with potential environmental contaminants, e.g., use of gloves when working with soil and covering sandboxes when not in use. • Provide education on proper food handling and storage practices. • Provide education on good hygiene practices.

References

1. World Health Organization. Health topics: infectious disease. [cited 2015 May 15]. Available from: http://www.who.int/topics/infectious_diseases/en/.
2. Centers for Disease Control and Prevention (CDC). Division of Vector-Borne Diseases. [cited 2015 May 15]. Available from: http://www.cdc.gov/ncezid/dvbd/about.html.
3. Friis, H. Micronutrients and infection: an introduction. In: Micronutrients and HIV infection. Boca Raton:CRC Press; 2010. P. 3.
4. Centers for Disease Control and Prevention (CDC). Hepatitis information for the public. [cited 2014 Jan 27]. Available from: http://www.cdc.gov/hepatitis/PublicInfo.htm.
5. National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases. Viral hepatitis: A through E and beyond. [cited 2014 Jul 26]. Available from: http://www.nlm.nih.gov/medlineplus/hepatitis.html.
6. Centers for Disease Control and Prevention. Division of Viral Hepatitis and National Center for HIV/AIDS. Viral hepatitis, STD, and TB prevention. [cited 2015 May 1]. Available from: http://www.cdc.gov/hepatitis/.
7. Centers for Disease Control and Prevention (CDC). Viral Hepatitis – Hepatitis A Information. [cited 2012 Aug 18]. Available from: http://www.cdc.gov/hepatitis/hav/havfaq.htm#general.
8. National Institute of Allergy and Infectious Disease (NIAID). Hepatitis A. [cited 2012 Aug 18]. Available from: http://www.niaid.nih.gov/topics/hepatitis/types/Pages/hepatitisA.aspx.
9. Centers for Disease Control and Prevention (CDC). Hepatitis E FAQs for Health Professionals. [cited 2012 Aug 18]. Available from: http://www.cdc.gov/hepatitis/hev/hevfaq.htm#section1.
10. National Institute of Allergy and Infectious Disease (NIAID). Hepatitis E. [cited 2012, Aug 18]. Available from: http://www.niaid.nih.gov/topics/hepatitis/types/Pages/hepatitisE.aspx.
11. Centers for Disease Control and Prevention (CDC). Meningitis. [cited 2012 Aug 26]. Available from: http://www.cdc.gov/meningitis/index.html.
12. Centers for Disease Control and Prevention (CDC). Bacterial Meningitis. [cited 2012 Aug 26]. Available from: http://www.cdc.gov/meningitis/bacterial.html.
13. Centers for Disease Control and Prevention (CDC). Cronobactor. [cited 2014 Feb 12]. Available from: http://www.cdc.gov/cronobacter/technical.html.
14. Centers for Disease Control and Prevention (CDC). Viral Meningitis. [cited 2012 Aug 26]. Available from: http://www.cdc.gov/meningitis/viral.html.
15. Food Safety.gov. Listeria. [cited 2012 Aug 26]. Available from: http://www.foodsafety.gov/poisoning/causes/bacteriaviruses/listeria/#.
16. Centers for Disease Control and Prevention (CDC). Listeria: People at Risk. [cited 2012 Aug 26]. Available from: http://www.cdc.gov/listeria/risk.html.
17. Schlech WF, 3rd, Lavigne PM, Bortolussi RA, Allen AC, Haldane EV, Wort AJ, Hightower AW, Johnson SE, King SH, Nicholls ES, Broome CV. Epidemic listeriosis--evidence for transmission by food. The New England journal of medicine. 1983;308(4):203-6.

18. Centers for Disease Control and Prevention. Vital signs: listeria illnesses, deaths, and outbreaks - United States, 2009-2011. Morbidity and Mortality Weekly Report (MMWR). 2013;62(22):448-52.
19. Jackson KA, Iwamoto M, Swerdlow D. Pregnancy-associated listeriosis. Epidemiology and infection. 2010;138(10):1503-9.
20. Centers for Disease Control and Prevention (CDC). Pneumonia. [cited 2012 Aug 26]. Available from: http://www.cdc.gov/pneumonia/ .
21. Goodnight W H, & Soper D E (2005). Pneumonia in pregnancy. *Critical care medicine*, *33*(10), S390-S397.
22. Centers for Disease Control and Prevention (CDC). Bronchitis. [cited 2012 Sep 16]. Available from: http://www.cdc.gov/getsmart/community/for-patients/common-illnesses/bronchitis.html.
23. Centers for Disease Control and Prevention (CDC). Symptom Relief. [cited 2012 Sep 16]. Available from: http://www.cdc.gov/getsmart/community/for-patients/symptom-relief.html.
24. Centers for Disease Control and Prevention (CDC). Parasites. [cited 2012 Aug 26]. Available from: http://www.cdc.gov/parasites/about.html.
25. Centers for Disease Control and Prevention (CDC). Toxoplasmosis. [cited 2012 Aug 26]. Available from: http://www.cdc.gov/parasites/toxoplasmosis/indexhtml.
26. Centers for Disease Control and Prevention (CDC). Toxoplasmosis - Prevention. [cited 2012 Aug 26]. Available from: http://www.cdc.gov/parasites/toxoplasmosis/prevent.html.
27. Centers for Disease Control and Prevention (CDC). Toxoplasmosis - Treatment. [cited 2012 Aug 26]. Available from: http://www.cdc.gov/parasites/toxoplasmosis/treatment.html.

Clarification

Self-reporting of a diagnosis by a medical professional should not be confused with self-diagnosis, where a person simply claims to have or to have had a medical condition without any reference to professional diagnosis. A self-reported medical diagnosis ("My doctor says that I have/my son or daughter has…") should prompt the CPA to validate the presence of the condition by asking more pointed questions related to that diagnosis.

352b Infectious Diseases - Chronic

Definition/Cut-off Value

Conditions likely lasting a lifetime and require long-term management of symptoms. Infectious diseases come from bacteria, viruses, parasites, or fungi and spread directly or indirectly, from person to person (1). Infectious diseases may also be zoonotic, which are transmitted from animals to humans, or vector-borne, which are transmitted from mosquitoes, ticks, and fleas to humans (1, 2). These diseases and/or conditions include, but are not limited to (an extensive listing of infectious diseases can be found at: http://www.nlm.nih.gov/medlineplus/infections.html):

Chronic Infectious Diseases*	
HIV Human Immunodeficiency Virus	Hepatitis B
AIDS Acquired Immunodeficiency Syndrome	Hepatitis C
Hepatitis D	

Presence of condition diagnosed, documented, or reported by a physician or someone working under a physician's orders, or as self reported by applicant/participant/caregiver. See Clarification for more information about self-reporting a diagnosis.

Participant Category and Priority Level

Category	Priority
Pregnant Women	I
Breastfeeding Women	I
Non-Breastfeeding Women	III, IV, V, or VI
Infants	I
Children	III

Justification

Both chronic and acute infectious diseases can lead to: 1) poor appetite, 2) low nutrient absorption, 3) accelerated nutrient utilization, and/or 4) rapid nutrient loss, depending on the individual's nutritional state before becoming infected and the individual's diet during the improvement period (3). The following information pertains to some of the more prevalent and/or serious chronic infectious diseases.

Human Immunodeficiency Virus (HIV)/ Acquired Immunodeficiency Syndrome (AIDS)

The Human Immunodeficiency Virus (HIV) is a chronic virus that reduces an individual's ability to fight off infections and diseases (4). HIV destroys white blood cells found in the immune system, also known as CD4

(cluster of differentiation) or T cells (T lymphocytes) (5). HIV is transmitted only through blood, semen, pre-seminal fluid, rectal fluids, vaginal fluids, and breast milk from an HIV-infected person (6). HIV can lead to Acquired Immunodeficiency Syndrome (AIDS) if left untreated (4). Individuals who are aware of their HIV status and are undergoing antiretroviral therapy (ART) to stop the replication of the virus, can typically live decades – while those unaware of their status or are not on ART, can usually remain in this stage about ten years before progressing to the AIDS stage. Some individuals may progress to the AIDS stage sooner than 10 years. During the time period a person progresses from HIV to AIDS, the immune system becomes extremely weakened and can no longer protect against other infections or opportunistic illnesses** - which are infections generally not detrimental to healthy individuals, but can be life-threatening in people infected with HIV. A person with AIDS and an opportunistic illness that goes untreated has a life expectancy of approximately one year (4).

Getting tested is the only way individuals know they are infected with HIV. Many people infected with the virus display no symptoms for as long as ten years or more. The Centers for Disease Control and Prevention (CDC) currently estimates that 1 in 6 people in the United States infected with HIV do not know they have the virus and therefore recommends that everyone between the ages of 13-64 get tested at least once as part of a regular health screening. The CDC further recommends that all pregnant women be tested early in their pregnancy, via an "opt-out" testing measure – which is when pregnant women are told that an HIV test will be included in the standard group of prenatal tests and that they may decline the test. Unless the HIV test is specifically declined, they will be tested for the virus. (7)

An early diagnosis in pregnant women can reduce the transmission of HIV in babies to 2%, if the expectant mother (8):

- Receives Active Antiretroviral Therapy (ART) during pregnancy, labor, and delivery.
- Delivers the baby by cesarean, or C-section.
- Avoids breastfeeding.

There is a 20% chance of transmission if the HIV positive, expectant mother does none of the prevention measures listed above (8). In addition, women living in certain geographic areas or women considered high risk, such as those with sexually transmitted infections, multiple partners, or have substance abuse issues, are encouraged to be retested in the third trimester, preferably when less than 36 weeks pregnant (9).

PrEP (Pre-Exposure Prophylaxis) is a daily pill containing two medicines (tenofovir and emtricitabine), recommended for HIV negative people who are at substantial risk of becoming infected with HIV. PrEP, when taken consistently, reduces HIV transmission by up to 92%, and is recommended for (10):

- Individuals in an HIV discordant relationship in which one partner is HIV positive and the other partner is HIV negative.
- Heterosexual women who do not regularly use condoms with sex partners of unknown HIV status.
- Women who share injectable drug paraphernalia or were in treatment for injectable drug use in the past six months.

** Extensive listing of opportunistic illness can be found at: http://womenshealth.gov/hiv-aids/opportunistic-infections-and-other-conditions/.

HIV/AIDS and Nutrition: Dietary needs for an HIV positive individual are determined by the presence of symptoms (11, 12). **Symptomatic** individuals experiencing unintended weight loss, or wasting, and are dealing with: 1) poor food intake due to medication side effects, sore mouth, or mental health issues; 2)

altered metabolism due to disease progression; or 3) nutrient malabsorption caused by gastrointestinal problems resulting from medications or just the presence of the virus. In symptomatic participants, the main goals are to: 1) increase or maintain a normal body weight; 2) retain or increase lean body mass; and 3) ensure adequate intake of macro- and micronutrients. In most cases, these individuals usually require diets higher in protein and potentially a multivitamin, as vitamins A, B_6, C, and E are lower in symptomatic people. In instances when wasting cannot be alleviated through regular dietary means, enteral and parenteral nutrition therapy may be necessary. For **asymptomatic** individuals or those with a stable weight, the goals should focus on adequate intake of nutrients to prevent wasting – and if food intake is low, these individuals could potentially include a multivitamin or mineral supplement to avoid deficiencies (11, 12).

It is important to note that taking large amounts of iron supplements, leading to iron-overload, encourages disease progression from HIV to AIDS, and should be avoided. In addition, Vitamin A and Zinc, in the form of supplements, can have a negative impact on adults living with HIV/AIDS (12). Participants should always consult with their health care providers before taking dietary supplements over the Recommended Dietary Allowance to prevent adverse reactions and interactions with medications used to treat HIV/AIDS. (13)

HIV/AIDS Medication Nutritional Problems: Even though people with HIV are able to manage the disease and live longer with Highly Active Antiretroviral Therapy (HAART), the side effects can have a negative impact on a person's nutritional status. Common side effects include: gastrointestinal problems, lipid disorders, and insulin resistance/glucose intolerance. Participants experiencing these problems should: reduce total fat intake and cholesterol; increase dietary fiber; increase physical activity; reduce alcohol consumption; and reduce the consumption of simple sugars. (11, 12)

HIV/AIDS and Food Safety: Participants living with HIV are more susceptible to contracting a food-borne illness due to weakened immune systems and therefore should be encouraged to: store and prepare foods safely; check expiration dates; and avoid raw or semi raw foods, such as meat, non-pasteurized dairy, and soft cheeses (11, 12). Infants born to HIV positive mothers, regardless of their HIV status, should drink ready-to-feed or liquid concentrate infant formula as powdered infant formula is not sterile and may not be microbiological safe (14).

HIV/AIDS Care and Support: HIV-affected families often experience a lack of financial and psychosocial support needed to deal with an HIV/AIDS diagnosis, including the effects of social stigma which negatively impacts their ability to comply with the medical treatment needed to control the disease (15). Further, to fully benefit from current treatment protocols required to manage HIV and reduce the progression to AIDS, infected individuals who know their status, must get care, stay in care, and adhere to an effective antiretroviral treatment plan known as an HIV/AIDS Care Continuum (16). WIC agencies should proactively refer participants to health care services and various community resources, including other FNS nutrition assistance programs, to improve health outcomes among HIV-infected WIC participants.

Implications for WIC Nutrition Services

WIC can improve the management of chronic infectious diseases through WIC foods, nutrition education, counseling, and referrals to community resources that provide support in the long-term management of chronic infectious diseases.

HIV/AIDS

The table below summarizes the WIC Nutrition Services that can help improve the health and birth outcomes of participants with HIV/AIDS.

Participant Category	WIC Nutrition Services Recommendations for HIV/AIDS
ALL CATEGORIES	**NUTRITION AND HEALTH TIPS TO MANAGE HIV/AIDS SYMPTOMS (12, 17, 18, 19)** • Use MyPlate as the guide for dietary needs. • Consult health care providers when using supplements and herbs to avoid adverse reactions or medication interactions that could reduce effectiveness. • Eat small, frequent meals when gastrointestinal problems are present or persistent. • Eat soft foods with manageable textures at tolerable temperatures when oral lesions and dental problems are present (i.e. mashed potatoes, scrambled/boiled eggs, bananas, non-citrus juices, puddings, custards, milk, cooked vegetables, rice, oatmeal, non-fizzy drinks, cottage cheese, non-spicy foods). • Add canned tuna, beans, cheese, peanut butter, dried milk for inexpensive extra protein. • Add moderate amounts of concentrated sources of calories to diet when needed (e.g., butter, cream cheese, gravies, whole milk, ice cream). • Consume nutritious, high caloric foods when appetite is normal or has returned. • Drink adequate water to stay hydrated, replace fluid loss from diarrhea and vomiting, and help medications move through the body. • Consume foods high in fiber or fiber supplements to slow digestion if foods are moving too quickly through the body. • Eat yogurt or foods with *Lactobacillus acidophilus* culture to help with bacterial over-growth resulting from prolonged use of antibiotics. • Avoid caffeinated beverages to prevent dehydration. • Avoid or reduce sugar-free foods with sorbitol as diarrhea may be exacerbated. • Consult with health care provider about use of complete oral nutritional supplements to help nutritional status. • Avoid alcohol and illegal drugs for overall good health and to help protect the liver. • Use pancreatic enzymes when medically prescribed to help with digestion. • Prepare and store food safely. • Avoid expired and moldy foods or foods with rotten spots. • Participate in weight-bearing exercises to strengthen and maintain bones. • Refer HIV-affected families to other community resources for food, housing, and medical resources to improve compliance with HIV treatment.
WOMEN	• Encourage all women to be tested to prevent mother-to-child HIV transmission through delivery and breastfeeding (7). Women who are considered high risk, such as those with sexually transmitted infections, multiple partners, or have substance abuse issues, are encouraged to be retested during late gestation, preferably before 36 weeks (9). Note: HIV testing is not a standard medical test administered to pregnant women in many states, in addition, pregnant women can opt-out in those states in which HIV testing is part of the standard test. Therefore, WIC can impact the spread of HIV/AIDS by making referrals to participants for early and late gestation testing, given that some populations served by WIC are most at risk for contracting HIV (7).

Participant Category	WIC Nutrition Services Recommendations for HIV/AIDS
WOMEN (Continued)	• Advise infected pregnant women to consume a diet adequate in nutrients, achieve appropriate weight gain, and discuss taking a multivitamin with their health care provider (11). • Educate mothers with HIV/AIDS to avoid breastfeeding. This is especially important for recent immigrants and refugees from developing nations, as the recommendations are different in developing countries (15). In some developing countries, breastfeeding is encouraged due to the lack of available clean water to prepare infant formula and other sanitation problems). • More information about **women and HIV** can be found at: o http://www.womenshealth.gov/hiv-aids/ o http://www.cdc.gov/hiv/risk/gender/pregnantwomen/facts/
INFANTS	• Inform mothers/caregivers that formula feeding is the standard for infants born to HIV positive mothers in the United States as breastfeeding is not recommended – especially to the immigrant and refugee population (13). • Ensure that liquid concentrate, or ready-to-feed infant formula, prescribed with medical documentation, is provided to HIV-exposed infants or babies born to HIV positive mothers, even if the infant has tested negative for HIV. Powdered infant formula is not sterile and therefore may not be microbiologically safe for immune-compromised participants (14). • Discourage giving pre-chewed food, regardless of HIV status, as the individual's HIV status, who is pre-chewing the food is unknown (6). • More information about **infants and HIV** can be found at: o http://www.cdc.gov/hiv/risk/gender/pregnantwomen/facts/
CHILDREN	• Discourage giving pre-chewed food, regardless of HIV status, as the individual's HIV status, who is pre-chewing the food is unknown (6) • More information about **children and HIV** can be found at: o http://www.cdc.gov/hiv/risk/gender/pregnantwomen/facts/ o http://aids.gov/hiv-aids-basics/just-diagnosed-with-hiv-aids/overview/children/

VIRAL HEPATITIS

Hepatitis is inflammation of the liver. It is most often caused by viruses, but can also be caused by excessive alcohol consumption, toxins, and medicines such as acetaminophen, as well as other medical conditions linked to liver inflammation (20). Viral hepatitis is caused by a series of viruses labeled A, B, C, D, and E with A, B, and C being the most common forms in the United States. Viral hepatitis A and E are the only forms that are acute and do not become chronic, whereas B, C, and D can both be acute and chronic in nature (20). Regardless of the type of hepatitis, infected individuals with signs of the infection will typically experience: anorexia, nausea, vomiting, diarrhea, jaundice, epigastria pain, tiredness, and weakness, all of which affect one's diet and health (21). In addition, darker urine and pale stools may be present in infected individuals. It is important to note that viral hepatitis is the leading cause of liver cancer and the most frequent need for liver transplants in the United States (22).

Hepatitis B: Hepatitis B is both acute and chronic, and is transmitted through contact with hepatitis B virus (HBV) infected blood, sexual intercourse with an infected person, and from mother to child by both vaginal or cesarean section births (20). Those at higher risk of becoming infected with hepatitis B are those: living

with a hepatitis B infected person; coming into contact with blood, needles, or body fluids through work; working or living in a prison system; from Asian and Pacific Islands nations; undergoing kidney dialysis; infected with HIV or hepatitis; and who have an immigrant or refugee status (21).

Treatment for Hepatitis B involves the use of interferon and antiviral drugs to interfere with the course of the virus. Early diagnosis and treatment of hepatitis B can help prevent damage to the liver. In addition, the Hepatitis B vaccination can prevent Hepatitis B. (22)

Hepatitis B is not spread through human milk. Given that Hepatitis B is spread through blood, mothers who breastfeed should care for their nipples to avoid cracking and bleeding. If a mother with Hepatitis B has cracked and bleeding nipples, she should temporarily stop breastfeeding until her nipples heal - but continue to pump and discard pumped milk to maintain her milk supply (23). If a mother with HBV has concerns with providing her milk to her infant or concerns with drug treatment for the HBV, she should consult her physician.

Hepatitis C: Hepatitis C is both acute and chronic; however, most cases are chronic and commonly spread through sharing needles during intravenous drug use (20). It can also spread through sexual intercourse; having a blood transfusion or organ transplant before July 1992; or using the razor, toothbrush, or nail clippers of an infected person. Being infected with a sexually transmitted disease or HIV can increase the chances of becoming infected with Hepatitis C. Getting tattoos and body piercings from unlicensed facilities, in casual settings, or with the use of non-sterile instruments can also transmit Hepatitis C (20).

By the time symptoms appear with hepatitis C, the liver has been damaged, which in most cases can be as long as ten years after being infected. There is no vaccine for Hepatitis C. Medicines are used to slow or stop the virus from damaging the liver in chronic hepatitis. Severe damage to the liver leading to failure may require a liver transplant. (20)

Infants born to mothers with hepatitis C can become infected; however, breastfeeding is not contraindicated, as Hepatitis C is not transmitted through human milk, unless the mother's nipples are cracked and bleeding. (See information above in **Hepatitis B** about breastfeeding with cracked and/or bleeding nipples.)

Hepatitis D: Hepatitis D is both acute and chronic. Though not common in the United States, viral hepatitis D can only be contracted when an individual also has hepatitis B (20, 22). The virus is present in blood and other body fluids of infected persons and is most commonly transmitted through: engaging in sexual activity; mother to child during delivery; sharing injection drug paraphernalia, razors, or toothbrushes; or coming in direct contact with the blood of an infected person. Chronic hepatitis D resulting from a super-infection, in which an individual has chronic hepatitis B, can progress to end-stage liver diseases (cirrhosis) or liver cancer. In some patients, interferon may be useful for treating hepatitis D. Although no vaccine exist for Hepatitis D, it can be prevented in persons who do not have Hepatitis B, by getting the Hepatitis B vaccination (20, 22).

Implications for WIC Nutrition Services

WIC can improve the management of chronic infectious diseases through WIC foods, nutrition education, counseling, and referrals to community resources that provide support in the long-term management of chronic infectious diseases.

HEPATITIS

The table below summarizes the WIC Nutrition Services recommendations that can help improve the health outcomes of participants with Hepatitis.

Types of Hepatitis	WIC Nutrition Services Recommendations for Chronic Hepatitis (24, 25)
All Types	• Recommend testing to pregnant women and high risk individuals. • Encourage abstinence from alcohol. • Provide information on high calorie, high protein and moderate fat diets. • Recommend high calorie consumption at breakfast to mitigate nausea. (Typically nausea is less common in the morning.) • Recommend, in consultation with health care provider, consumption of high calorie and protein liquid formula between meals to boost calorie intake. • Encourage a bland diet with extra fluids depending on the severity of nausea and vomiting.
Hepatitis B	• Encourage the Hepatitis B vaccine for all newborns, previously unvaccinated adolescents through the age of 18, and high-risk adults. • Promote breastfeeding as being safe, but to avoid breastfeeding when nipples are cracked and bleeding – at which time, mothers should pump and discard milk to maintain supply. • Discourage the practice of pre-chewing food for infants, as blood may be present.
Hepatitis C	• Promote breastfeeding as being safe, but to avoid breastfeeding when nipples are cracked and bleeding – at which time, mothers should pump and discard milk to maintain supply.
Hepatitis D	• Recommend Hepatitis B vaccine.

References

1. World Health Organization. Health topics: infectious disease. [cited 2015 May 15]. Available from: http://www.who.int/topics/infectious_diseases/en/.
2. Centers for Disease Control and Prevention (CDC). Division of Vector-Borne Diseases. [cited 2015 May 15]. Available from: http://www.cdc.gov/ncezid/dvbd/about.html.
3. Friis, H. Micronutrients and infection: an introduction. In: Micronutrients and HIV infection. Boca Raton:CRC Press; 2010. P. 3.
4. Centers for Disease Control and Prevention (CDC). HIV/AIDS: about HIV/AIDS. [cited 2015 May 15]. Available from: http://www.cdc.gov/hiv/basics/whatishiv.html.
5. AIDS.gov. CD4 count. [cited 2015 May 15]. Available from: https://www.aids.gov/hiv-aids-basics/just-diagnosed-with-hiv-aids/understand-your-test-results/cd4-count/.
6. Centers for Disease Control and Prevention (CDC). HIV/AIDS: transmission. [cited 2015 May 15]. Available from: http://www.cdc.gov/hiv/basics/transmission.html.
7. Centers for Disease Control and Prevention (CDC). HIV/AIDS: testing. [cited 2015 May 15]. Available from: http://www.cdc.gov/hiv/basics/testing.html.

8. Centers for Disease Control and Prevention (CDC). HIV/AIDS: prevention. [cited 2015 May 15]. Available from: http://www.cdc.gov/hiv/basics/prevention.html.
9. Branson BM, Handsfield HH, Lampe MA, Janssen RS, Taylor AW, Lyss SB, et al. Revised recommendations for HIV testing of adults, adolescents, and pregnant women in health-care settings. MMWR Recommendations and Reports 2006;55(RR-14):1–17. [cited 2015 May 15]. Available from: http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5514a1.htm.
10. Centers for Disease Control and Prevention (CDC). HIV/AIDS: PrEP. [cited 2015 May 15]. Available from: http://www.cdc.gov/hiv/basics/prep.html.
11. Poulia KA. HIV/AIDS. In: Katsilambros N, Dimosthenopoulos C, Kontogianni MD, Manglara E, editors. Clinical nutrition in practice. Wiley.com; 2010. p. 147-153.
12. Lutz CA, MA, Mazur EE, Litch NA. Nutrition and diet therapy: evidence-based applications. 6th edition. F.A. Davis Company, 2015. Chapter 23.
13. World Health Organization. Nutrient requirements for people living with HIV/AIDS: report of a technical consultation. World Health Organization, Geneva, 13–15 May 2003. [cited 2015 May 15]. Available from: http://www.who.int/nutrition/publications/hivaids/9241591196/en/.
14. Food and Agriculture Organization of the United Nations. *Enterobacter sakazakii* and other microorganisms in powdered infant formula. WHO, Geneva, 2-5 February 2004.
15. McFarland EJ. Human immunodeficiency virus infection. In: Hay WW, Levin MJ, Deterding RR, Abzug MJ. In: Current diagnosis & treatment: Pediatrics. 22nd edition. McGraw-Hill; 2014. Chapter 41.
16. AIDS.gov. HIV/AIDS care continuum. [cited 2015 May 15]. Available from: https://www.aids.gov/federal-resources/policies/care-continuum/.
17. Shiau S, Arpadi SM, Yin MT. HIV/AIDS and bone health: the role of nutrition. In: Holick MF, Nieves JW, editors. Nutrition and Bone Health. 2nd edition. New York: Springer; 2015. Chapter 38.
18. Knox TA, Jerger L, Tang, AM. Alcohol, HIV/AIDS, and liver disease. In: Watson RR, Preedy VR, Zibadi S, editors. Alcohol, Nutrition, and Health Consequences. New York: Humana Press; 2013. p. 287-303.
19. Staying Healthy with Diet and Exercise When You Have HIV/AIDS. In: Judd S, Judd S, Judd S, editors. Health Reference Series: AIDS Sourcebook. Detroit: Omnigraphics; 2011. Section 41.1
20. Centers for Disease Control and Prevention (CDC). Hepatitis information for the public. [cited 2014 Jan 27]. Available from: http://www.cdc.gov/hepatitis/PublicInfo.htm.
21. National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases. Viral hepatitis: A through E and beyond. [cited 2014, July 26]. Available from: http://www.nlm.nih.gov/medlineplus/hepatitis.html.
22. Centers for Disease Control and Prevention. Division of Viral Hepatitis and National Center for HIV/AIDS. Viral hepatitis, STD, and TB prevention. [cited 2015 May 1]. Available from: http://www.cdc.gov/hepatitis/.
23. Centers for Disease Control and Prevention. Breastfeeding: hepatitis B and C infections. [cited 2015 May 1]. Available from: http://www.cdc.gov/breastfeeding/disease/hepatitis.htm.

24. Carroll A & Lutz, MA. Diet in gastrointestinal disease. In: nutrition and diet therapy. Philadelphia: F.A.Davis Company; 2011. Chapter 20.

25. Juve C, Schadewald D, Youngkin EQ, Davis MS, eds. 2013. Women's health: a primary care clinical guide - 4th Edition. New Jersey. Pearson Education; 2013.

Clarification

Self-reporting of a diagnosis by a medical professional should not be confused with self-diagnosis, where a person simply claims to have or to have had a medical condition without any reference to professional diagnosis. A self-reported medical diagnosis ("My doctor says that I have/my son or daughter has…") should prompt the CPA to validate the presence of the condition by asking more pointed questions related to that diagnosis.

353 Food Allergies

Definition/Cut-off Value

Food allergies are adverse health effects arising from a specific immune response that occurs reproducibly on exposure to a given food. (1)

Presence of condition diagnosed, documented, or reported by a physician or someone working under a physician's orders, or as self reported by applicant/participant/caregiver. See Clarification for more information about self-reporting a diagnosis.

Participant Category and Priority Level

Category	Priority
Pregnant Women	I
Breastfeeding Women	I
Non-Breastfeeding Women	III, IV, V, or VI
Infants	I
Children	III

Justification

The actual prevalence of food allergies is difficult to establish due to variability in study designs and definitions of food allergies; however recent studies suggest a true increase in prevalence over the past 10 to 20 years (1). A meta-analysis conducted by the National Institute of Allergy and Infectious Disease (NIAID) found the prevalence of food allergy among all age groups between 1-10% (2). Further research has found that food allergy affects more children than recently reported with the prevalence estimated to be 8 % (2). Food allergies are a significant health concern as they can cause serious illness and life-threatening reactions. Prompt identification and proper treatment of food allergies improves quality of life, nutritional well-being and social interaction.

Food allergy reactions occur when the body's immune system responds to a harmless food as if it were a threat (3). The most common types of food allergies involve immunoglobulin E (IgE)-mediated responses. The immune system forms IgE against offending food(s) and causes abnormal reactions. IgE is a distinct class of antibodies that mediates an immediate allergic reaction. When food allergens enter the body, IgE antibodies bind to them and release chemicals that cause various symptoms. (1)

According to an expert panel sponsored by the National Institute of Allergy and Infectious Disease, individuals with a family history of any allergic disease are susceptible to developing food allergies and are classified as "at risk" or "high risk." Individuals who are "at risk" are those with a biological parent or sibling with existing, or history of, allergic rhinitis, asthma or atopic dermatitis. Individuals who are "high risk" are those with preexisting severe allergic disease and/or family history of food allergies. (1)

Food Allergies vs. Intolerances

Food intolerances are classified differently from food allergies based on the pathophysiological mechanism of the reactions. Unlike food allergies, food intolerances do not involve the immune system. Food intolerances are adverse reactions to food caused either by the properties of the food itself, such as a toxin, or the characteristics of the individual, such as a metabolic disorder (4). Food intolerances are often misdiagnosed as food allergies because the symptoms are often similar. Causes of food intolerances may include food poisoning, histamine toxicity, food additives such as monosodium glutamate (MSG), or sulfites (5). The most common food intolerance is lactose intolerance (see nutrition risk criterion #355, *Lactose Intolerance*).

Common Food Allergens

Although reactions can occur from the ingestion of any food, a small number of foods are responsible for the majority of food-induced allergic reactions (6). The foods that most often cause allergic reactions include:

- cow's milk (and foods made from cow's milk)
- eggs
- peanuts
- tree nuts (walnuts, almonds, cashews, hazelnuts, pecans, brazil nuts)
- fish
- crustacean shellfish (e.g., shrimp, crayfish, lobster, and crab)
- wheat
- soy

For many individuals, food allergies appear within the first two years of life. Allergies to cow's milk, eggs, wheat and soy generally resolve in early childhood. In contrast, allergy to peanuts and tree nuts typically persist to adulthood. Adults may have food allergies continuing from childhood or may develop sensitivity to food allergens encountered after childhood, which usually continue through life. (1)

Symptoms

There are several types of immune responses to food including IgE-mediated, non-IgE-mediated or mixed. In an IgE-mediated response, the immune system produces allergen-specific IgE antibodies (sIgE) when a food allergen first enters the body. Upon re-exposure to the food allergen, the sIgE identifies it and quickly initiates the release of chemicals, such as histamine (3). These chemicals cause various symptoms based on the area of the body in which they were released. These reactions occur within minutes or up to 4 hours after ingestion and include symptoms such as urticaria (hives), angioedema, wheezing, cough, nausea, vomiting, hypotension and anaphylaxis (7).

Food-induced anaphylaxis is the most severe form of IgE-mediated food allergies. It often occurs rapidly, within seconds to a few hours after exposure, and is potentially fatal without proper treatment. Food-induced anaphylaxis often affects multiple organ systems and produces many symptoms, including respiratory compromise (e.g., dyspnea, wheeze and bronchospasm), swelling and reduced blood pressure (7). Prompt diagnosis and treatment is essential to prevent life-threatening reactions. Tree nuts, peanuts, milk, egg, fish and crustacean fish are the leading causes of food-induced anaphylaxis (1).

Food allergens may also induce allergic reactions which are non-IgE-mediated. Non-IgE-mediated reactions generally occur more than 4 hours after ingestion, primarily result in gastrointestinal symptoms and are more chronic in nature (7). Examples of non-IgE-mediated reactions to specific foods include celiac disease (see nutrition risk criterion #354, Celiac Disease), food protein-induced enterocolitis syndrome (FPIES), food protein-induced proctocolitis (FPIP), food protein-induced gastroenteropathy, food-induced contact dermatitis and food-induced pulmonary hemosiderosis (Heiner's syndrome) (accessed May 2012) (8).

The diagnosis of food allergies by a health care provider (HCP) is often difficult and can be multifaceted (see Clarification for more information). Food allergies often coexist with severe asthma, atopic dermatitis (AD), eosinophilic esophagitis (EoE) and exercise-induced anaphylaxis. Individuals with a diagnosis of any of these conditions should be considered for food allergy evaluation. (1)

Prevention

Currently, there is insufficient evidence to conclude that restricting highly allergenic foods in the maternal diet during pregnancy or lactation prevents the development of food allergies in the offspring (9). Adequate nutrition intake during pregnancy and lactation is essential to achieve positive health outcomes. Unnecessary food avoidance can result in inadequate nutrition. There is also a lack of evidence that delaying the introduction of solids beyond 6 months of age, including highly allergenic foods, prevents the development of food allergies. If the introduction of developmentally appropriate solid food is delayed beyond 6 months of age, inadequate nutrient intake, growth deficits and feeding problems can occur. (1)

The protective role that breastfeeding has in the prevention of food allergies remains unclear. There is some evidence for infants at high risk of developing food allergies that exclusive breastfeeding for at least 4 months may decrease the likelihood of cow's milk allergy in the first 2 years of life (9). The American Academy of Pediatrics (AAP) continues to recommend that all infants, including those with a family history of food allergies, be exclusively breastfed until 6 months of age, unless contraindicated for medical reasons (1, 10). For infants who are partially breastfed or formula fed, partially hydrolyzed formulas may be considered as a strategy for preventing the development of food allergies in at-risk infants. According to the AAP, there is no convincing evidence for the use of soy formula as a strategy for preventing the development of food allergies in at-risk infants and therefore it is not recommended. (9)

Management

Food allergies have been shown to produce anxiety and alter the quality of life of those with the condition. It is recommended that individuals with food allergies and their caregivers be educated on food allergen avoidance and emergency management that is age and culturally appropriate. Individuals with a history of severe food allergic reactions, such as anaphylaxis, should work with their HCP to establish an emergency management plan. (1)

Food allergen avoidance is the safest method for managing food allergies. Individuals with food allergies must work closely with their HCP to determine the food(s) to be avoided. This includes the avoidance of any cross-reactive foods, i.e., similar foods within a food group (see Clarification for more information). Nutrition counseling and growth monitoring is recommended for all individuals with food allergies to ensure a nutritionally adequate diet. Individuals with food allergies should also be educated on reading food labels and ingredient lists. (1)

Infants who are partially breastfed or formula fed, with certain non-IgE mediated allergies, such as, FPIES and FPIP may require extensively hydrolyzed casein or amino acid-based formula. According to food allergy

experts, children with FPIES can be re-challenged every 18-24 months and, infants/children with FPIP can be re-challenged at 9-12 months of age. The re-challenging of foods should be done with HCP oversight. (8)

Implications for WIC Nutrition Services

Through client-centered counseling, WIC staff can assist families with food allergies in making changes that improve quality of life and promote nutritional well-being while avoiding offending foods. Based on the needs and interests of the participant, WIC staff can (as appropriate):

- Facilitate and encourage the participant's ongoing follow-up with the HCP for optimal management of the condition.
- Promote exclusive breastfeeding until six months of age and continue through the first year (10).
- Provide hypoallergenic formula for participants with appropriate medical documentation, as needed.
- Tailor food packages to substitute or remove offending foods.
- Educate participants on maintaining adequate nutritional intake while avoiding offending foods.
- Monitor weight status and growth patterns of participants.
- Educate participants about reading food labels and identifying offending foods and ingredients. See resources below:
    - http://www.fda.gov/downloads/ForConsumers/ConsumerUpdates/UCM254727.pdf. Accessed May 2012.
    - http://www.webmd.com/allergies/foodtriggers. Accessed May 2012.
    - http://www.foodallergy.org/section/how-to-read-a-label. Accessed May 2012.
- Educate participants on planning meals and snacks for outside the home.
- Refer participants to their HCP for a re-challenge of offending foods, as appropriate.
- Establish/maintain communication with participant's HCP.

References

1. Boyce, J. et al. Guidelines for the diagnosis and management of food allergy in the United States: Report of the NIAID-Sponsored Expert Panel. Journal of Allergy and Clinical Immunology. 2010; 126(6):S1-S58. http://www.jacionline.org/article/S0091-6749(10)01566-6/fulltext. Accessed May 2012.
2. Gupta, R. et al. The prevalence, severity and distribution of childhood food allergy in the United States. Pediatrics. 2011; 128(1):e9-e17. Available at: http://pediatrics.aappublications.org/content/128/1/e9.full.html. Accessed May 2012.
3. National Institute of Allergy and Infectious Disease website: How do allergic reactions work? Available at: http://www.niaid.nih.gov/topics/foodallergy/understanding/pages/whatisit.aspx. Accessed May 2012.
4. Cianferoni, A, Spergel, JM. Food allergy: review, classification and diagnosis. Allergology International. 2009; 58:457-466.

5. National Institute of Allergy and Infectious Disease. Food allergy: An overview. Bethesda, MD: U.S. Department of Health and Human Services, National Institutes of Health, 2010 (NIH Publication No. 11-5518). Available at: http://www.niaid.nih.gov/topics/foodallergy/understanding/pages/whatisit.aspx. Accessed May 2012.

6. Sampson, HA. Food Allergy. Part 1: Immunopathogenesis and clinical disorders. Journal of Allergy and Clinical Immunology. 1999; 103(5):717-728.

7. Davis, C. Food allergies: clinical manifestations, diagnosis, and management. Current Problems in Pediatric Adolescent Health Care. 2009; 39:236-254.

8. Metcalfe DD, Sampson HA, Simon RA, editors. Food allergy: adverse reactions to food and food additives. 4th ed. Malden (MA): Blackwell Publishing; 2008.

9. Greer, F. et al. American Academy of Pediatrics Committee on Nutrition. Effects of early nutritional interventions on the development of atopic disease in infants and children: the role of maternal dietary restriction, breastfeeding, timing of introduction of complementary foods, and hydrolyzed formulas. Pediatrics. 2008; 121(1), pages 183-191.

10. Gartner LM, Morton J, Lawrence RA, et al. American Academy of Pediatrics. Policy Statement: Breastfeeding and the use of human milk. Pediatrics.2005; 115 (2):496– 506.

11. Sicherer S.H., Sampson, HA. Food allergy. Journal of Allergy and Clinical Immunology. 2010; (125):S116-S125.

Clarification

Self-reporting of a diagnosis by a medical professional should not be confused with self-diagnosis, where a person simply claims to have or to have had a medical condition without any reference to professional diagnosis. A self-reported medical diagnosis ("My doctor says that I have/my son or daughter has…") should prompt the CPA to validate the presence of the condition by asking more pointed questions related to that diagnosis.

Food allergies are diagnosed by a HCP by evaluating a thorough medical history and conducting a physical exam to consider possible trigger foods to determine the underlying mechanism of the reaction, which guides testing. Along with a detailed history of the disorder, such as symptoms, timing, common triggers and associations, there are several types of tests that the HCP may use in diagnosing food allergies. These include the following:

- Food Elimination Diet
- Oral Food Challenges
- Skin Prick Test (SPT)
- Allergen-specific serum IgE (sIgE)
- Atopy Patch Test

Diagnosing food allergies is difficult because the detection of sIgE does not necessarily indicate a clinical allergy. Often, more than one type of test is required to confirm a diagnosis. The double-blind, placebo-controlled food challenge is considered the gold standard in testing for food allergies. (11)

Children often outgrow allergies to cow's milk, soy, egg, and wheat quickly; but are less likely to outgrow allergies to peanut, tree nuts, fish, and crustacean shellfish. If the child has had a recent allergic reaction, there is no reason to retest. Otherwise, annual testing may be considered to see if the allergy to cow's milk, soy, egg, or wheat has been outgrown so the diet can be normalized. (1)

Cross-reactive food: When a person has allergies to one food, he/she tends to be allergic to similar foods within a food group. For example, all shellfish are closely related; if a person is allergic to one shellfish, there is a strong chance that person is also allergic to other shellfish. The same holds true for tree-nuts, such as almonds, cashews and walnuts. (1)

354 Celiac Disease

Definition/Cut-off Value

Celiac Disease (CD) is an autoimmune disease precipitated by the ingestion of gluten (a protein in wheat, rye, and barley) that results in damage to the small intestine and malabsorption of the nutrients from food. (1). (For more information about the definition of CD, please see the Clarification section)

CD is also known as:

- Celiac Sprue
- Gluten-sensitive Enteropathy
- Non-tropical Sprue

Presence of condition diagnosed, documented, or reported by a physician or someone working under a physician's orders, or as self reported by applicant/participant/caregiver. See Clarification for more information about self-reporting a diagnosis.

Participant Category and Priority Level

Category	Priority
Pregnant Women	I
Breastfeeding Women	I
Non-Breastfeeding Women	III, IV, V, or VI
Infants	I
Children	III

Justification

CD affects approximately 1% of the U.S. population (2, 3). CD can occur at any age and the treatment requires strict adherence to a gluten-free diet for life. CD is both a disease of malabsorption and an abnormal immune reaction to gluten. When individuals with CD eat foods or ingest products containing gluten, their immune system responds by damaging or destroying villi—the tiny, fingerlike protrusions lining the small intestine. Villi normally allow nutrients from food to be absorbed through the walls of the small intestine into the bloodstream (4). The destruction of villi can result in malabsorption of nutrients needed for good health. Key nutrients often affected are iron, calcium and folate as they are absorbed in the first part of the small intestine. If damage occurs further down the small intestinal tract, malabsorption of carbohydrates (especially lactose), fat and fat-soluble vitamins, protein and other nutrients may also occur (2,5).

In addition to the gastrointestinal system, CD affects many other systems in the body, resulting in a wide range and severity of symptoms. Symptoms of CD may include chronic diarrhea, vomiting, constipation, pale foul-smelling fatty stools and weight loss. Failure to thrive may occur in infants and children. The vitamin and mineral deficiencies that can occur from continued exposure to gluten may result in conditions such as anemia, osteoporosis and neurological disorders such as ataxia, seizures and neuropathy.

Individuals with CD who continue to ingest gluten are also at increased risk for developing other autoimmune disorders (e.g., thyroid disease, type 1 diabetes, Addison's disease) and certain types of cancer, especially gastrointestinal malignancies (2).

Continued exposure to gluten increases the risk of miscarriage or having a low birth weight baby, and may result in infertility in both women and men. A delay in diagnosis for children may cause serious nutritional complications including growth failure, delayed puberty, iron-deficiency anemia, and impaired bone health. Mood swings or depression may also occur (2, 6). See Table 1 for Nutritional Implications and Symptoms.

Table 1. Nutritional Implications and Symptoms of CD

Common in Children

Digestive Symptoms-more common in infants and children, may include:

- vomiting
- chronic diarrhea
- constipation
- abdominal bloating and pain
- pale, foul-smelling, or fatty stool

Other Symptoms:

- delayed puberty
- dental enamel abnormalities of the permanent teeth
- failure to thrive (delayed growth and short stature)
- weight loss
- irritability

Common in Adults

Digestive Symptoms- same as above, less common in adults

Other Symptoms- adults may instead have one or more of the following:

- unexplained iron-deficiency anemia
- other vitamin and mineral deficiencies (A, D, E, K, calcium)
- lactose intolerance
- fatigue
- bone or joint pain
- arthritis
- depression or anxiety
- tingling numbness in the hands and feet
- seizures
- missed menstrual periods
- infertility (men and women) or recurrent miscarriage
- canker sores inside the mouth
- itchy skin rash- dermatititis herpetiformis
- elevated liver enzymes

Table 1. Nutritional Implications and Symptoms of CD

Sources:

Case, Shelley, Gluten-Free Diet, A Comprehensive Resource Guide, Case Nutrition Consulting Inc., 2008.

National Institute of Diabetes and Digestive and Kidney Diseases, Celiac Disease, NIH Publication No. 08-4269 September 2008.) http://digestive.niddk.nih.gov/ddiseases/pubs/celiac/#what. Accessed May 2012.

The risk for development of CD depends on genetic, immunological, and environmental factors. Recent studies suggest that the introduction of small amounts of gluten while the infant is still breast-fed may reduce the risk of CD. Both breastfeeding during the introduction of dietary gluten, and increasing the duration of breastfeeding were associated with reduced risk in the infant for the development of CD. It is not clear from studies whether breastfeeding delays the onset of symptoms or provides a permanent protection against the disease. Therefore, it is prudent to avoid both early (<4 months) and late (≥7 months) introduction of gluten and to introduce gluten gradually while the infant is still breast-fed, as this may reduce the risk of CD. (7)

The only treatment for CD is a gluten-free diet. Individuals with CD should discuss gluten-free food choices with a dietitian or physician that specializes in CD. Individuals with CD should always read food ingredient lists carefully to make sure that the food does not contain gluten. Making informed decisions in the grocery stores and when eating out is essential for the successful treatment of the disease (5, 8).

Implications for WIC Nutrition Services

Through client-centered counseling, WIC staff can assist participants with CD in making gluten-free food choices that improve quality of life and promote nutritional well-being. WIC can provide nutrition education/counseling on alternatives to gluten-containing food products as well as provide gluten-free grain selections available in the WIC food packages. Based on the needs and interests of the participant, WIC staff may (as appropriate):

- Promote breastfeeding throughout the first year of life, with exclusive breastfeeding until 4-6 months of age.
- In consultation with the guidance of a medical provider, introduce gluten-containing foods between 4 and 6 months to infants at risk of CD, including infants with a parent or sibling with CD.
- Tailor food packages to substitute or remove gluten-containing foods.
- Educate participants on meeting nutritional needs in the absence of gluten-containing foods.
- Encourage high fiber, gluten-free grain selections.
- Monitor participant's growth pattern and weight status.
- Educate participants on planning gluten-free meals and snacks for outside the home.
- Provide educational materials outlining allowed foods and foods to avoid, for example:
    - http://www.celiac.nih.gov/Default.aspx. Accessed May 2012.

- http://www.naspghan.org/user-assets/Documents/pdf/diseaseInfo/GlutenFreeDietGuide-E.pdf. Accessed May 2012.

- Provide referrals as appropriate.

References

1. National Institute of Allergy and Infectious Disease. Food allergy: an overview. Bethesda, MD: U.S. Department of Health and Human Services, National Institutes of Health, 2010 (NIH Publication No. 11-5518). Available at: http://www.niaid.nih.gov/topics/foodallergy/understanding/pages/whatisit.aspx. Accessed May 2012.
2. Case, S. Gluten-free diet: A comprehensive resource guide. Case Nutrition Consulting Inc., 2008.
3. Green, PHR, Cellier, C. Medical progress-celiac disease. The New England Journal of Medicine. 2007 Oct 25:1731-1743.
4. National Institute of Diabetes and Digestive and Kidney Diseases, Celiac Disease, National Institute of Health. Celiac disease. Available at: http://digestive.niddk.nih.gov/ddiseases/pubs/celiac/#what Accessed May 2012.
5. National Institute of Diabetes and Digestive and Kidney Diseases, Celiac Disease, NIH Publication No. 08-4269 September 2008.
6. Guideline for the Diagnosis and Treatment of Celiac Disease in Children: Recommendation of the North American Society for Pediatric Gastroenteroloy, Hepatology and Nutrition. J Pediatr Gastroenterol Nutr. 2005 Jan;40(1):1-19.
7. ESPGHAN Committee on Nutrition: Agostoni, C. et al. Complementary feeding: A commentary by the ESPGHAN Committee on Nutrition, Medical Position Paper. Journal of Pediatric Gastroenterology and Nutrition, January 2008: 46:99-110.
8. Raymond, N, Heap, J, Case, S. The gluten-free diet: An update for health professionals. Practical Gastroenterology. 2006 September: 67-92.
9. American Gastroenterological Association (AGA) Institute Technical Review on the Diagnosis and Management of Celiac Disease. Gastroenterology. 2006 Dec;131(6):1981–2002.
10. Boyce, J. et al. Guidelines for the diagnosis and management of food allergy in the United States: Report of the NIAID-Sponsored Expert Panel. Journal of Allergy and Clinical Immunology. 2010; 126(6):S1-S58. http://www.jacionline.org/article/S0091-6749(10)01566-6/fulltext. Accessed May 2012.

Clarification

Self-reporting of a diagnosis by a medical professional should not be confused with self-diagnosis, where a person simply claims to have or to have had a medical condition without any reference to professional diagnosis. A self-reported medical diagnosis ("My doctor says that I have/my son or daughter has…") should prompt the CPA to validate the presence of the condition by asking more pointed questions related to that diagnosis.

The 2006 American Gastroenterological Association (AGA) Institute Technical Review on the Diagnosis and Management of Celiac Disease refers to CD as "a unique disorder that is both a food intolerance and autoimmune disorder" (9). According to the 2010 NIAID-Sponsored Expert Panel definition, CD is a non-IgE mediated food allergy (10). (See nutrition risk criterion #353, *Food Allergy*.) However, the Expert Panel did not include information about CD in its report but rather refers readers to existing clinical guidelines on CD, including the AGA Institute's Technical Review. (5 9,10)

355 Lactose Intolerance

Definition/Cut-off Value

Lactose intolerance is the syndrome of one or more of the following: diarrhea, abdominal pain, flatulence, and/or bloating, that occurs after lactose ingestion.

Presence of condition diagnosed, documented, or reported by a physician or someone working under a physician's orders, or as self reported by applicant/participant/caregiver. See Clarification for more information about self-reporting a diagnosis.

Participant Category and Priority Level

Category	Priority
Pregnant Women	I
Breastfeeding Women	I
Non-Breastfeeding Women	III, IV, V, or VI
Infants	I
Children	III

Justification

Lactose intolerance occurs because of a deficiency in the levels of the lactase enzyme (1). Many variables determine whether a person with lactase deficiency develops symptoms. They include: the dose of lactose ingested; the residual intestinal lactase activity; the ingestion of food along with lactose; the ability of the colonic flora to ferment lactose; and, the individual sensitivity to the products of lactose fermentation (1). Some forms of lactase deficiencies may be temporary, resulting from premature birth or small bowel injuries, and will correct themselves, leaving individuals with the ability to digest lactose sufficiently (2).

Primary lactase deficiency is attributable to relative or absolute absence of lactase that develops in childhood, and is the most common cause of lactose malabsorption and lactose intolerance (2).

Secondary lactase deficiency is one that results from small bowel injury, such as acute gastroenteritis, persistent diarrhea, or other causes that injure the small intestine mucosa, and can present at any age, but is more common in infancy. Treatment of secondary lactase deficiency and lactose malabsorption attributable to an underlying condition generally do not require elimination of lactose from the diet. Once the primary problem is resolved, lactose-containing products can be consumed normally. (2)

Congenital lactase deficiency is a rare disorder that has been reported in only a few infants. Affected newborn infants present with intractable diarrhea as soon as human milk or lactose-containing formula is introduced. (2)

Developmental lactase deficiency is the relative lactase deficiency observed among pre-term infants of less than 34 weeks gestation (2). One study in preterm infants reported benefit from the use of lactase-supplemented feedings or lactose-reduced formulas (3). The use of lactose-containing formulas and human milk does not seem to have any short- or long-term deleterious effects in preterm infants (2).

Lactose is found primarily in milk, milk-based formula and other dairy products, which provide a variety of nutrients essential to the WIC population (calcium, vitamin D, protein). Lactose intolerance varies according to individuals. Some individuals may tolerate various quantities of lactose without discomfort, or tolerate it when consumed with other foods. Dairy products that are soured, or otherwise treated with bacteria that secrete lactase (e.g., Lactobacillus acidophilus), such as cheese and yogurt, are easier to digest in lactose-intolerant individuals because they contain relatively low levels of lactose. (4)

Many individuals diagnosed with lactose intolerance avoid dairy all together. Also, lactose intolerance has been shown to be associated with low bone mass and increased risk of fracture (5). Inadequate dairy intake increases the risk of metabolic syndrome, hypertension, preeclampsia, obesity and certain forms of cancer, especially colon cancer (6).

Implications for WIC Nutrition Services

It is important to assess participants individually for lactose tolerances and nutrient needs to determine the best plan of action. WIC can provide client-centered counseling to incorporate tolerated amounts of lactose-containing foods and/or other dietary sources of calcium, vitamin D and protein into participants' diets. WIC foods such as cheese, lactose-free milk, soy beverages, tofu, and calcium fortified foods (like juice) can provide these nutrients to participants with lactose intolerance. Based on the needs and interests of the participant, WIC staff can, in addition, also offer the following strategies (as appropriate):

- **Except for infants with congenital lactase deficiency**, promote exclusive breastfeeding until six months of age and continue breastfeeding through the first year. For infants with congenital lactase deficiency, treatment is removal and substitution of lactose from the diet with a commercial lactose-free formula (2).
- Tailor food packages to substitute or remove lactose-containing foods.
- Educate participants on meeting nutritional needs in the absence of lactose-containing foods.
- Educate participants on planning lactose-free/lactose-reduced meals and snacks for outings, social gatherings, school and/or work.

Any WIC participant suspected to have lactose intolerance should be referred to a health care provider for evaluation and appropriate diagnosis (7), if needed (see Clarification for additional information on diagnosing Lactose Intolerance).

References

1. National Institutes of Health Consensus Development Conference Statement: Lactose intolerance and health. February, 2010. Available at: http://consensus.nih.gov/2010/lactosestatement.htm. Accessed May 2012.
2. Heyman MB. Lactose intolerance in infants, children, and adolescents; Pediatrics 2006 September: 118 (#3) 1279-1286. http://aappolicy.aappublications.org/cgi/reprint/pediatrics;118/3/1279.pdf. Accessed May 2012.
3. Shulman RJ, Feste A, Ou C. Absorption of lactose, glucose polymers, or combination in premature infants. J Pediatr. 1995; 127:626−631.
4. Ranciaro A, Tishoff SA. Population genetics: evolutionary history of lactose tolerance in africa [abstract]. NIH Consensus Development Conference Lactose Intolerance and Health; February 2010; 43-47.

5. U.S. Department of Health and Human Services- Office of the Surgeon General. Bone health and osteoporosis: a report of the surgeon general. 2004.

6. Hearney RP. Consequences of excluding dairy or of avoiding milk in adults [abstract]. NIH Consensus Development Conference Lactose Intolerance and Health. February, 2010; 73-77.

7. Chang, Lin MD. Clinical Presentation: But what if it is not lactose intolerance? [abstract]. NIH Consensus Development Conference Lactose Intolerance and Health; February 2010; 39-42.

Additional Reference

1. National Dairy Council [Internet]. Lactose Intolerance Health Education Kit (2011). Available at: http://www.nationaldairycouncil.org/EDUCATIONMATERIALS/HEALTHPROFESSIONALSEDUCATIONKITS/Pages/LactoseIntoleranceHealthEducationKit.aspx. Accessed May 2012

Clarification

Self-reporting of a diagnosis by a medical professional should not be confused with self-diagnosis, where a person simply claims to have or to have had a medical condition without any reference to professional diagnosis. A self-reported medical diagnosis ("My doctor says that I have/my son or daughter has…") should prompt the CPA to validate the presence of the condition by asking more pointed questions related to that diagnosis.

Lactose malabsorption can be diagnosed with a hydrogen breath test. The test involves having individuals ingest a standard dose of lactose after fasting. Elevated levels of breath hydrogen, which are produced by bacterial fermentation of undigested lactose in the colon, indicate the presence of lactose malabsorption (1). The hydrogen breath test is not routinely ordered, and instead, patients are frequently asked to assess symptoms while avoiding dairy products for a period of time followed by a lactose product challenge to determine if they are lactose intolerant (7). The demonstration of lactose malabsorption does not necessarily indicate that an individual will be symptomatic.

356 Hypoglycemia

Definition/Cut-off Value

Presence of hypoglycemia diagnosed, documented, or reported by a physician or someone working under a physician's orders, or as self reported by applicant/participant/caregiver. See Clarification for more information about self-reporting a diagnosis.

Participant Category and Priority Level

Category	Priority
Pregnant Women	I
Breastfeeding Women	I
Non-Breastfeeding Women	III, IV, V or VI
Infants	I
Children	III

Justification

Hypoglycemia can occur as a complication of diabetes, as a condition in itself, in association with other disorders, or under certain conditions such as early pregnancy, prolonged fasting, or long periods of strenuous exercise (1).

Symptomatic hypoglycemia is a risk observed in a substantial proportion of newborns who are small for gestational age (SGA), but it is uncommon and of shorter duration in newborns who are of the appropriate size for gestational age (2).

WIC can provide nutrition management that concentrates on frequent feedings to support adequate growth for infants and children (2). WIC can also provide nutrition education to help manage hypoglycemia in women that includes consuming a balanced diet, low carbohydrate snacks and exercise (1).

References

1. National Institute of Diabetes, Digestive and Kidney Diseases. Hypoglycemia. National Diabetes Information Clearinghouse, 1999. Available at: http://www.niddk.nih.gov/health/diabetes/pubs/hypo/hypo.htm.
2. Institute of Medicine. WIC nutrition risk criteria a scientific assessment. National Academy Press, Washington D.C.; 1996. p.217-218.

Clarification

Self-reporting of a diagnosis by a medical professional should not be confused with self-diagnosis, where a person simply claims to have or to have had a medical condition without any reference to professional diagnosis. A self-reported medical diagnosis ("My doctor says that I have/my son or daughter has…")

should prompt the CPA to validate the presence of the condition by asking more pointed questions related to that diagnosis.

357 Drug Nutrient Interactions

Definition/Cut-off Value

Use of prescription or over-the-counter drugs or medications that have been shown to interfere with nutrient intake, absorption, distribution, metabolism, or excretion, to an extent that nutritional status is compromised.

Participant Category and Priority Level

Category	Priority
Pregnant Women	I
Breastfeeding Women	I
Non-Breastfeeding Women	III, IV, V or VI
Infants	I
Children	III

Justification

There are two general concerns with regard to interactions between nutrients and medications: the impact the nutrient has on the medication and the impact the medication has on nutritional status. Although nutrients can dramatically impact the effectiveness of medications, the focus of this risk is on the impact that medications may have on an individual's nutritional status. The interactions that may occur between medications and nutrients can be physical, chemical, physiologic, and/or pathophysiologic (1).

Over-the-counter and prescription medications may impact nutritional status directly or indirectly. Direct impacts of medications on nutritional status include changes to the following:

- The absorption and the distribution of the nutrient.
- The metabolism of the nutrient.
- The rate at which the nutrient is excreted.

These direct impacts of medications may be severe enough to lead to nutrient deficiency and/or nutrient toxicity, which can then impact bodily systems such as bone formation, immune system function, and energy metabolism. (2)

Indirect impacts of medications on nutritional status include the following:

- Changes to appetite
- Changes to taste and smell
- A dry or sore mouth
- Epigastric distress, nausea, vomiting, diarrhea, and/or constipation

These indirect medication related side-effects can impact the amount and/or variety of foods consumed by the individual and may lead to weight changes and/or the development of nutrient deficiency diseases. Some medications that are known to cause the indirect side-effects listed above include pain medications, such as oxycodone and hydrocodone, and medications to treat cancer. (2)

Research on the overall incidence and prevalence of nutrient and drug interactions remains limited. The following table provides a summary of medications that are commonly used and their associated potential impacts on nutritional status. For a comprehensive list of food and medication interactions, WIC programs should reference resources such as the *Physician's Desk Reference* or the most current *Food Medication Interactions* guide. Additional information on medications can also be found online at: https://medlineplus.gov/druginformation.html.

Medication	Medication Purpose	Impact on Nutritional Status
Amiloride (Midamor)	Diuretic	May cause loss of appetite, nausea diarrhea, and vomiting (3) May reduce magnesium excretion (4)
Calcium Carbonate (Tums)	Antacid	May cause vomiting, constipation, and loss of appetite (3) May decrease the absorption of iron, zinc, magnesium, and fluoride (2)
Chlorthalidone (Hygroton)	Diuretic	May cause upset stomach, vomiting, diarrhea, and loss of appetite (3) Increases excretion of zinc (5)
Ciprofloxacin (Cipro)	Antibiotic	May cause nausea, vomiting, stomach pain, and diarrhea Decreases the absorption of zinc (5)
Furosemide (Lasix)	Diuretic	May cause constipation and diarrhea (3) May increase magnesium excretion with chronic use (4)
Lansoprazole (Prevacid) and Omeprazole (Prilosec)	Proton pump inhibitors	May cause constipation, nausea and diarrhea (3) May reduce iron absorption and lead to suboptimal iron repletion with supplements (6)
Levothyroxine (Synthroid, Levothroid, Levoxly)	Thyroid hormone	May cause diarrhea and vomiting (3) May decrease appetite and weight (2)
Metformin	Antihyperglycemic	May cause diarrhea, indigestion, and constipation (3) May decrease appetite (2)

Medication	Medication Purpose	Impact on Nutritional Status
		May decrease the absorption of folate and vitamin B12 (2)
Methadone	Analgesic (Opioid)	May cause weight gain (3) May cause dry mouth, nausea, vomiting, and constipation (2)
Ondansetron (Zofran)	Antiemetic, Antinauseant	May cause constipation (3) In rare cases may decrease potassium levels (2)
Phenobarbital	Antiepileptic	May cause nausea and vomiting (3) May decrease vitamin D and vitamin K level (2) Decreases calcium absorption (7) May decrease folate levels (8)
Prednisone	Corticosteroid	May deplete calcium and lead to osteoporosis (9) Calcium and vitamin D supplement recommended with long-term use (2)
Rantidine (Zantac)	Antiulcer, AntiGERD, Antisecretory	May cause constipation, diarrhea, nausea and vomiting (3) May decrease iron and vitamin B12 absorption (2)
Sertraline (Zoloft)	Antidepressant	May cause nausea, diarrhea, constipation and vomiting (3) May lead to anorexia and decreased weight (2)
Sulfasalazine	Ulcerative Colitis Treatment	May cause diarrhea, loos of appetite and vomiting (3) Decreases folate absorption (8)

Breastfeeding and Medication Use

Breastfeeding is important for promoting the health of both the mother and infant. Medication use in the postpartum period, however, can sometimes pose some challenges to breastfeeding. While many medications are safe to use while breastfeeding, some are not compatible with breastfeeding or should be used with caution. If breastfeeding women require medication, then medications should be chosen that are not contraindicated with breastfeeding, if possible. It is thus very important for the mother to discuss her breastfeeding status and goals with her healthcare provider to determine the best infant feeding and medication plan. Information and recommendations on the use of specific medications while breastfeeding

can be found at the National Institutes of Health's LactMed Drugs and Lactation Database (https://toxnet.nlm.nih.gov/newtoxnet/lactmed.htm) and in the most recent version of *Hale's Medication and Mothers' Milk*. Note that while these resources provide useful information, WIC staff need to refer women to their healthcare provider to discuss the safety of taking specific medications while breastfeeding. For additional guidance on breastfeeding and medication use, please refer to the Food and Nutrition Service's WIC *Breastfeeding Policy and Guidance,* specifically section 1.4, "When Mothers Should Avoid Breastfeeding" (https://fns-prod.azureedge.net/sites/default/files/wic/WIC-Breastfeeding-Policy-and-Guidance.pdf).

Implications for WIC Nutrition Services

For participants who are currently taking a medication with known nutrient interactions, WIC staff can:

- Refer the participant/caregiver to their health care provider or pharmacist to discuss the potential nutrient related side-effects and weight fluctuation of medications they take.
- Encourage improved intake of whole grains, legumes, dairy, lean protein, fruits, and vegetables, as appropriate.
- Inform the participant/caregiver of foods or beverages that provide nutrients that may be impacted by the medication.
- Provide education on nutrient-dense foods (when appropriate), meal frequency, portion sizes, and fluid intake when medications induce poor appetite, nausea, or vomiting.
- Provide education on fiber and fluid intake and physical activity to manage constipation related side-effects.
- Provide education on fluid intake, moist foods, and dental care when medications cause a dry mouth.
- Refer women who are either breastfeeding or planning on breastfeeding to their health care provider to determine the best infant feeding and medication plan.

Additional Resources for WIC Staff:

- For information on food and medication interactions:
    - *Physician's Desk Reference* (most recent edition)
    - *Food Medication Interactions* (most recent edition)
    - National Institute of Health's Medline Plus Database on Drugs, Herbs and Supplements (https://medlineplus.gov/druginformation.html)
- For information and recommendations on the use of medications while breastfeeding:
    - Food and Nutrition Service's WIC *Breastfeeding Policy and Guidance,* specifically section 1.4 "When Mothers Should Avoid Breastfeeding" (https://fns-prod.azureedge.net/sites/default/files/wic/WIC-Breastfeeding-Policy-and-Guidance.pdf)
    - National Institutes of Health's LactMed Drugs and Lactation Database (https://toxnet.nlm.nih.gov/newtoxnet/lactmed.htm)
    - *Hale's Medication and Mothers' Milk* (most recent edition)

References

1. Chan LN. Drug-nutrient interactions. J Parenter Enteral Nutr. 2013 May 14 [cited 2019 Mar 19];37(4):450-9. Available from: https://doi.org/10.1177/0148607113488799.
2. Pronsky ZM, Elbe D, Ayoob K. Food medication interactions. 18th edition. Birchrunville (PA): Food Medication Interactions; 2015 Apr 17. 444 p.
3. American Society of Health-System Pharmacists [Internet]. Bethesda (MD): National Library of Medicine, c2019. MedlinePlus. [cited 2019 Apr 29] Available from: https://medlineplus.gov/druginformation.html.
4. National Institutes of Health [Internet]. Magnesium fact sheet for health professionals. Bethesda (MD): 2016 Feb 11 [cited 2018 Jan 1]. [about 13 screens]. Available from: https://ods.od.nih.gov/factsheets/Magnesium-HealthProfessional/.
5. National Institutes of Health [Internet]. Zinc fact sheet for health professionals. Bethesda (MD): 2016 Feb 11 [cited 2018 Jan 19]. [about 12 screens]. Available from: https://ods.od.nih.gov/factsheets/Zinc-HealthProfessional/.
6. National Institutes of Health [Internet]. Iron fact sheet for health professionals. Bethesda (MD): 2016 Feb 11 [cited 2016 Dec 2]. [about 14 screens]. Available from: https://ods.od.nih.gov/factsheets/Iron-HealthProfessional/
7. National Institutes of Health [Internet]. Vitamin D fact sheet for health professionals. Bethesda (MD): 2016 Feb 11 [cited 2018 Jan 19]. [about 14 screens]. Available from: https://ods.od.nih.gov/factsheets/VitaminD-HealthProfessional/.
8. National Institutes of Health [Internet]. Folate fact sheet for health professionals. Bethesda (MD): 2016 Apr 20 [cited 2018 Jan 19]. Folate fact sheet for health professionals. [about 16 screens]. Available from: https://ods.od.nih.gov/factsheets/Folate-HealthProfessional/.
9. National Institutes of Health [Internet]. Calcium fact sheet for health professionals. Bethesda (MD): 2016 Nov 17 [cited 2018 Jan 19]. [about 20 screens]. Available from: https://ods.od.nih.gov/factsheets/Calcium-HealthProfessional/.

Clarification

Self-reporting of a diagnosis by a medical professional should not be confused with self-diagnosis, where a person simply claims to have or have had a medical condition without any reference to professional diagnosis. A self-reported medical diagnosis ("My doctor says that I have/my son or daughter has…") should prompt the CPA to validate the presence of the condition by asking more pointed questions related to that diagnosis.

358 Eating Disorders

Definition/Cut-off Value

Eating disorders are characterized by severe disturbances in a person's eating behaviors and related thoughts and emotions (1). Eating disorders include, but are not limited to:

- Anorexia Nervosa (AN)
- Bulimia Nervosa (BN)
- Binge-Eating Disorder (BED)

Presence of eating disorder diagnosed, documented, or reported by a physician or someone working under a physician's orders, or as self-reported by applicant/participant/caregiver. See Clarification for more information about self-reporting a diagnosis.

Participant Category and Priority Level

Category	Priority
Pregnant Women	I
Breastfeeding Women	I
Non-Breastfeeding Women	III, IV, V or VI

Justification

Eating disorders are caused by a complex interaction of genetic, biological, behavioral, psychological, and social factors (1). They are extremely prevalent in the United States and associated with the highest morbidity and mortality of any mental illness (2, 3, 4).

Comorbidities that commonly occur with eating disorders include anxiety, bipolar disorder, depressive disorders, and substance use disorders (5). If left untreated, eating disorders can be serious and even fatal. Eating disorders are associated with an increased risk of premature death, including from electrolyte disturbances, dehydration, suicide, and alcoholism, among other causes (6). Total annual mortality attributable to eating disorders amounts to 10,200 deaths per year, equating to 1 death every 52 minutes (4).

It is estimated that around 9 percent, or 28.8 million Americans, will have an eating disorder in their lifetime (2, 3, 4). The three most common eating disorders are:

- Anorexia Nervosa (AN) – involves a severe restriction of calories; there may be a fear of weight gain and strict "rules" about eating. AN is a syndrome of self-starvation involving significant weight loss of 15 percent or more of ideal body weight (7).
- Bulimia Nervosa (BN) – involves recurrent episodes of binge eating followed by compensatory behaviors collectively referred to as purging and can include exercise as such a behavior. This could include vomiting or using laxatives or exercising excessively. Patients with BN are, by definition, at normal weight or above (7).
- Binge-Eating Disorder (BED) – involves recurrent episodes of binge eating which are characterized by eating an amount of food that is larger than what most people would eat in a similar period of time under similar circumstances and a sense of lack of control over eating

during the episode. Unlike BN, periods of binge-eating are not followed by purging or excessive exercise. As a result, people with binge-eating disorder often are overweight or obese. (5, 8).

In the U.S., BED is the most common type of eating disorder (9). Other less common types of eating disorders include Avoidant/Restrictive Food Intake Disorder and Rumination Disorder (5).

While stereotypically associated with thin, White, affluent females, eating disorders can affect individuals of all ages, races/ethnicities, body weights and genders. Frequently appearing during the teen years or young adulthood, eating disorders may also develop during childhood or later in life. While eating disorders affect both genders, prevalence is higher among women than men (1).

There is a lack of eating disorder research among low-income communities, making it difficult to determine the prevalence, severity, and types of eating disorder pathology among this population (10). However, existing research shows that food insecure adults often deliberately restrict food for reasons other than weight and shape concerns and that this dietary restraint is nonetheless correlated with increased eating disorder pathology (11). Research also supports the notion that increased levels of food insecurity are associated with increased levels of eating disorder pathology (10).

Complications of Eating Disorders during Pregnancy and Postpartum

Research suggests that up to 7.5 percent of pregnant women are affected by an eating disorder (12). It was once thought that pregnancy was rare among women with eating disorders due to associated menstrual dysfunction. Although having an eating disorder can decrease the likelihood of becoming pregnant, a growing body of evidence has confirmed that not only can pregnancy occur during an eating disorder but that it happens more commonly than previously thought (13, 14, 15, 16). Eating disorders have been linked to poor health outcomes for pregnant and postpartum women including depressive symptoms during pregnancy, postnatal depression, and poor infant attachment or maternal bonding (17, 18, 19, 20, 21).

Other misconceptions about eating disorders and pregnancy include the perception that pregnancy motivates eating disorder patients to stop their behaviors; that it will be obvious if a pregnant woman has an eating disorder because she won't gain enough weight; and that as long as weight gain is adequate then eating disorders will not affect the pregnancy or its outcomes (22). Pregnant women with eating disorders may have specific maternal macro- and micronutrient deficiencies (12). When energy and nutrient stores are low and not sufficiently restored through healthy eating, as in AN, the mother can become severely malnourished which can lead to depression, exhaustion, and many other serious health complications (23). Women with BN who continue to purge during pregnancy are at increased risk of dehydration, chemical imbalances, or even cardiac irregularities (23).

Some women experience an exacerbation of eating disorder symptoms during pregnancy including body image disturbances and abnormal stress from normal pregnancy weight gain whereas other women with eating disorders may experience relief from their symptoms during pregnancy. However, one of the most supported conclusions based on the research is that regardless of whether an eating disorder improves during pregnancy, eating disorder symptoms frequently relapse to their highest level almost immediately after delivery (22).

For women with eating disorders, pregnancies are often unplanned and eating disorder pathology has been associated with various perinatal risks such as delayed development, prematurity, hypotrophy, stillbirth, difficult delivery, and postnatal depression (24). The following table summarizes the health outcomes for both the woman and infant that may result from an eating disorder.

Possible Health Outcomes for Women and Infants by Eating Disorder (17, 25, 26, 27, 28, 29, 30, 31, 32, 33)

	Anorexia Nervosa	Bulimia Nervosa	Binge-Eating Disorder*
Health Outcomes for Woman	• Higher risk of cesarean delivery • Hyperemesis • Higher risk of anemia • Antepartum hemorrhage† • Hypertension • Stillbirth • Miscarriage • Malnutrition • Electrolyte imbalance • Fluid imbalance • Bone loss • Changes in brain function	• Higher risk of cesarean delivery • Hyperemesis • Stillbirth • Miscarriage • Malnutrition • Electrolyte imbalance • Fluid imbalance • Postpartum depression • Wearing down of tooth enamel • Heart problems	• Higher risk of cesarean delivery • Gestational hypertension • Gestational diabetes • Bone loss • Heart attack • Stroke • Arthritis • High cholesterol • Miscarriage • Delivery complications • Postpartum depression
Health Outcomes for Infant	• Underweight • Low birthweight • Small-for-gestational-age • Slow fetal growth • Intrauterine growth restriction • Preterm birth • Microcephaly • Perinatal death	• Dehydration • Chemical imbalance • Cardiac irregularities • Microcephaly • Preterm birth • Low birthweight	• Large-for-gestational-age

*Added as a diagnosis to the DSM-5 in 2013, there is limited research on the health outcomes of BED for both the woman and infant.
† Bleeding from the genital tract in the second half of pregnancy (34)

Complications of Eating Disorders while Breastfeeding

Research is inconclusive as to whether eating disorders affect breastfeeding rates. Some research shows that women with a history of eating disorders may be slightly less likely to initiate breastfeeding, whereas other research shows no difference in initiation and cessation of breastfeeding between mothers with and without eating disorders (35, 36, 37). Although there is limited research on the impact of eating disorders on breastfeeding rates, returning to eating disorder behaviors in the postpartum period may result in a shorter duration of breastfeeding and may impact the interaction a mother has with her infant as well as her relationship with her partner (21, 38, 39).

Diagnosis and Treatment

The American Psychiatric Association's (APA) Diagnostic and Statistical Manual of Mental Disorders (DSM-5) outlines the diagnostic criteria that must be met to diagnose an eating disorder (5). A person with an eating disorder may display one symptom or many, and a person's appearance may not always display the amount

of physical or emotional danger they are experiencing. Someone that appears to be a "healthy weight" can have an eating disorder and need treatment (40). Although there are formal guidelines that professionals use to diagnose eating disorders, as specified in the DSM-5, unhealthy eating behaviors exist on a continuum and the severity of individual criteria are considered in making a diagnosis.

There is no standardized screening for eating disorders during pregnancy and it is uncommon for a medical practitioner to screen pregnant patients for disordered eating symptoms (16, 40, 41, 42, 43). Women are often reluctant to inform medical staff of their struggle with eating disorders, likely the result of anxiety and guilt about harming the fetus (44, 45). Lack of screening and diagnosis has the potential to increase adverse health outcomes for women who do not receive treatment or assistance to address the eating behavior symptoms and/or pathology (46).

Treatment of eating disorders depends on the disorder and symptoms displayed, but typically involves psychological therapy, also known as psychotherapy (47). Depending on the severity of eating disorder symptoms, admission to a specialized residential or hospital-based treatment program can be lifesaving (48). Treatment plans are tailored to the individual's needs, should involve a multidisciplinary team such as a therapist, dietitian, and physician, and may include one or more of the following (1, 49):

- Individual, group, and/or family psychotherapy
- Medical care and monitoring
- Nutritional counseling
- Medications

Additionally, obtaining adequate health insurance coverage for inpatient treatment of eating disorders remains a challenge as one major issue plaguing discussions with insurers regarding reimbursement for the treatment of eating disorders is the apparent gap between research on variables associated with outcomes and the formulas used for reimbursement (50).

Implications for WIC Nutrition Services

The role of WIC is not to diagnose or treat an eating disorder but rather to reinforce and support the medical nutrition therapy that the WIC participant is receiving.

Discussing eating disorders, body weight, weight loss, or weight gain can trigger behaviors associated with eating disorders. Therefore, it is important for WIC staff to be sensitive when discussing eating disorders.

For individuals affected by an eating disorder, staff can (5, 25, 37):

- If available, refer the participant to a health care provider (HCP) with expertise in eating disorders. The participant can work with the provider to create a plan for healthy eating and weight gain.
- Reinforce nutrition counseling/advice that is provided by the eating disorder treatment team/plan.
- Encourage the participant to be honest with their HCP and WIC staff regarding past or present struggles with an eating disorder or disordered eating.
- Encourage the participant to seek or refer the participant to individual counseling and/or support groups during and after pregnancy to help them cope with their concerns and fears regarding food, weight gain, body image, and the new role of parenting.

- Encourage the participant to attend other classes on pregnancy, childbirth, child development, and parenting skills.
- Educate participants that it is important for their prenatal HCP to weigh them as this information is essential to tracking the health of baby.
- When possible, the CPA should coordinate with the participant's HCP to obtain referral data such as height, weight gain, etc. Additionally, encourage the participant to discuss with their HCP about blind weighing (36). If necessary, they can ask their doctor about standing on the scale backwards and instruct them not to share the number with them.
- Encourage the participant to talk to their HCP before attending a prenatal exercise class to make sure it fits with their recovery plan.
- Modify conversation with the participant to avoid topics that are likely to provoke eating disordered behaviors (e.g., topics related to body weight, body shape, and calories).

Clarification

Self-reporting of a diagnosis made by a medical professional should not be confused with self-diagnosis, where a person claims to have or to have had a medical condition without reference to a professional diagnosis. A self-reported medical diagnosis ("My doctor says that I have/my son or daughter has…") should prompt the CPA to validate the presence of the condition by asking more pointed questions related to that diagnosis. Although a self-diagnosis should not be used to assign risk, it should prompt the CPA to make a referral to a healthcare professional for diagnosis and treatment, as appropriate.

An eating disorder is diagnosed based on an individual's symptoms and experiences aligned with criteria defined by the American Psychiatric Association. The term disordered eating is a descriptive phase, not a diagnosis as defined by the American Psychiatric Association. It is possible to have disordered eating patterns that do not fit within the current confines of an eating disorder diagnosis (51). See risk #427-Inappropriate Nutrition Practices for Women to learn more about disordered eating.

References

1. National Institute of Mental Health [Internet]. Bethesda (MD): National Institute of Mental Health, c2016. Eating Disorders. 2016 Feb [cited 2021 June]. Available from: https://www.nimh.nih.gov/health/topics/eating-disorders/index.shtml.
2. Hay P, Girosi F, Mond J. Prevalence and sociodemographic correlates of DSM-5 eating disorders in the Australian population. J Eat Disord. 2015 Apr 25 [cited 2021 June 23]; 3(19). Available from: Prevalence and sociodemographic correlates of DSM-5 eating disorders in the Australian population | Journal of Eating Disorders | Full Text (biomedcentral.com).
3. Hudson JI, Hiripi E, Pope Jr HG, et al. The prevalence and correlates of eating disorders in the National Comorbidity Survey Replication. Biol Psychiatry. 2007 Feb 1 [cited 2021 June 23]; 61(3):348–58. Available from: The prevalence and correlates of eating disorders in the National Comorbidity Survey Replication - PubMed (nih.gov).
4. Harvard School of Public Health [Internet]. Boston; c2021. Report: Economic Cost of Eating Disorders; 2020 June [cited 2021 June 23]; [about 3 screens]. Available from: https://www.hsph.harvard.edu/striped/report-economic-costs-of-eating-disorders/.

5. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 5th ed. Arlington (VA): American Psychiatric Publishing; 2013.
6. Herzog DB, Greenwood DN, Dorer DJ, et al. Mortality in eating disorders: a descriptive study. Int J Eat Disord. 2000 May; 28(1): 20–26.
7. Johns Hopkins Medicine: Psychiatry and Behavioral Sciences Eating Disorders Program [Internet]. Baltimore: John Hopkins Medicine; c2021. Frequently Asked Questions About Eating Disorders; [cited 2021 June 23]; [about 10 screens]. Available from: https://www.hopkinsmedicine.org/psychiatry/specialty_areas/eating_disorders/faq.html.
8. National Institute of Mental Health [Internet]. Bethesda (MD); c2022. Eating; 2021 Dec [cited 2022 Sep 8]; [about 2 screens]. Available from: https://www.nimh.nih.gov/health/topics/eating-disorders.
9. Office on Women's Health [Internet]. Washington DC: Office on Women's Health, c2020. Binge eating disorder. 2018 Aug 16 [cited 2021 June 23]. Available from: https://www.womenshealth.gov/mental-health/mental-health-conditions/eating-disorders/binge-eating-disorder.
10. Becker CB, Middlemass KM, Gomez F, et al. Eating Disorder Pathology Among Individuals Living with Food Insecurity: A Replication Study. Clin Psychol Sci. 2019 June 17 [cited 2021 June 23]; 7(5):1144-58. Available from: https://doi.org/10.1177/2167702619851811.
11. Middlemass KM, Cruz J, Gamboa A, et al. Food insecurity & dietary restraint in a diverse urban population. Eat Disord. 2020 Mar 4; 1 – 14.
12. Dorsam AF, Preissi H, Micali N, et al. The Impact of Maternal Eating Disorders on Dietary Intake and Eating Patterns during Pregnancy: A Systematic Review. Nutrients. 2019 Apr 12 [cited 2021 June 23]; 11(4): 840. Available from: The Impact of Maternal Eating Disorders on Dietary Intake and Eating Patterns during Pregnancy: A Systematic Review - PubMed (nih.gov).
13. Glassman JN, Rick CL, Darko D, et al. Menstrual dysfunction in bulimia. Ann Clin Psychiatry. 1991 [cited 2021 June 23]; 3(2):161–65.
14. Tierney S, Fox JRE, Butterfield C, et al. Treading the tightrope between motherhood and an eating disorder: a qualitative study. Int J Nurs Stud. 2011 Oct [cited 2021 June 23]; 48(10): 1223–33.
15. Easter A, Bye A, Taborelli E, et al. Recognising the symptoms: how common are eating disorders in pregnancy? Eur Eat Disord Rev. 2013 July [cited 2021 June 23]; 21(4): 340–44. Available from: https://onlinelibrary.wiley.com/doi/abs/10.1002/erv.2229.
16. Cardwell MS. Eating disorders during pregnancy. Obstet Gynecol Surv. 2013 Aug [cited 2021 June 23]; 68(4):312–23. Available from: https://pubmed.ncbi.nlm.nih.gov/23943041.
17. Mazzeo SE, Slof Op't Landt MCT, Jones I, et al. Associations among postpartum depression, eating disorders, and perfectionism in a population-based sample of adult women. Int J Eat Disord. 2006 Apr; 39(3):202–11.
18. Abraham S, Taylor A, Conti J. Postnatal depression, eating, exercise, and vomiting before and during pregnancy. Int J Eat Disord. 2001 May [cited 2021 June 23]; 29(4):482–87. Available from: Postnatal depression, eating, exercise, and vomiting before and during pregnancy. - Abstract - Europe PMC.

19. Welch SL, Doll HA, Fairburn CG. Life events and the onset of bulimia nervosa: a controlled study. Psychol Med. 1997 May [cited 2021 June 23]; 27(3):515–22. Available from: doi: https://pubmed.ncbi.nlm.nih.gov/9153672.

20. Ward VB. Eating disorders in pregnancy. BMJ. 2008 Jan 12 [cited 2021 June 23]; 336(76350):93–96. Available from: doi: https://www.bmj.com/content/336/7635/93.

21. Morgan JF, Lacey JH, Sedgwick PM. Impact of pregnancy on bulimia nervosa. Br J Psychiatry. 1999 Feb [cited 2021 June 23]; 174:135–140. Available from: https://pubmed.ncbi.nlm.nih.gov/10211167.

22. Setnick, J. Eating Disorders and Pregnancy: What Every Dietetics Professional Should Know. DevelopMental Issues. 2003;22(2): 1-6.

23. Behavioral Nutrition [Internet]. Quincy (MA); c2021. Eating Disorders & Pregnancy: Anorexia, Bulimia and Binge Eating; 2018 Aug 3 [cited 2021 June 23]; [about 7 screens]. Available from: https://behavioralnutrition.org/eating-disorders-pregnancy-anorexia-bulimia-and-binge-eating/.

24. Squires C, Lalanne C, Murday N, et al. The influence of eating disorders on mothers' sensitivity and adaptation during feeding: a longitudinal observational study. BMC Pregnancy and Childbirth]. 2014 Aug 14 [cited 2021 June 23]; 14:274. Available from: https://pubmed.ncbi.nlm.nih.gov/25123354.

25. NEDA: Feeding Hope [Internet]. New York (NY); c2021. Pregnancy and Eating Disorders; [cited 2021 June 23]; [about 3 screens]. Available from: Pregnancy and Eating Disorders | National Eating Disorders Association.

26. Watson HJ, Zerwas S, Torgersen L, et al. Maternal Eating Disorders and Perinatal Outcomes: A Three-Generation Study in the Norwegian Mother and Child Cohort Study. J Abnorm Psychol. 2017 July [cited 2021 June 23]; 126(5):552-64. Available from: https://pubmed.ncbi.nlm.nih.gov/28691845.

27. Mantel A, Linden Hirschberg A, Stephansson O. Association of Maternal Eating Disorders With Pregnancy and Neonatal Outcomes. JAMA Psychiatry. 2020 Mar 1 [cited 2021 June 23]; 77(3):285-93. Available from: https://pubmed.ncbi.nlm.nih.gov/31746972.

28. Arnold C, Johnson H, Mahon C, et al. The Effects of Eating Disorders in Pregnancy on Mother and Baby: A Review. Psychiatr Danub. 2019 Sept [cited 2021 June 23]; 31(3): 615-18. Available from: https://pubmed.ncbi.nlm.nih.gov/31488801/.

29. March of Dimes [Internet]. Arlington (VA); c2021. Eating Disorders and Pregnancy; 2016 Apr [cited 2021 June 23]; [about 4 screens] Available from: https://www.Marchofdimes.org/complications/eating-disorders-and-pregnancy.aspx.

30. Marcos A. Eating disorders: a situation of malnutrition with peculiar changes in the immune system. Eur J Clin Nutr. 2000 Mar [cited 2021 June 23]; 54(1):S61-64. Available from: Eating disorders: a situation of malnutrition with peculiar changes in the immune system | European Journal of Clinical Nutrition (nature.com).

31. Abed J, Judeh H, Abed E, et al. "Fixing a heart": the game of electrolytes in anorexia nervosa. Nutr J. 2014 Sept 5 [cited 2021 June 23]; 13:90. Available from: https://pubmed.ncbi.nlm.nih.gov/25192814.

32. NEDA: Feeding Hope [Internet]. New York (NY); c2012. Bulimia Nervosa. 2012 [cited 2021 June 23]; [2 pages]. Available from: https://www.nationaleatingdisorders.org/sites/default/files/ResourceHandouts/BulimiaNervosa.pdf.

33. Academy of Nutrition and Dietetics [Internet]. Chicago (IL); c2022. Understanding Eating Disorders. [cited 2022 Sep 8]; [1 page]. Available from: https://www.eatright.org/health/diseases-and-conditions/eating-disorders/understanding-eating-disorders.

34. Giordano R, Cacciatore A, Cignini P, et al. Antepartum Haemorrhage. J Prenat Med. 2010 Jan [cited 2021 June 23]; 4(1):12 – 16. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3263934/.

35. Nguyen AN, de Barse LM, Tiemeier H, et al. Maternal history of eating disorders: Diet quality during pregnancy and infant feeding. Appetite. 2017 Feb 1 [cited 2021 June 23]; 109:108-14.

36. Martinez Olicina M, Rubio Arias JA, Reche Garcia C, et al. Eating Disorders in Pregnancy and Breastfeeding Women: A Systematic Review. Medicina (Kaunas). 2020 July 15 [cited 2021 June 23]; 56(7):352. Available from: Medicina. Eating Disorders in Pregnant and Breastfeeding Women: A Systematic Review (mdpi.com).

37. Froreich FV, Ratcliffe SE, Vartanian LR. Blind versus open weighing from an eating disorder patient perspective. J Eat Disord. 2020 Aug 17 [cited 2021 June 23]; 8:39 Available from: Blind versus open weighing from an eating disorder patient perspective (biomedcentral.com).

38. Lawton SA. Eating disorders Information for Teens: Health Tips About Anorexia, Bulimia, Binge Eating, and Other Eating Disorders Including Information On the Causes, Prevention, and Treatment of Eating Disorders, and Such Other Issues As Maintaining Healthy Eating and Exercise Habits. Detroit: Omnigraphics, 2009.

39. Larsson G, Andersson Ellstrom A. Experiences of pregnancy-related body shape changes and of breast-feeding in women with a history of eating disorders. Eur Eat Disord Rev. 2003 Jan 23 [cited 2021 June 23]; 11(2):116–24. Available from: https://doi.org/10.1002/erv.497.

40. Academy of Nutrition and Dietetics [Internet]. Chicago; c2021. Understanding Eating Disorders; 2019 Feb [cited 2021 June 23]; [about 4 screens]. Available from: https://www.eatright.org/health/diseases-and-conditions/eating-disorders/understanding-eating-disorders.

41. Broussard B. Psychological and behavioral traits associated with eating disorders and pregnancy: a pilot study. J Midwifery Womens Health. 2012 Jan Feb [cited 2021 June 23]; 57(1):61-66. Available from: Psychological and behavioral traits associated with eating disorders and pregnancy: a pilot study - PubMed (nih.gov).

42. Linna MS, Raevuori A, Haukka J, et al. Pregnancy, obstetric, and perinatal health outcomes in eating disorders. Am J Obstet Gynecol. 2014 Oct [cited 2021 June 23]; 211(4):392.e1-8. Available from: Pregnancy, obstetric, and perinatal health outcomes in eating disorders - PubMed (nih.gov).

43. Easter A, Solmi F, Bye A, et al. Antenatal and postnatal psychopathology among women with current and past eating disorders: longitudinal patterns. Eur Eat Disord Rev. 2015 Jan [cited 2021 June 23]; 23(1):19-27. Available from: Antenatal and postnatal psychopathology among women with current and past eating disorders: longitudinal patterns - PubMed (nih.gov).

44. Koubaa S, Hallstrom T, Lindholm C, et al. Pregnancy and neonatal outcomes in women with eating disorders. Obstet Gynecol. 2005 Feb [cited 2021 June 23]; 105(2):255–60. Available from: Pregnancy and neonatal outcomes in women with eating disorders - PubMed (nih.gov).

45. Nohr EA, Frydenberg M, Henriksen TB, et al. Does low participation in cohort studies induce bias? Epidemiology. 2006 July [cited 2021 June 23]; 17(4):413–18. Available from: doi: 10.1097/01.ede.0000220549.14177.60.

46. Fogarty S, Elmir R, Hay P, et al. The experience of women with an eating disorder in the perinatal period: a meta-ethnographic study. BMC Pregnancy and Childbirth. 2018 May 2 [cited 2021 June 23]; 18(1):121. Available from: The experience of women with an eating disorder in the perinatal period: a meta-ethnographic study - PubMed (nih.gov).

47. Mayo Clinic [Internet]. Rochester (MN): Mayo Clinic; c1998-2021. Eating disorder treatment: Know your options; 2017 July 14 [cited 2021 June 23]; [about 7 screens]. Available from: https://www.mayoclinic.org/diseases-conditions/eating-disorders/in-depth/eating-disorder-treatment/art-20046234.

48. American Psychiatric Association [Internet]. Washington DC; c2021. Expert Q&A: Eating Disorders; 2020 Dec [cited 2021 June 23]; [about 6 screens]. Available from: https://www.psychiatry.org/patients-families/eating-disorders/expert-q-and-a.

49. Academy for Eating Disorders [Internet]. Reston; c2020. Resources: Treatment Options; [cited 2021 June 23]; [about 5 screens]. Available from: https://www.aedweb.org/resources/about-eating-disorders/treatment-options.

50. Garner DM, Desmond M, Desai J, et al. The Disconnect between Treatment Outcome Data and Reimbursement for the Treatment of Anorexia Nervosa. Int J Physiatry. 2016 Apr 6 [cited 2021 June 23]; 2(1). Available from: (PDF) The Disconnect between Treatment Outcome Data and Reimbursement for the Treatment of Anorexia Nervosa (researchgate.net).

51. Eat Right: Academy of Nutrition and Dietetics [Internet]. Chicago; c2021. What is Disordered Eating; 2018 Oct 26 [cited 2021 June 23]; [about 3 screens]. Available from: https://www.eatright.org/health/diseases-and-conditions/eating-disorders/what-is-disordered-eating.

359 Recent Major Surgery, Physical Trauma, Burns

Definition/Cut-off Value

Major surgery (including cesarean sections), physical trauma or burns severe enough to compromise nutritional status.

Any occurrence:

- Within the past two (≤2) months may be self-reported.
- More than two (>2) months previous must have the continued need for nutritional support diagnosed by a physician or a health care provider working under the orders of a physician.

Participant Category and Priority Level

Category	Priority
Pregnant Women	I
Breastfeeding Women	I
Non-Breastfeeding Women	III, IV, V or VI
Infants	I
Children	III

Justification

The body's response to injuries such as major surgeries, physical trauma, or burn may adversely affect nutrient requirements needed for recovery, leading to malnutrition. The catabolic response to these injuries causes a hypermetabolic state in the body. This alteration in metabolism not only increases the individual's calorie and protein needs, but they also increase the needs for certain vitamins, minerals, fatty acids, and amino acids. (1)

Proper wound healing is essential in the recovery of surgeries, physical trauma, and burns. Normal wound healing is a complex process and involves three phases: inflammation, proliferation, and remodeling (1, 2). Each phase of wound healing involves growth factors, other biologically active molecules, and specific vitamins and minerals such as Vitamin A, Vitamin C, and Zinc. The process of wound healing does not always follow the three stages sequentially and can sometimes move forward or regress based on nutrition status and response to treatment (3, 4). Even after a wound is closed, the individual's metabolic rate and need for additional nutrition can remain high (5).

Factors that can prevent proper wound healing or can increase the time needed for a wound to heal include (2, 6):

- Malnutrition prior to the surgery, injury or burn
- Infections
- Diabetes

- Poor blood flow
- Obesity
- Age
- Heavy alcohol use
- Stress
- Medications
- Smoking

Because healing is a complex process and is impacted by a variety of factors, it is inappropriate to expect a set recovery time for an individual based solely on the type and severity of the injury (7). For some individuals, they may no longer be at increased nutritional risk within a couple weeks of their injury. For others, recovery from the same type and severity of injury may take months.

Major Surgery and Wound Healing

Many types of surgeries are completed as noninvasive procedures and do not result in large incisions that require additional medical and nutritional care to heal. However, many surgical procedures (including cesarean sections) do involve incisions that, if left unaddressed, could lead to infection. Major surgeries are surgeries that involve a risk to the life of the individual and include operations on organs within the body (8). Removal of a portion of the large or small intestine, heart surgery, and bariatric surgery are examples of major surgeries. Minor surgeries are surgeries that involve little risk to the individual and include operations on the superficial structures of the body (9). Ear tubes, the most common childhood surgery performed with anesthesia, are an example of a minor surgery that does not impact nutrition status (10).

Cesarean sections are considered a major surgery and, therefore, require additional assessment and education in the WIC clinic. In the US, the rate of cesarean delivery rose from 19.7% of singleton births in 1996 to 31.3% of singleton births in 2011 (11). Reasons for a cesarean delivery include: multiple pregnancy, labor fails to progress, medical concerns for the infant, problems with the placenta, a large infant, breech position, maternal infections, and medical conditions in the mother (i.e. diabetes or high blood pressure) (12).

Nutritional Considerations for Major Surgery/Wound Healing

The role of specific nutrients in wound healing continues to be explored and studies are conducted regularly to assess the role vitamins, minerals, fatty acids, amino acids, and carbohydrates play in proper wound healing. Nutrient supplements above the Recommended Dietary Allowance (RDA) may be necessary to aid in wound healing. However, before using any additional supplement to assist in wound healing, energy and protein requirements of the individual must be met (13, 14). Amino acids are essential to the repair of damaged tissue in the body. Amino acids are divided into three categories: essential (must be obtained through foods), nonessential (can be produced in the body), and conditionally essential (produced in the body except in cases of injury or illness). Arginine and Glutamine are examples of conditionally essential amino acids. The following table highlights the roles of these nutrients in the wound healing process:

Nutrient	Role in Wound Healing
Arginine	Involved in secretion of growth hormone (12)
Omega-3 fatty acids	Reduces wound infections (12)
Vitamin C	Collagen synthesis (2)
Vitamin A	Immune function and cellular communication (15)
Vitamin E	Antioxidant (16)
Vitamin D	Modulates cell growth Neuromuscular and immune function Reduces inflammation (17)
Magnesium	Co-factor for enzymes involved in protein and collagen synthesis (2)
Copper	Co-factor for cross-linking of collagen (2)
Zinc	Involved in RNA and DNA polymerase (2)
Iron	Aids in the synthesis of some growth hormones and connective tissue (18)

Following a cesarean section, a breastfeeding mother may experience difficulty finding a comfortable nursing position that does not cause pain with the incision. She may also have difficulty breastfeeding if the infant is drowsy due to the pain medication administered during the procedure. A referral to a lactation specialist can help ensure that the mother is successful in reaching her breastfeeding goals.

Physical Trauma

Physical trauma is usually a result of accidents and injuries that often lead to fractures, wounds, and subsequent hospitalization. Physical trauma can be divided into blunt force trauma, penetrating trauma, and trauma from surgery. Blunt force trauma is the result of an object (or force) striking the body, causing concussions, lacerations or fractures. Penetrating trauma is trauma that occurs as a result of an object piercing the skin, causing an open wound (7). Fracture healing is a process that begins with a hemorrhage and progresses through three stages: inflammatory, reparative, and remodeling.

Physical trauma can also be a result of domestic and/or child abuse. In addition to the physical effects of abuse, victims of abuse often experience acute and ongoing psychological and emotional trauma that may also impact an individual's nutrition status. Poor appetite, undesirable food choices, and using food for coping can impact both women and children. Children may also begin hoarding food in cases of abuse or neglect. For more information on the impact of abuse, see Risk #901 *Recipient of Abuse*.

Nutritional Considerations for Physical Trauma

In addition to an increase in energy, protein, and micronutrients needed for proper wound healing, physical trauma that includes fractures requires additional nutrients for proper bone healing. In some cases, the physical trauma will lead to temporary or lifelong difficulty with self-feeding. Research on the roles specific nutrients play in fracture healing continues to expand. Key nutrients for bone health include calcium, phosphorus, fluoride, magnesium, sodium, vitamin D, vitamin A, vitamin K, vitamin C, vitamin B6, folate, and vitamin B12. Meeting RDAs set for these nutrients is important for bone health and bone healing (19).

For some individuals, intakes above the RDA may be recommended by their medical provider to assist in bone healing; however, some nutrients including fluoride, sodium, and vitamin A may negatively impact bone health when intake is above the recommended level (19).

Burns

Burns can be caused by heat (including hot surfaces, fires, and hot liquids), chemicals, electricity, sunlight or nuclear radiation. There are three stages of burns based on what layers of the skin are burned. A first-degree burn only affects the outer layer of the skin (epidermis). A second-degree burn damages the epidermis and the layer directly under the epidermis (dermis). A third-degree burn damages the epidermis, dermis, and damages the tissue underneath the skin. (20)

Burns are also classified based on the surface area of the body that has been burned (Percent Total Body Surface Area or TBSA). For example, a burn that covers one hand and arm would be 9% TBSA, whereas a burn that covers a person's back would be 18% TBSA (21). Increases in the surface area affected by the burn result in a greater potential for fluid loss and infection (21). Inhalation burns are burns that occur inside an individual's lungs and internal organs. Once discharged from the hospital, enteral feedings may be prescribed to aid in healing.

Nutritional Considerations for Burns

The nutrition status of burn patients is monitored very closely during hospitalization and after discharge. Following a severe burn, the body goes into a catabolic state and the body begins to breakdown skeletal muscle (5). This state increases the requirements for energy, protein, carbohydrates, fats, vitamins, minerals, and antioxidants (22). Damaged blood vessels also increase fluid loss and can lead to dehydration or shock (19). Nutrition care in the hospital setting for individual's recovering from burns may also include parenteral or enteral nutrition support depending on the severity of the burns. Glutamine, a conditionally essential amino acid, can improve the healing of burns (23).

Implications for WIC Nutrition Services

Most surgeries, physical traumas, and burns are unexpected. The education and supplemental food that WIC provides can help ensure that the individual is in good nutritional health prior to the surgery, physical trauma or burn. Following a major surgery, physical trauma, and/or burn, an individual will be at increased nutritional risk until the injury has completely healed. WIC staff can improve outcomes following an injury by:

- Assuring that vitamin and mineral intakes meet the RDAs (unless amounts that exceed the RDAs are recommended by their medical provider).
- Assuring that energy and protein intake preserve lean muscle mass and body weight.
- Recommending a participant speak with their medical provider about a multivitamin supplement when diet alone cannot meet the RDAs for vitamins and minerals.
- Referring to community resources for smoking cessation, support groups, food assistance, and safe living environments (in cases of physical abuse).
- Referring to a lactation educator if women experience difficulty breastfeeding following a cesarean section.

References

1. Gurtner GC. Wound Healing: normal and abnormal. In: Thorne CH, editor. Grabb and Smith's Plastic Surgery. Riverwoods, IL;2007. p.15-22.
2. Guo S, DiPietro LA. Factors affecting wound healing. J Dent Res. 2010; 89:219-229.
3. Wild T, Rahbarnia A, Kellner M, Sobotka L, Eberlein T. Basics in nutrition and wound healing. J Nut. 2010;26:862-866.
4. Stechmiller JK. Understanding the role of nutrition and wound healing. Nutr Clin Pract. 2010;25:61-68.
5. Prelack K, Dylewski M, Sheridan RL. Practical guidelines for nutritional management of burn injury and recovery. J Burns.2007;33:14-24.
6. National Institutes of Health [Internet]. Maryland; c1997-2015 [updated 2015 Jun 15; cited 2015 Jul 6]. How wounds heal; [about 3 screens]. Available from: https://www.nlm.nih.gov/medlineplus/ency/patientinstructions/000741.htm.
7. National Institutes of Health [Internet]. Maryland: [updated 2014 Nov 17; cited 2015 Aug 4]. Trauma Fact Sheet; [about 2 screens]. Available from: http://nigms.nih.gov/Education/Pages/Factsheet_Trauma.aspx.
8. Merriam-Webster Medical Dictionary. [cited 2015 Jul 6]. Available from: http://www.merriam-webster.com/medical/major+surgery.
9. Merriam-Webster Medical Dictionary. [cited 2015 Jul 6]. Available from: http://www.merriam-webster.com/medical/minor+surgery.
10. American Academy of Otolaryngology-Head and Neck Surgery [Internet]. Virginia; c2015 [cited 2015 Aug 12]. Ear Tubes; [about 5 screens]. Available from: http://www.entnet.org/content/ear-tubes.
11. Osterman MJK, Martin JA. Changes in cesarean delivery rates by gestational age: United States, 1996-2011. NCHS Data Brief. 2013;124.
12. National Institutes of Health [Internet]. Maryland: [updated 2012 Nov 30; cited 2015 Jul 6]. When is a cesarean delivery necessary and what are the risks; [about 1 screen]. Available from: http://www.nichd.nih.gov/health/topics/obstetrics/conditioninfo/pages/risks.aspx.
13. Alexander JW, Supp D. Role of arginine and omega-3 fatty acids in wound healing and infection. Adv Wound Care. 2014;3:682-690.
14. Ellinger S, Stehle P. Efficacy of vitamin supplementation in situations with wound healing disorders: results from clinical intervention studies. Curr Opin Clin Nutr Metab Care. 2009;12:588-95.
15. National Institutes of Health [Internet]. Maryland: [updated 2013 Jun 5; cited 2015 Jul 6]. Vitamin A fact sheet for health professionals; [about 16 screens]. Available from: https://ods.od.nih.gov/factsheets/VitaminA-HealthProfessional/.
16. National Institutes of Health [Internet]. Maryland: [updated 2013 Jun 5; cited 2015 Jul 6]. Vitamin E fact sheet for health professionals; [about 11 screens]. Available from: https://ods.od.nih.gov/factsheets/VitaminE-HealthProfessional/.

17. National Institutes of Health [Internet]. Maryland: [updated 2014 Nov 10; cited 2015 Jul 6]. Vitamin D fact sheet for health professionals; [about 9 screens]. Available from: https://ods.od.nih.gov/factsheets/VitaminD-HealthProfessional/.

18. National Institutes of Health [Internet]. Maryland: [updated 2015 Feb 19; cited 2015 Jul 6]. Iron fact sheet for health professionals; [about 20 screens]. Available from: https://ods.od.nih.gov/factsheets/Iron-HealthProfessional/.

19. Angelo G (Oregon State University, Linus Pauling Institute, Corvallis, OR). Micronutrient Information Center; 2012 Aug.

20. National Institutes of Health [Internet]. Maryland: [updated 2014 Aug 8; cited 2015 May 12]. Burns Fact Sheet; [about 2 screens]. Available from: http://nigms.nih.gov/Education/Pages/Factsheet_Burns.aspx.

21. National Institutes of Health [Internet]. Maryland: [updated 2011 Jun 25; cited 2015 Jul 6]. Burn triage and treatment – thermal injuries [about 11 screens]. Available from: http://chemm.nlm.nih.gov/burns.htm.

22. Chan MM, Chan GM. Nutritional therapy for burns in children and adults. J Nut.2009;25:261-269.

23. Ellinger S. Micronutrients, arginine, and glutamine: does supplementation provide an efficient tool for prevention and treatment of different kinds of wounds. Adv Wound Care. 2014;3:691-707.

Additional Reference:

Mahan LK, Raymond JL. Krause's food & nutrition care process. 14th ed. Philadelphia (PA): Elsevier BV; 2016.

360 Other Medical Conditions

Definition/Cut-off Value

Diseases or conditions with nutritional implications that are not included in any of the other medical conditions. The current condition, or treatment for the condition, must be severe enough to affect nutritional status. This includes, but is not limited to:

Medical Condition	
Juvenile Idiopathic Arthritis (JIA)	Cardiovascular Disease
Systemic Lupus Erythematosus (SLE)	Persistent Asthma (moderate or severe) requiring daily medication
Polycystic Ovary Syndrome (PCOS)	Cystic Fibrosis

Presence of medical condition(s) diagnosed, documented, or reported by a physician or someone working under a physician's orders, or as self-reported by applicant/participant/caregiver. See Clarification for more information about self-reporting a diagnosis.

Participant Category and Priority Level

Category	Priority
Pregnant Women	I
Breastfeeding Women	I
Non-Breastfeeding Women	III, IV, V or VI
Infants	I
Children	III

Justification

Juvenile Idiopathic Arthritis (JIA)

In 2001, the International League of Associations for Rheumatology reclassified juvenile rheumatoid arthritis as juvenile idiopathic arthritis (JIA) (1). This was done in efforts to be inclusive of both American and European diagnosis criteria and to improve communication between international healthcare providers and researchers (2). JIA is an umbrella term for all forms of childhood arthritis. It is a systemic disease that results in the destruction of joint tissue due to inflammation (2).

Due to differences in nomenclature, it is difficult to estimate the number of children affected with JIA. In the United States, it is estimated that about 1 in 1000 children develop chronic arthritis, mainly JIA (3).

Children with JIA face nutritional impairment due to chronic inflammation, drug side effects, and/or functional difficulties, such as jaw joint stiffness. Nutritional problems often lead to observed lower BMI

and smaller height stature among JIA patients (3). While there is no prescribed diet for children with JIA, dietary fats (e.g., omega-3 fatty acids) can influence inflammation (4, 5). More research needs to be done to know if foods rich in omega-3 fatty acids will be helpful. However, these foods have other health benefits, especially in the prevention of heart disease and can be recommended. The best sources of omega-3 fatty acids are from fish such as salmon, sardines, mackerel, herring and tuna. Other omega-3 sources (less potent than fish, however) include ground flax, flaxseed oil, walnuts and, to a limited degree, green leafy vegetables (5).

Systemic Lupus Erythematosus

Systemic lupus erythematosus (SLE) is a chronic inflammatory and autoimmune disease that can affect multiple organ systems, including the skin, joints, kidneys, heart, and central nervous system. The appearance and progression of this disease is highly variable. The most common symptoms include fatigue, loss of appetite and weight, and skin lesions (butterfly rash on face). (6)

The cause of SLE is not fully known. Genetics is thought to play a role in its development. Environmental factors such as exposure to silica dust particles and cigarette smoking as well as use of estrogen-based oral contraceptives or hormone replacement therapy can increase the risk of the disease (6, 7). The role of exposure to ultraviolet light (UV) in the development of SLE is still not known, though it may worsen SLE symptoms (7). There is no cure for SLE but medical interventions and lifestyle changes can help control it (8).

SLE is common with more than 200,000 cases per year in the U.S. (9). While anyone, including children, can develop SLE, it is most common among women of childbearing ages, 15 to 44 years, and women of color (10). Women who have SLE can safely get pregnant and have normal pregnancies and healthy babies. However, they will be considered to have a “high risk pregnancy” due to an increased likelihood of problems arising during their pregnancy (10, 11). High-risk maternal complications include inflammation of the kidneys, gestational diabetes, and pre-eclampsia; while fetal complications include miscarriage, preterm birth, and intrauterine growth restriction (11).

Typical SLE management uses antimalarial drugs, immunosuppressive agents, biological agents, and some adjunctive therapies (6, 12). Mild cases can be controlled with non-steroidal anti-inflammatory drugs or low-dose glucocorticoids, but more severe cases may require more advanced treatment (12). Glucocorticoids can be associated with side effects including osteoporosis, hyperglycemia and may increase the predisposition to obesity, the risk of developing diabetes, hypertension, and cardiovascular disease (CVD) (12).

Diet quality in people with SLE is important because they are at higher risk of CVD, low bone mineral density, and vitamin D deficiency (13, 14). More than half of the people with SLE have three or more risk factors for CVD (mostly obesity, hypertension, and dyslipidemias) (12). A low-calorie diet high in vitamin- and mineral- rich foods and mono and polyunsaturated fatty acids (MUFA/PUFA) may help control the inflammatory aspects of the disease and the complications and co-morbiditiesresulting from SLE treatment (15). Some studies have highlighted the importance of specific vitamins mainly A, B_6, C, D and E, and adequate dietary fiber intake, as well as protein and sodium restriction in reducing co-morbidities and preventing SLE flares (16, 17). For all people with SLE, it remains important to encourage them to stop smoking, avoid being overweight and optimize their blood pressure and lipid profile to decrease cardiovascular risk (13).

Polycystic Ovary Syndrome

Polycystic ovary syndrome (PCOS) is a hormonal disorder common among women of reproductive age. Most women with PCOS produce excess male sex hormones (androgens) and have many small cysts on their ovaries (18). The prevalence of PCOS ranges from 4 percent to 21 percent, depending on the criteria used to make the diagnosis (19). The exact cause of PCOS is unknown, however, insulin resistance is believed to play a role in the pathogenesis of PCOS (20). In addition, there may be a genetic component, since it is not unusual for multiple women in the same family to have PCOS (18).

Hyperandrogenism (excess male sex hormones) may prevent ovulation and can cause irregular menstrual periods, leading to difficulty conceiving a child or a complete inability to conceive (19). PCOS is the most common cause of infertility (19). For those who achieve pregnancy, there is an increased risk of complications and pregnancy loss (19). Women with PCOS are more likely to develop type 2 diabetes, high blood pressure, problems with the heart and blood vessels, uterine cancer, and metabolic syndrome (18, 19).

About half of all women with PCOS are overweight or obese (19). Treatment for PCOS may include medication to promote ovulation, however, weight loss is the primary therapy for PCOS (18, 20). A reduction in weight of as little as 5% can improve insulin resistance associated with PCOS, and for some women it may improve the hormone imbalance and increase fertility (21). WIC nutrition services should focus on dietary and physical activity guidance to promote weight loss and compliance with healthcare provider treatment.

Cardiovascular Disease

Cardiovascular disease (CVD), or commonly known as heart disease, is an umbrella term for several types of heart conditions that cause a decrease flow of blood to the heart which can result in a heart attack (22). The most common type of CVD is coronary artery disease (22). CVD is the leading cause of death for women in the United States and is responsible for about 1 in every 5 female deaths (23). Due to the fact that most CVDs develop slowly over decades as plaque builds up and hardens arteries, cardiac disorders in children are not caused by CVD (24). Children with cardiac conditions typically have congenital heart disease and should be assigned risk 349 *Genetic and Congenital Disorders*.

Traditional risk factors for developing CVD include diabetes, smoking, obesity and overweight, physical inactivity, high blood pressure, and high cholesterol (25, 26). Recent discoveries have highlighted differences in how men and women develop and are diagnosed with CVD. Women are more affected by traditional CVD risk factors than men, and some risk factors specific to women go under recognized by their healthcare providers (25, 26).

Women-specific risk factors for CVD are pregnancy and pregnancy-related complications (27). Pre-eclampsia, preterm delivery, gestational diabetes, and polycystic ovary syndrome are all risk factors for CVD (26, 27, 28, 29, 30). If women have any women-specific CVD risk factors, it is recommended to encourage them to discuss their risk for CVD with their healthcare provider.

People with CVD benefit from cardiac rehabilitation which is a program that helps strengthen the heart through physical activity and helps build healthier habits like eating a healthy diet (31). Likewise, a heart healthy diet can prevent the development of CVD, and includes (32):

- Eating high fiber foods
- Eating foods low in saturated fat

- Limiting salt in diet
- Limiting added sugars in diet
- Limiting alcoholic drinks

Asthma

Asthma is a chronic lung disease that causes the airways to become inflamed and narrow (33). Symptoms include wheezing, breathlessness, chest tightness, and coughing of variable severity (34). Asthma attacks may be mild, moderate, or severe enough to become life-threatening events (34).

According to the Centers for Disease Control and Prevention (CDC), asthma affects 25 million people. The prevalence among adults is 7.7%. In children, asthma prevalence is lower among children age 0-4 (3.8%) than older children age 5-19 (9.8%). In addition, asthma is more common in females (9.3%) than males (6.4%). Regarding race and ethnicity, asthma prevalence is higher among Blacks and American Indian or Alaska Natives, 10.7 and 10.4% respectively, compared with Whites (8.0%). Among Hispanics asthma prevalence is 6.5% and among Asians it is 4.5%. Asthma prevalence increases with decreasing annual household income, with the highest prevalence seen in those with incomes less than 100% poverty (11.7%). (35)

In most cases, the cause(s) of asthma is unknown (34). However, people with asthma can reduce the number and severity of asthma attacks by identifying what triggers an attack. Triggers can be different for everyone, but the most common ones include (36):

- Tobacco smoke
- Dust mites
- Air pollution
- Pest (e.g., cockroaches, mice)
- Pet dander
- Plant pollen
- Mold
- Infections
- Exercise
- Strong scents (such as perfumes)

Asthma can't be cured, but its symptoms can be controlled. Treatment includes avoiding the triggers of an asthma attack and medications. There are two types of asthma medicines (36):

- Quick-relief medicines act fast to open up tight airways. They can be used as needed during a flare- up. Quick-relief medicines act fast, but their effect doesn't last long. These kinds of medicines are also called "fast-acting" or "rescue" medicines.
- Long-term control medicines manage asthma by preventing symptoms from happening. They reduce inflammation in the airways, which is the cause of the swelling and mucus. (Quick-relief medicines only treat the symptoms caused by the inflammation.) Long-term control medicines — also called "controller" or "maintenance" medicines — must be taken every day, even when a person feels well.

Inhaled corticosteroids are the most effective and commonly used long-term control medications for asthma. In children, long-term use of inhaled corticosteroids can delay growth slightly, but the benefits of using these medications to maintain good asthma control generally outweigh the risks. (37)

There is no specific diet therapy for asthma, but below are recommendations for reducing symptoms (38):

- Consume a diet to maintain or achieve a healthy weight. Being overweight can worsen asthma. Even losing a little weight can improve symptoms
- Eat plenty of fruits and vegetables. They're a good source of antioxidants such as beta carotene and vitamins C and E, which may help reduce lung inflammation and irritation caused by cell- damaging free radicals.
- Avoid allergy-triggering foods. Allergic food reactions can cause asthma symptoms.
- Consume foods high in vitamin D. People with more-severe asthma may have low vitamin D levels. Milk, eggs, and fish such as salmon all contain vitamin D.

Cystic Fibrosis (CF)

Cystic fibrosis (CF) is a genetic disorder that affects the cells that produce mucus, sweat, and digestive fluids. In people with CF, a defective gene causes these secretions to become sticky and thick. Instead of acting as lubricants, the thick secretions clog ducts and passageways throughout the body, especially in the lungs, pancreas, and intestines. (39)

CF is a rare disease that affects about 35,000 people in the U.S. (40). All babies born in the United States are tested for CF soon after birth as part of newborn screening (40). Early diagnosis is important so that treatment can be started right away, which can help delay or prevent complications of the disorder. CF is a progressive disease and although there have been improvements in screening and treatments, people with CF have a life expectancy of 35 – 40 years, with some living into their 50s (39).

There is no cure for CF. People with CF often experience malnutrition, poor growth, frequent respiratory infections, breathing problems, and chronic lung disease (41). Goals of treatment are to ease symptoms, prevent and treat complications, and slow the progress of the disease (39). Due to the impact of CF on pancreatic enzymes, the digestion and absorption of protein and fats, are greatly impaired (42). Thus, most people with CF must take pancreatic enzymes as well as fat soluble vitamins (A, D, K and E) (42). The focus of nutrition therapy is to ensure adequate intake due to impaired digestion. Nutritional care should be personalized and provided by a specialized CF dietitian, if available, because needs may change dramatically during the progression of the disease (42).

Implications for WIC Nutrition Services

WIC can improve the management of above listed medical conditions through WIC foods, nutrition education, counseling, and referrals to health and community resources. The table below provides additional WIC nutrition services recommendations specific to the disease state:

WIC Nutrition Services Recommendations for Other Medical Conditions	
All Types of Medical Conditions	• Reinforce healthcare provider treatment and dietary plan (if applicable) • Refer for medical nutrition therapy (if available) • Recommend a healthy dietary pattern as described in the Dietary Guidelines for Americans
Juvenile Idiopathic Arthritis (JIA)	• Encourage adequate caloric intake • Monitor growth
Systemic Lupus Erythematosus (SLE)	• Encourage stress-relieving activities to prevent flares • Encourage and refer to smoking cessation if participant is a smoker • Encourage use of sunscreen and sun exposure avoidance • Encourage physical activity as tolerated
Polycystic Ovary Syndrome (PCOS)	• Provide dietary and physical activity guidance to support weight loss, if necessary
Cardiovascular Diseases	• Encourage participant to discuss blood cholesterol and triglycerides with health care provider • Recommend healthy food choices to control overweight or obesity • Recommend limiting alcohol, salt, added sugars, and saturated fat as part of a healthy dietary pattern • Suggest dietary fiber food options (e.g., fruit, vegetables, whole grains, legumes) • Encourage stress-relieving activities • Encourage smoking cessation if participant is a smoker
Asthma	• Provide dietary and physical activity guidance to support weight loss, if necessary • Educate on the avoidance allergy-triggering foods if allergies are present
Cystic Fibrosis (CF)	• Provide more frequent growth monitoring • Encourage adequate caloric intake to maintain healthy weight and normal growth

Clarification

Self-reporting of a diagnosis by a medical professional should not be confused with self-diagnosis, where a person simply claims to have or to have had a medical condition without any reference to professional diagnosis. A self-reported medical diagnosis ("My doctor says that I have/my son or daughter has…")

should prompt the CPA to validate the presence of the condition by asking more pointed questions related to that diagnosis.

References

1. Petty RE, Southwood TR, Manners P, et al. International League of Associations for Rheumatology classification of juvenile idiopathic arthritis: second revision, Edmonton, 2001. The Journal of Rheumatology. 2004 February [cited 2020 September]: 31(2): 390-392. Available from: https://www.jrheum.org/content/31/2/390.long.
2. Abramowicz A, Kim S, Prahalad S, et al. Juvenile arthritis: current concepts in terminology, etiopathogenesis, diagnosis, and management. International Journal of Oral and Maxillofacial Surgery. 2016 July; 45(7): 801-812.
3. Cron RQ, Weiser P, Beukelman T. Juvenile idiopathic arthritis. Clinical Immunology. 2019; 5: 723-733.
4. Little EM, Grevich S, Huber JL, et al. Parental perception of dietary invention in juvenile idiopathic arthritis. The Journal of Alternative and Complementary Medicine. 2019 June 4; 25(6): 643-647.
5. Harvard Health Publishing. Cambridge (MA): Harvard Medical School. Can diet improve arthritis symptoms? 2013 May [cited 2021 May]. Available from: https://www.health.harvard.edu/nutrition/can-diet-improve-arthritis-symptoms.
6. Kiriakidou M, Ching CL. Systemic Lupus Erythematosus. Ann Intern Med. 2020 June [cited 2021 Jan 19]; 2;172(11):ITC81-ITC96. Available from: https://doi.org/10.7326/AITC202006020.
7. Parks CG, de Souza Espindola Santos A, Barbhaiya M, Costenbader KH. Understanding the role of environmental factors in the development of systemic lupus erythematosus. Best Pract Res Clin Rheumatol. 2017 June [cited 2021 Jan 15];31(3):306-320. Available from: https://dx.doi.org/10.1016%2Fj.berh.2017.09.005.
8. Centers for Disease Control and Prevention [Internet]. Atlanta (GA): Centers for Disease Control and Prevention. Systematic lupus erythematosus. 2018 October17 [cited 2020 October]. Available from: https://www.cdc.gov/lupus/facts/detailed.html.
9. Lupus Foundation of America [Internet]. Washington (DC): Lupus Foundation of America. Lupus facts of statistics. 2016 October 6 [cited 2020 October]. Available from: https://www.lupus.org/resources/lupus-facts-and-statistics.
10. Centers for Disease Control and Prevention [Internet]. Atlanta (GA): Centers for Disease Control and Prevention. About heart disease. 2020 September 8 [cited 2021 January]. Available from: https://www.cdc.gov/lupus/basics/pregnancy.htm.
11. Petri M. Pregnancy and Systemic Lupus Erythematosus. Best Pract Res Clin Obstet Gynaecol. 2020 April;64:24-30.
12. Kuhn, A, Bonsmann, G, Anders, HJ, et al. The diagnosis and treatment of systemic lupus erythematosus. Dtsch Arztebl Int. 2015 [cited 2021 Jan 18];112, 423–432. Available from: https://doi.org/10.3238/arztebl.2015.0423.
13. Rodriguez Huerta, M, Trujillo-Martin, M, Rua-Figueroa, I, et al. Healthy lifestyle habits for patients with systemic lupus erythematosus: a systemic review. Semin Arthritis Rheum. 2016 [cited 2021 Jan 20];45: 463–470. Available from: https://doi.org/10.1016/j.semarthrit.2015.09.003.

14. Nguyen M, Bryant K, O'Neill S. Vitamin D in SLE: a role in pathogenesis and fatigue? A review of the literature. Lupus. 2018;27(13):2003-2011

15. Islam MA, Khandker SS, Kotyla PJ, Hassan R. Immunomodulatory Effects of Diet and Nutrients in Systemic Lupus Erythematosus (SLE): A Systematic Review. Front Immunol. 2020 Jul [cited 2021 Jan 20];22;11:1477. Available from: https://doi.org/10.3389/fimmu.2020.01477.

16. Aparicio-Soto, M., Sanchez-Hidalgo, M., & Alarcon-de-la-Lastra, C. An Update on diet and nutritional factors in systemic lupus erythematosus management. Nutrition Research Reviews. 2017 [cited 2021 Jan];30(1), 118-137. Available from: https://doi.org/10.1017/S0954422417000026.

17. Constantin MM, Nita IE, Olteanu R, et al. Significance and impact of dietary factors on systemic lupus erythematosus pathogenesis. Exp Ther Med. 2019[cited Jan 25 2021] Feb;17(2):1085-1090. Available from: https://dx.doi.org/10.3892%2Fetm.2018.6986.

18. Johns Hopkins Medicine [Internet]. Baltimore (MD): Johns Hopkins University. Polycystic ovary syndrome. No date [cited 2021 May]. Available from: https://www.hopkinsmedicine.org/health/conditions-and-diseases/polycystic-ovary-syndrome-pcos.

19. U.S. National Library of Medicine [Internet]. Bethesda (MD): MedlinePlus. Polycystic ovary syndrome. 2020 August [cited 2021 May]. Available from: https://ghr.nlm.nih.gov/condition/polycystic-ovary-syndrome#.

20. Goodman NF, Cobin RH, Futterweit W, et al. American Association of Clinical Endocrinologists, American College of Endocrinology and Androgen Excess and PCOS Society Disease State Clinical Review: guide to the best practices in the evaluation and treatment of polycystic ovary syndrome – part 2. Endocr Pract. 2015 December 21 [cited 2021 May]; (12):1415-26. Available from: https://pubmed.ncbi.nlm.nih.gov/26642102/.

21. Mayo Clinic [Internet]. Rochester (MN): Mayo Clinic. Polycystic ovary syndrome. No date [cited 2021 May]. Available from: https://www.mayoclinic.org/diseases-conditions/pcos/diagnosis-treatment/drc-20353443.

22. Centers for Disease Control and Prevention [Internet]. Atlanta (GA): Centers for Disease Control and Prevention. About heart disease. 2020 September 8 [cited 2021 January]. Available from: https://www.cdc.gov/heartdisease/about.htm.

23. Centers for Disease Control and Prevention [Internet]. Atlanta (GA): Centers for Disease Control and Prevention. Women and heart disease. 2021 January 31 [cited 2020 January]. Available from: https://www.cdc.gov/heartdisease/women.htm.

24. Mayo Clinic [Internet]. Rochester (MN): Mayo Clinic. Polycystic ovary syndrome. No date [cited 2021 May]. Available from: https://dx.doi.org/10.3892%2Fetm.2018.6986.

25. Garcia M, Mulvagh SL, Merz NB, et al. Cardiovascular disease in women. Circulation Research. 2016 April 15 [cited 2021 January]; 118: 1273-1293. Available from: https://www.ahajournals.org/doi/full/10.1161/CIRCRESAHA.116.307547.

26. Brown HL, Warner JJ, Gianos E, et al. Promoting risk identification and reduction of cardiovascular disease in women through collaboration with obstetricians and gynecologists: a presidential

advisory from the American Heart Association and the American College of Obstetricians and Gynecologists. Circulation. 2018 June 12.

27. Peters SAE, Regitz-Zagrosek V. Pregnancy and rik of cardiovascular disease: is the relationship due to childbearing or childrearing? European Heart Journal. 2017 May 14 [cited 2021 January]; 38(19): 1448-1450. Available from: https://academic.oup.com/eurheartj/article/38/19/1448/3823351?login=true.
28. Castelao JE, Gago-Cominguez M. Risk factors for cardiovascular disease in women: relationship to lipid peroxidation and oxidative stress. Medical Hypotheses. 2008; 71(1): 39-44.
29. Okoth K, Chandan JS, Marshall T, et al. Association between the reproductive health of young women and cardiovascular disease later in life: umbrella review. The BMJ. 2020 Oct 14 [cited 2021 January]. Available from: https://www.bmj.com/content/371/bmj.m3963.
30. Kramer CK, Campbell S, Retnakaran R. Gestational diabetes and the risk of cardiovascular disease in women: a systematic review and meta-analysis. Diabetologia. 2019 March 7; 62: 905-914.
31. Centers for Disease Control and Prevention [Internet]. Atlanta (GA): Centers for Disease Control and Prevention. How cardiac rehabilitation can help heal your heart. 2020 December 28 [cited 2021 January]. Available from: https://www.cdc.gov/heartdisease/cardiac_rehabilitation.htm.
32. Centers for Disease Control and Prevention [Internet]. Atlanta (GA): Centers for Disease Control and Prevention. Prevent heart disease. 2020 April 21 [cited 2021 January]. Available from: https://www.cdc.gov/heartdisease/prevention.htm.
33. Mayo Clinic [Internet]. Rochester (MN): Mayo Clinic. Asthma. 2020 August 11 [cited 2021 May]. Available from: https://www.mayoclinic.org/diseases-conditions/asthma/symptoms-causes/syc-20369653.
34. Centers for Disease Control and Prevention [Internet]. Atlanta (GA): Centers for Disease Control and Prevention. Asthma facts. 2013 July [cited 2021 May]. Available from: https://www.cdc.gov/asthma/pdfs/Asthma_Facts_Program_Grantees.pdf.
35. Centers for Disease Control and Prevention [Internet]. Atlanta (GA): Centers for Disease Control and Prevention. Asthma data, statistics, and surveillance. No date [cited 2021 May]. Available from: https://www.cdc.gov/asthma/asthmadata.htm.
36. U.S. Food and Drug Administration [Internet]. Silver Spring (MD): U.S. Food and Drug Administration. Manage your asthma. 2018 November 8 [cited 2021 May]. Available from: https://www.fda.gov/consumers/consumer-updates/manage-your-asthma-know-your-triggers-and-treatment-options.
37. Mayo Clinic [Internet]. Rochester (MN): Mayo Clinic. Asthma medications. 2020 June 19 [cited 2021 May]. Available from: https://www.mayoclinic.org/diseases-conditions/asthma/in-depth/asthma-medications/art-20045557.
38. Mayo Clinic [Internet]. Rochester (MN): Mayo Clinic. Asthma diet. 2020 March 21 [cited 2021 May]. Available from: https://www.mayoclinic.org/diseases-conditions/asthma/expert-answers/asthma-diet/faq-20058105iet.

39. Mayo Clinic [Internet]. Rochester (MN): Mayo Clinic. Cystic fibrosis. 2020 March 14 [cited 2021 May]. Available from: https://www.mayoclinic.org/diseases-conditions/cystic-fibrosis/symptoms-causes/syc-20353700.

40. Centers for Disease Control and Prevention [Internet]. Atlanta (GA): Centers for Disease Control and Prevention. Cystic fibrosis. 2020 May 18 [cited 2021 May]. Available from: https://www.cdc.gov/genomics/disease/cystic_fibrosis.htm.

41. Johns Hopkins Medicine [Internet]. Baltimore (MD): Johns Hopkins Medicine. Asthma data, statistics, and surveillance. No date [cited 2021 May]. Available from: https://www.hopkinsmedicine.org/health/conditions-and-diseases/cystic-fibrosis.

42. Hollander FM, de Roos NM, Heijerman HGM. The optimal approach to nutrition and cystic fibrosis: latest evidence and recommendations. Current Opinion in Pulmonary Medicine. 2017 Nov [cited 2021 May];23(6):556-561. Available from: https://pubmed.ncbi.nlm.nih.gov/28991007/.

361 Mental Illnesses

Definition/Cut-off Value

As defined by the American Psychiatric Association in the Diagnostic and Statistical Manual of Mental Health Disorders, Fifth Edition, a mental disorder (or mental illness)[1] is:

> "A syndrome characterized by clinically significant disturbance in an individual's cognition, emotion regulation, or behavior that reflects a dysfunction in the psychological, biological, or developmental processes underlying mental functioning. Mental disorders are usually associated with significant distress or disability in social, occupational, or other important activities (1)."

Mental illnesses where the current condition, or treatment for the condition may affect nutrition status include, but are not limited to:

Mental Illnesses	
Depression	Anxiety Disorders
Post-Traumatic Stress Disorder (PTSD)	Obsessive-Compulsive Disorder (OCD)
Personality Disorders	Bipolar Disorders
Schizophrenia	Attention-Deficit/Hyperactivity Disorder (ADHD)

Note: For mental illnesses related to eating disorders (e.g., anorexia nervosa, bulimia nervosa and binge-eating disorder), please see risk #358 Eating Disorders.

The presence of a mental illness that is diagnosed, documented, or reported by a physician, or someone working under a physician's orders, mental health provider or as self-reported by an applicant, participant, or caregiver. See Clarification (page 12) for more information about self-reporting a diagnosis.

Participant Category and Priority Level

Category	Priority
Pregnant Women	I
Breastfeeding Women	I
Non-Breastfeeding Women	III, IV, V or VI
Children	III

Justification

Prevalence of Mental Illnesses

In 2019, the prevalence of any mental illness in U.S. adults was 20.6%; one fifth of the adult population (2). Mental illnesses can vary in impact from mild to severe (2). Young adults aged 18-25 had the highest prevalence of mental illnesses (29.4%) (2). Females had a higher prevalence (24.5%) than males (16.3%) (2). Those reporting two or more races had the highest prevalence (31.7%), followed by Whites (22.2%), Alaskan Natives or Native Americans (18.7%), Hispanics (18%), Blacks (17.3%), Native Hawaiians or Other

[1] The terms mental disorder and mental illness are both used in the Diagnostic and Statistical Manual of Mental Health Disorders. Mental illness is the term endorsed by Substance Abuse and Mental Health Services Administration (SAMHSA).

Pacific Islanders (16.6%), and Asians (14.4%) (2). Additionally, people in the Lesbian, Gay, Bi-Sexual, Transgender, Queer (LGBTQ) community experience mental illnesses, especially depression and anxiety disorders, at a higher rate (3). LGB adults are more than twice as likely as heterosexual adults to experience a mental illness while transgender adults are nearly 4 times as likely as cisgender adults to experience a mental illness (3).

The prevalence of severe mental illness in U.S. adults was 5.2% in 2019 (2). Severe mental illness results in serious functional impairment which substantially interferes with or limits one or more major life activities (2). The Americans with Disabilities Act Amendments Act of 2008 defines major life activities as "including but not limited to caring for oneself, performing manual tasks, seeing, hearing, eating, sleeping, walking, standing, speaking, breathing, lifting, learning, reading, concentrating, and working" (4). People with severe mental illness often have difficulty maintaining a healthy diet, even when guidance is provided (5). Unintended changes in total body weight (5% in the past month, or 10% in the past six months) and medications that alter appetite or intake, nutrient absorption, or the metabolism of nutrients may signal the need for additional referrals and indicate that the mental illness is more serious (5). Females had a higher prevalence (6.5%) of severe mental illness than males (3.9%) (2). Young adults aged 18-25 years had the highest prevalence of severe mental illness (8.6%) compared to adults aged 26-49 years (6.8%) and aged 50 and older (2.9%) (2). Those reporting two or more races had the highest prevalence of severe mental illness (9.3%), followed by Alaskan Natives or Native Americans (6.7%), Whites (5.7%), Hispanics (4.9%), Blacks (4.0%), Asians (3.1%), and Native Hawaiians or Other Pacific Islanders (2.6%) (2).

The prenatal and postnatal periods are a common time for the relapse of mental illnesses such as depression, bipolar disorder, and anxiety disorders since women may choose not to take their medications while pregnant or breastfeeding. Suicide remains a leading cause of mortality in the postpartum period and accounts for 20% of maternal deaths in the first year after birth. Mental illnesses during pregnancy have been associated with adverse perinatal outcomes, including placental abnormalities, small-for-gestational-age fetuses, fetal distress, preterm delivery, adverse neurodevelopmental outcomes, and disordered attachment. Pregnant women with untreated mental illness are also more likely to smoke, use alcohol and drugs, have less prenatal care, and have poor nutrition. (6)

Children whose parents have a mental illness are at risk for developing social, emotional, and behavioral problems. They are more likely to have an inconsistent and unpredictable family environment which can place the child at risk for poverty, living in a single parent home, hostile behavior by a parent, and having a parent with a substance use disorder. (7)

Mental illnesses or serious emotional disturbances also occur in children. Symptoms in children are observed as serious changes in the way they typically learn, behave, or handle their emotions, which cause distress and problems getting through the day. The diagnosis is often made in the school years or sometimes earlier. Symptoms of mental illnesses often change as a child grows. Mental illnesses can also interfere with a child's healthy development, causing problems that can continue into adulthood. The most common mental illnesses that are diagnosed in childhood are attention-deficit/hyperactivity disorder (ADHD), anxiety, and behavior disorders, as follows (8):

- 9.4% of U.S. children aged 2-17 years have received an ADHD diagnosis.
- 7.4% of U.S. children aged 3-17 years have a diagnosed behavior problem.
- 7.1% of U.S. children aged 3-17 years have diagnosed anxiety.
- 3.2% of U.S. children aged 3-17 years have diagnosed depression.

- 16.7% U.S. children aged 2–8 years have a diagnosed mental, behavioral, or developmental disorder.

Poverty affects mental health in many ways including increased financial stress, chronic and acute stressful life events, inadequate nutrition, and lead exposure. It can also affect parental relationship stress, result in a low-stimulation home environment, and child abuse and neglect. Poverty in childhood is associated with depressive and anxiety disorders, and higher rates of almost every psychiatric illness in adulthood. Poverty in adulthood is linked to depressive disorders, anxiety disorders, and suicide. (9)

Treatment

Treatment for any mental illness can be complex and depends on the severity of the symptoms (1). It is estimated that only half of individuals with any type of mental illness receive treatment (2). More females receive treatment for mental illnesses than males (2). It is also more common for older adults to receive treatment than those aged 18-25 years old (2).

Mental illnesses are most commonly treated with psychotherapy and medication (1). Medications can play a role in treating most mental illnesses but choosing the right treatment plan should be based on an individual's needs, medical situation, and be under the guidance of a health care professional (10). Certain medication such as antidepressants, antipsychotics, anticonvulsants, or stimulants can influence body weight and appetite (11). Individuals who are prescribed antipsychotics often have weight gain that may result in additional health issues, reduced quality of life, and poor compliance with taking the medication as prescribed (12).

Mental Illnesses and Nutrition

Nutrition is important to mental health because it contributes to maintaining the structure and function of the nerve cells and chemicals in the brain. The production of nerve chemicals or neurotransmitters requires certain nutrients including amino acids, zinc, copper, magnesium, iron, iodine, selenium, and B vitamins. If the intake of these nutrients is low, it can affect the production of neurotransmitters and therefore mental health. While vitamin D is usually associated with bone health it is also a very important nutrient for the brain. Research has associated vitamin D deficiency with mood disorders, dementia, and an increased risk for depression. (12)

Essential fatty acids (EFA) are also crucial nutrients that may support mental health. They are the building blocks for nerve tissue and transmitting nerve signals. When EFA are out of balance or consumed in insufficient amounts, biochemical malfunctions such as incomplete or inaccurate nerve signals can impact physical and mental health. (12)

Some patients with mental illnesses can be deficient in some vitamins, minerals, and nutrients. These commonly include, B6, B9, B12, omega-3 and omega-6 fatty acids, magnesium, vitamin D, and zinc (12). Evidence suggests that in some cases, when these deficiencies are returned to normal, changes in mood and behavior can be achieved. (12)

Common Mental Illnesses

Depression

Depression has a variety of symptoms, the most common are feelings of sadness or a marked loss of interest in pleasure or activities (13). Other symptoms include appetite changes resulting in unintended weight loss or gain, insomnia or oversleeping, loss of energy or increased fatigue, restlessness or irritability, feelings of worthlessness or inappropriate guilt and difficulty thinking, concentrating, or making decisions

(14). Depression affects 6.7% U.S. adults in any given year and 16.6% will experience depression at some time in their life (14). The prevalence of depression among females is 60% higher than males (13). Of those adults diagnosed with depression, 63.8% had severe impairment (2). Although depression can occur at any age, it usually first appears in the late teens to mid-twenties (14). Depression is now recognized in children and adolescents and tends to present as irritability, rather than low mood (2). There is no definite cause of depression but there are many contributing factors including genetics, nutrition, environmental stressors, hormonal disruptions, and changes in brain chemistry (12). Approximately one-third of people who have depression do not respond well to the available treatments (12).

For information on screening WIC participants for possible depression please see *Guidance for Screening and Referring with or at Risk for Depression* (available on the Food and Nutrition Service PartnerWeb). This guidance clarifies WIC staff's role in maternal depression, provides training resources, identifies focus areas of breastfeeding promotion and support, and nutrition education related to maternal depression. It also contains information on referring participants to appropriate mental health services to maximize participant benefit from WIC nutrition services to achieve positive health outcomes.

Prenatal Depression

The most common symptoms of prenatal depression include feelings of sadness, anxiety, and fatigue (15). Women who experience depression during pregnancy are found to be at an increased risk of not following their prenatal medical plan, inadequate or excessive gestational weight gain, smoking, and substance use (16). Studies suggest that pregnant women with untreated symptoms of depression have increased rates of birth complications, preeclampsia, preterm delivery, low birth weight and impaired social, cognitive, and emotional development in the baby (16, 17). Approximately 10% of pregnant women experience depression with some reported rates as high as 22% (18, 19). Women of color and those from lower socioeconomic groups have a significantly higher incidence of prenatal depression (20).

Approximately 6-8% of U.S. women report using or having been prescribed an antidepressant while pregnant (21). There are currently no recommendations on which medication should be used to treat depression during pregnancy and there are concerns about the negative associations of antidepressants on fetal and infant health (12, 22). Selective serotonin reuptake inhibitors (SSRIs) are the most frequently used medication to treat pregnant women with depression (22). Some complications associated with SSRIs and Selective neurontin reuptake inhibitors (SNRIs) used in pregnancy may include increased risk of spontaneous abortion, preterm birth and low birth weight, poor neonatal adaptation syndrome, persistent pulmonary hypertension and congenital anomalies including heart defects (22). High rates of depression relapse (70%) have been found in some studies when pregnant women have stopped their antidepressant medication (23). The use of antidepressants during pregnancy may also influence a woman's choice for feeding her infant making her less likely to plan on or initiate breastfeeding (24). For all these reasons, it is imperative that prenatal women discuss the benefits and risks of antidepressant therapy as part of the treatment for depression with their health care provider (21).

Depression in Pregnant Adolescents

Adolescent pregnancy is considered a significant risk for depression (25). Women who gave birth before their 20th birthday showed higher levels of depressive and anxiety symptoms (25). The symptoms of depression in adolescence are different than those presented in adulthood (26). While they share a depressed mood, adolescents more frequently show changes in appetite or weight and insomnia, rather than a loss of interests and poor concentration (26). Depression in adolescent pregnancy has a high frequency of suicidal attempts, reaching up to 20% (26).

Teens who are female, have a family history of depression, a history of trauma, family conflict, a chronic medical disease, or who are LGBTQ are at greater risk for developing adolescent depression. Depression in adolescents can occur with other mental illnesses including anxiety. (26)

Postpartum Depression

Postpartum depression (PPD) is a form of depression that occurs within 4 to 6 weeks after childbirth and is one of the most common complications that occurs after pregnancy (27, 28). PPD is associated with many adverse outcomes for both mother and offspring including, maternal mortality and morbidity, increased risk for infanticide, poorer maternal-infant attachment, early discontinuation of breastfeeding, and impaired parenting behaviors (12, 27). It affects 10-15% of women (27). The risk factors associated with PPD include genetics, history of a mental illness and adverse life events including physical, psychological, or sexual abuse (27). Discrimination and immigration are often overlooked adverse life events associated with PPD (27).

PPD is different from the "baby blues" which is used to describe mild mood changes, feelings of worry, unhappiness, and exhaustion in the first 2 weeks after having a baby (15). The "baby blues" is a common reaction following delivery that affects 70-80% of new mothers (12). The "baby blues" typically peak four to five days after delivery and may last hours to days and usually resolve within 2 weeks (12, 15).

Breastfeeding and Depression

Women with PPD are less likely to breastfeed, as PPD is considered a risk factor for breastfeeding self-efficacy (12, 29). Women with low self-efficacy are 3 times more likely to stop breastfeeding early (29). Studies show the presence of depressive symptoms in the postpartum period decrease maternal confidence in breastfeeding and increase the risk of discontinuing exclusive breastfeeding (29). Women with PPD also have fewer positive interactions with their infants and a poorer perception regarding their baby's behavior (29). Additionally, PPD can negatively affect milk supply due to elevated levels of cortisol in the mother's system (12). Difficulties with breastfeeding can cause the mother to feel overwhelmed and increase the risk of depression (12). If a mother with early signs of PPD stops breastfeeding, depression can become more severe due to the abrupt drop in oxytocin levels (12). Successful breastfeeding may have a protective effect on maternal mental health because the breastfeeding relationship can decrease feelings of loneliness and emptiness that are common in PPD (12). Higher levels of oxytocin released during breastfeeding can cause the mother to feel calmer and more relaxed (12).

Medications used to treat PPD include SSRIs and SSNIs (23). Most research shows negligible risk in infants exposed to SSRIs in human milk containing antidepressants (24). Sertraline, an SSRI, is the most studied antidepressant in breastfeeding (6). It has minimal transfer into breastmilk and is well tolerated by most infants (6).

Anxiety Disorders

Anxiety disorders are the most common mental illness in adults in the U.S. (12). They include the following types: generalized anxiety disorder, panic disorder, and various phobia-related disorders (30). In anxiety disorders, worry and fear interfere with daily life and are much more severe than occasional anxiety (2,30). All anxiety disorders share an increase in emotional, physical, and neurological symptoms precipitated by a specific situation or circumstance (12). Nineteen percent of the adults in the U.S. have an anxiety disorder; 22% of those individuals experience severe impairment related to their anxiety. (12). The risk factors for anxiety disorders include both genetic and environmental components along with exposure to stressful events, an adverse childhood experience, and a history of mental illness in the family (12, 30).

During pregnancy, anxiety may have adverse effects on both the mother and baby, including impaired fetal development, complications of labor, and altered mental development of the newborn (31). Therefore, it may be necessary to consider medication for anxiety that worsens during pregnancy. Anxiety disorders are usually treated with psychotherapy and medications (30, 32). The medications most used to treat anxiety disorders include anti-anxiety medications (benzodiazepines), antidepressants (SSRIs and SSNIs), and blood-pressure medications (beta-blockers) (2, 30, 32). Benzodiazepines (i.e., Xanax, Valium) have the benefit of working faster than anti-depressants, but they can be addictive if used over the long-term (30). Both antidepressants, SSRIs (i.e., Zoloft, Prozac) and SSNIs (i.e., Effexor), are used to treat anxiety disorders, but they can take 4-6 weeks for effects on mood to occur (30). An increase in suicidal thoughts or behavior can occur in those under age 25 when taking antidepressant medications, especially in the first few weeks after starting, or when the dose is changed which requires appropriate monitoring by the prescribing provider (33). Beta-blockers can be used to help relieve the physical symptoms of anxiety, including shaking and a rapid heartbeat but they are usually used short-term or on an as needed basis such as during situational anxiety (32). SSRIs are the first-line pharmacological agents for anxiety disorders in perinatal patients (23).

Post-Traumatic Stress Disorder (PTSD)

PTSD is a psychiatric disorder that may occur in people who have experienced or witnessed a traumatic, shocking, scary, or dangerous event (34). People with PTSD have intense or disturbing thoughts and feelings related to their trauma that lasts after the traumatic event has ended (35). They may avoid situations or people that remind them of the event, and they may have strong negative reactions to something like a loud noise or an unexpected touch (35). Symptoms of PTSD usually begin within 3 months of the traumatic incident, but sometimes begin years after (35). To be considered PTSD, the symptoms must last more than a month and be severe enough to interfere with relationships or work (35). PTSD can occur at any age and affects 3.5% of the U.S. population with women being more likely to be affected than men (36). Hispanics, Blacks, and Native Americans have higher rates of PTSD than non-Hispanic whites (32). Rape is the most common trigger of PTSD and childhood sexual abuse is a strong predictor for developing PTSD in one's lifetime (36). Approximately 3.3% of pregnant women and 4% of postpartum women have PTSD (37). Women are susceptible to developing PTSD as a result of childbirth (37). Risk factors associated with postpartum PTSD include negative subjective birth experiences, having an operative birth, history of mental health problems, and lack of support (37). Studies support an association between postpartum PTSD with lower birth weights and lower rates of breastfeeding (37). Usually, psychotherapy or medications is used to treat PTSD or a combination of the two (34 ,35). The medications most used to treat the symptoms of PTSD are the antidepressants, SSRIs and SSNIs (34, 35).

Obsessive-Compulsive Disorder (OCD)

OCD is a chronic and long-lasting disorder in which a person has uncontrollable, reoccurring thoughts (*obsessions*) and/or behaviors (*compulsions*) that they feel the urge to repeat over and over (38). The compulsions, such as hand washing, checking on things or cleaning, can interfere with a person's daily life (38). People with OCD have difficulty stopping the obsessive thoughts or the compulsive actions even though they are very distressing and recognize their thoughts and behaviors are excessive (38). OCD occurs in 1.0% of the U.S. population with women and men being equally affected (36). The average age of onset is 19 years old with one-third of affected adults having first experienced symptoms in childhood (36). The causes of OCD are unknown but there are some risk factors associated with it including genetics, childhood trauma, and brain abnormalities (39). People with mild to moderate forms of OCD are usually treated with either cognitive behavioral therapy (CBT) or medication (38). Usually, a high dose of SSRIs is recommended to treat OCD, but it can take up to 12 weeks to notice an improvement (39). In severe forms of OCD, it is

recommended that both medication and CBT be used (39). Given the relatively large number of studies regarding their safety in the perinatal period for OCD patients SSRIs are the first-line medications (30).

Personality Disorders

Personality disorders, including obsessive-compulsive personality disorder (different from OCD), narcissistic personality disorder, antisocial personality disorder, and borderline personality disorder, are an "enduring pattern of inner experience and behavior that deviates markedly from the expectations of the individual's culture" (1, 36). Behaviors are pervasive and inflexible, often resulting in distress and impairment (1). The person's way of thinking, feeling, and behaving is different from the expectations of society and causes problems functioning (40). Personality disorders affect at least two of these areas: the way a person thinks about oneself and others, the way a person responds emotionally, the way a person relates to other people, or the way a person controls their behavior (40). Personality disorders are not usually diagnosed until a person is over the age of 18 because prior to that age a person's personality is still developing (40). It is estimated that 9% of the U.S. population has at least one personality disorder (36). There are no medications specifically used to treat personality disorders, but psychotherapy can be effective (40). Medications, such as antidepressants, anti-anxiety medication or mood stabilizing medication, may be helpful in treating some symptoms under the care of a psychiatrist (40).

Bipolar Disorders

Bipolar disorder (formerly known as manic depressive disorder or manic depression) is a mental illness that causes changes in a person's mood that affects their daily life (41, 42). These mood shifts are known as manic (elevated or agitated) or depressive (sad and hopeless) (41, 42). During depressive episodes, approximately 25-50% of those with bipolar disorder attempt suicide (12). Sometimes people may have a mixed episode, feeling both manic and depressive symptoms at the same time (42). The symptoms of a mood can last from days to weeks and vary in intensity (41). People with bipolar disorders are more likely to have other mental illnesses like anxiety, eating disorders, substance use issues or chronic medical conditions such as diabetes, obesity, or heart disease (12, 41). The lifetime prevalence of bipolar disorder in the U.S. is 4.4% (12). Of those 4.4% diagnosed with bipolar disorder 82.9% have severe impairment (12). The exact cause of bipolar disorders is not known, but genetics, hormones, and an imbalance in brain chemistry are believed to play a role (12, 42). Bipolar disorders also tend to run in families with the average age of onset being 25 years old (42).

Medications are the treatment of choice for bipolar disorders with mood stabilizers like antiseizure medications with lithium being used the most commonly (12). These medications are believed to affect the chemical imbalances in brain (42). Lithium and sodium are similar in chemical bonding, so it is necessary for those taking lithium to have a stable, moderate intake of salt to keep lithium levels steady (12). Simple information based on the Dietary Approaches to Stop Hypertension (DASH) diet could be useful to those taking lithium (12). Mood stabilizers may also cause other side effects that could affect a person's nutritional status including weight gain, increased thirst, nausea, vomiting, and diarrhea (12).

The postpartum period is a vulnerable time for illness relapse in bipolar women (43). Women with bipolar disorder who discontinued their medication during pregnancy had a significantly higher risk of relapsing during the postpartum period (approximately 65% vs 25%) than those who remained taking their medication (6). The effect of lithium use on a breastfed baby is not as well studied (43). Lithium is excreted in human milk (23). Both the American Academy of Pediatrics and the National Library of Medicine (LactMed) provide guidelines for lithium use during breastfeeding but when lithium therapy is continued during the perinatal period it requires close monitoring of the breastfeeding dyad (23 ,43). Infant

monitoring includes checking for over-sedation, restlessness, hydration status, and changes in growth and development (23).

Schizophrenia

Schizophrenia is a serious mental illness that can be severely disabling if not treated (44). It is characterized by delusions, hallucinations, disorganized speech and behavior, and other symptoms that cause social or occupational dysfunction (44). For a diagnosis, symptoms must have been present for six months and have been active for at least one month (1). Schizophrenia affects 1% of the U.S. population (45). It occurs equally in men and women but tends to be diagnosed earlier in males (1, 44). Symptoms appear in males in their late teens or early twenties and in females in their twenties or thirties (12). Genetics is estimated to be responsible for 80% of schizophrenia cases (12). People with schizophrenia also have higher mortality rates due to higher rates of heart disease, liver disease, and diabetes (12, 45). These diseases appear to be more related to fat metabolism than dietary fat intake as schizophrenia appears to be associated with altered metabolism (12). Studies of patients with schizophrenia have shown them to have three times the amount of visceral fat when compared to those with equal total body fat (12). They also have reduced energy needs which may be related to antipsychotic medications frequently used in the treatment of schizophrenia (12). Antipsychotic medications are associated with increased appetite and weight, with some patients gaining as much as 25-60 pounds over the first few years after starting mediation (12, 44).

People with schizophrenia are at increased risk for substance use disorders. Their lifetime risk of having a serious drug or alcohol problem is 47% compared to 16% for the general population (46). High rates of substance use are associated with poor medical compliance, clinical decline, violence, and suicide. Some researchers think that the genetic risk for schizophrenia also increases the likelihood of substance use and an increased use of substances in adolescence may both increase the risk for developing a later substance use disorder and serve as an additional risk factor for the appearance of psychotic symptoms. (46)

Women with schizophrenia are more likely to have increased rates of stillbirths and neonatal deaths (23). This may be due to the illness, other medical conditions, lifestyle factors, or social issues (23). Pregnant women with schizophrenia who take antipsychotics are more likely to be obese, smoke, use alcohol, drugs, other medications, and have pre-existing diabetes and hypertension (23). Antipsychotics may increase the risk of gestational diabetes mellitus (GDM), obesity, and gestational hypertension (23). These conditions can lead to adverse maternal and neonatal outcomes such as fetal growth abnormalities, preterm birth, and congenital malformations (23). Since most antipsychotics are sedating for adults, it is recommended that breastfed infants are monitored for sedation as some cases in infants have been reported (24).

Attention-Deficit/Hyperactivity Disorder (ADHD)

Attention-deficit/hyperactivity disorder (ADHD) is a persistent pattern of inattention and/or hyperactivity-impulsivity that interferes with functioning or development (1). Inattention includes behaviors such as wandering off task, difficulty keeping focus, and disorganization (47). Hyperactivity includes moving constantly, excessively fidgeting, tapping, or talking (47). Impulsivity includes hasty acts that occur without thought and may have a high potential for harm (47, 48). To be diagnosed with ADHD the child must exhibit symptoms before age twelve and consistently show signs of inattention, hyperactivity and impulsivity that is inappropriate for their age and cannot be contributed to other causes (1, 12). These symptoms must be present in more than one setting (1). Many parents first observe excessive motor activity when the child is a toddler, but the symptoms are difficult to distinguish from highly variable normative behaviors before age four (1). ADHD is most often identified during elementary school years when the inattention becomes more prominent and impairing (1). In most individuals with ADHD, symptoms of motoric hyperactivity become

less obvious in adolescence and adulthood, but difficulties with restlessness, inattention, poor planning, and impulsivity persist (1). Severe impairment is more likely to be present when an ADHD diagnosis occurs at or before four years of age (1). In the U.S., 9.5-11% of children have been diagnosed with ADHD with nearly 2/3 of those having another behavioral diagnosis (12). Male children are two times as likely to have ADHD compared to female children (1). It is estimated that 2.5% of adults have ADHD (48). Many adults do not even realize that they have ADHD (47). Adults with undiagnosed ADHD may have a history of problems at school, work, or with relationships (48). In adults, hyperactivity may manifest as extreme restlessness or wearing others out with their activity (1, 48). Impulsive behaviors may manifest as social intrusiveness (e.g., interrupting others excessively) and/or as making important decisions without consideration of long-term consequences (e.g., taking a job without adequate information) (1). In the U.S., Black and Hispanic population rates of ADHD tend to be lower than for White populations suggesting that culturally appropriate practices are relevant in assessing ADHD (1).

The causes of ADHD are not understood but genetics play a role (1, 12, 48). Other potential causes or risk factors include premature delivery or low birth weight, alcohol, drugs, or tobacco use during pregnancy, environmental exposure to lead or pesticides at a young age, or brain injury (1, 12, 48). Standard treatment for ADHD includes both behavior therapy and medication (12). Stimulants are usually used as medications and can cause a reduced appetite and problems with gaining weight (12). Stimulants work by increasing the brain chemicals dopamine and norepinephrine, which play essential roles in thinking and attention (48). With long-term use, this has resulted in lower adult height and potentially negative effects on bone mineralization (12). Nutrition treatment should focus on maximizing interest in eating and eating before medications are taken so they do not affect appetite (12). For children who need to gain weight, calorie dense foods can be offered; bribes or coercion that pressure a child to eat are not effective (12). While the research on diet and its impact on ADHD remains inconclusive, most researchers agree that treatment should include decreasing processed foods, increasing foods high in omega-3 fatty acids, and assuring appropriate weight gain and growth (12).

Medications used to treat ADHD are being more commonly prescribed during pregnancy because if it is not properly treated it can result in risk-taking behavior, potentially placing the mother and fetus in danger (23). There is evidence to support that adequate treatment of ADHD may decrease substance use in the mother (23). However, there is also research that shows the stimulant methylphenidate is associated with an increased risk of low Apgar score at delivery that is not seen in untreated women with ADHD (23). Infants may also have neonatal withdrawal syndrome after being exposed to methylphenidate (23). The data is limited regarding the safety of ADHD medications during the pregnancy and lactation, but it currently does not suggest a link between methylphenidate and congenital malformations (23).

Implications for WIC Nutrition Services

WIC can improve the management of mental illnesses through WIC foods, nutrition education, counseling, and referrals to community resources. The table below provides WIC nutrition services recommendations specific to the disease state:

WIC Nutrition Services Recommendations for Mental Illnesses	
All types of Mental Illnesses	• Make referrals (or encourage continued visits) to the primary health care provider and/or other appropriate mental health and social service programs to initiate and/or maintain treatment. • Reinforce and support the treatments and therapies prescribed by the participant's health care provider. • When appropriate, encourage regular, heathy, meals and snacks that are simple and easy to prepare (12). • Encourage carbohydrate sources from whole grains, vegetables, and fruits to aid in maintaining stable blood sugar levels. Rapid increases in blood glucose can result in an increase in the release of insulin, which in turn raises adrenaline and cortisol which can cause changes in behavior and mood (12). • Encourage oily fish such as salmon, sardines, and tuna which are high in eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) as the essential Omega-3 fatty acids contribute to overall brain function and may offer some benefit for mental health condition such as depression, anxiety, and bipolar disorder (12). • Because a person with a mental illness may experience significant distress in social, work, or other settings, WIC professionals should seek to understand how symptom severity impacts eating and physical activity. Value Enhance Nutrition Assessment (VENA) techniques can be used to provide participant centered education and goal setting for these individuals. Goal setting should consider the level of impairment in major life activities and be cognizant of the participant's needs and barriers (5). • Assess for unintended changes in weight (12). • Assess current medications and possible drug nutrient interactions.
Depression	• Encourage food choices such as fruits, vegetables, olive oil, whole grains, low-fat dairy, and nutrient dense animal and plant protein sources (e.g., lean meats, poultry and eggs; seafood; nuts and seeds) as part of a healthy dietary pattern (12,49). • Encourage regular physical activity after consulting healthcare provider (50). • Educate about prevalence, risks, and signs of postpartum depression. • Provide breastfeeding education, assessment, and support (e.g., peer counseling) to women with existing depression in the perinatal period.
Anxiety Disorders	• Support gradual behavioral changes (12). • Encourage practices that promote mindfulness which may be helpful with anxiety (5). • Recommend maintaining well-balanced meals and routine mealtimes (12).
PTSD and OCD	• Support gradual behavioral changes (12).
Personality Disorders	• Support flexible variety of food choices (provide the participant options to give them the freedom to choose) (12). • Encourage flexible eating times if possible (12).
Bipolar Disorders	• Encourage regular simple meals and snacks that may help maintain blood sugar levels (12). • Assess for consistent fluid and salt intake. If taking lithium, education on following the Dietary Guidelines for Americans or the DASH diet may be appropriate (12). • Encourage social and physical activity (12).

	• Assess for increased thirst, nausea, vomiting and diarrhea (12).
Schizophrenia	• Encourage simple meals (12). • Encourage food choices such as fruits, vegetables, nuts, fish, olive oil, low-fat dairy and reduced animal products as part of a healthy dietary pattern (12). • Provide shopping and snack ideas (12). • Discourage grapefruit/grapefruit juice and/or alcohol consumption with certain medications with that warning on the label: Lurasidone (Latuda), Quetiapine (Seroquel), Ziprasidone (Geodon) (12).
ADHD	• Recommend eating small frequent meals (12). • Provide suggestions for limiting distractions at meals (TV, tablets, or games) (12). • Encourage foods rich in omega 3 fatty acids and limit intake of processed foods. (12).

Stigma, prejudice, and discrimination against people with mental illness can cause people to avoid or delay treatment. Individuals with mental illness can have negative attitudes, including internalized shame, about their own condition (i.e., self-stigma). The strong family values of emotional restraint and avoiding shame in some Asian cultures, may be contrary to seeking professional help for mental illness. In addition, some African American communities distrust the mental healthcare system. Stigma not only directly affects individuals with mental illness but also the friends and family of those who seek treatment. The National Alliance on Mental Illness (NAMI) offers some suggestions about what we can do to help reduce the stigma of mental illness (51):

- Talk openly about mental health.
- Educate yourself and others about mental health so you can respond to misperceptions or negative comments by sharing accurate facts.
- Be conscious of language that is used to discuss mental health. For information see: What to Say - Tips for Talking About Mental Illnesses (makeitok.org)
- Encourage equality between physical and mental illness – normalize mental health treatment, just like other health care treatment.
- Show compassion for those with mental illness.

Additional Resources and Information:

Brochures and Fact Sheets on mental disorders by topic from the National Institute of Mental Health:
https://www.nimh.nih.gov/health/publications/index.shtml

Overview of medications used to treat mental disorders:
https://www.nimh.nih.gov/health/topics/mental-health-medications/index.shtml

Treatment Options for ADHD in Children and Teens: A Review of Research for Parents and Caregivers
https://www.ncbi.nlm.nih.gov/books/NBK99163/

National Suicide Prevention Lifeline:
988 or 1-800-273-8255 or 988
https://suicidepreventionlifeline.org/

National Maternal Health Hotline:
1-833-9-HELP4MOMS
National Maternal Mental Health Hotline | MCHB (hrsa.gov)

Clarification

Self-reporting of a diagnosis by a medical professional should not be confused with self-diagnosis, where a person simply claims to have or to have had a medical condition without any reference to professional diagnosis. A self-reported medical diagnosis ("My doctor says that I have/my son or daughter has…") should prompt the CPA to validate the presence of the condition by asking more pointed questions related to that diagnosis.

Nutrition Risk Criterion #902; Woman or Infant/Child of Primary Caregiver with Limited ability to Make Feeding Decisions or Prepare Food, may be an appropriate risk criterion assignment for an infant or child of a WIC mother diagnosed with mental illnesses. Nutrition Risk Criterion #357 Drug-Nutrient Interactions may be assigned, as appropriate, to women taking medications for mental illnesses.

References

1. American Psychiatric Association: Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition: 2013. Arlington, VA, American Psychiatric Association.

2. National Institute of Mental Health [Internet]. Mental Health Information. Statistics. Available at: NIMH » Mental Illness (nih.gov). Accessed September 2021.

3. National Alliance on Mental Illness [Internet]. Your Journey. Identity and Cultural Dimensions. LGBYQI. Available at: LGBTQI | NAMI: National Alliance on Mental Illness. Accessed January 2022.

4. US Department of Labor [Internet]. Office of Federal Contract Compliance Programs. Frequently asked Questions. Americans with Disabilities Act Amendments Act of 2008. Available at: ADA Amendments Act of 2008 Frequently Asked Questions | U.S. Department of Labor (dol.gov). Accessed October 2021.

5. Aly J, Engmann O. The Way to a Human's Brain Goes Through Their Stomach: Dietary Factors in Major Depressive Disorder. Front Neurosci. 2020 Dec 7;14:582853. doi: 10.3389/fnins.2020.582853.

6. Betcher HK, Wisner KL. Psychotropic Treatment During Pregnancy: Research Synthesis and Clinical Care Principles. J Womens Health (Larchmt). 2020 Mar;29(3):310-318. doi: 10.1089/jwh.2019.7781.

7. Mental Health America [Internet]. Parenting. Available at: Parenting | Mental Health America (mhanational.org). Accessed September 2021.

8. Centers for Disease Control and Prevention [Internet]. Children's Mental Health. Data and Statistics. Available at: https://www.cdc.gov/childrensmentalhealth/data.html. Accessed February 2022.

9. Simon, KM, Beder, M, Manseau, MW. Addressing Poverty and Mental Illness. Psychiatric Times. 2018 Jun;35(6): 7-9. doi: Addressing Poverty and Mental Illness (psychiatrictimes.com).

10. National Institute of Mental Health [Internet]. Mental Health Information. Mental Health Medications. Available at: NIMH » Mental Health Medications (nih.gov). Accessed September 2021.

11. Dayabandara M, Hanwella R, Ratnatunga S, Seneviratne S, Suraweera C, de Silva VA. Antipsychotic-associated weight gain: management strategies and impact on treatment adherence. Neuropsychiatr Dis Treat. 2017 Aug 22;13:2231-2241. doi: 10.2147/NDT.S113099.

12. Raymond, J. and Morrow, K. Krause and Mahan's Food & the Nutrition Care Process, 15th edition: 2021 pages 269, 298, 890-891, 894-896, 901-903, 905 906. 969-971.

13. National Institute of Mental Health [Internet]. Major depressive disorders among adults. Available at: NIMH » Major Depression (nih.gov). Accessed September 2021.

14. American Psychiatric Association. Depression: What is Depression. Available at: Psychiatry.org - What Is Depression? Accessed April 2022.

15. National Institute of Mental Health [Internet]. Perinatal Depression. Available at: NIMH » Perinatal Depression (nih.gov). Accessed October 2021.

16. Kendig, Susan JD, et al. Consensus Bundle on Maternal Mental Health, Obstetrics & Gynecology. 2017 Mar;129(3):422-430. doi: 10.1097/AOG.0000000000001902.

17. Goetz M, Schiele C, Müller M, Matthies LM, Deutsch TM, Spano C, Graf J, Zipfel S, Bauer A, Brucker SY, Wallwiener M, Wallwiener S. Effects of a Brief Electronic Mindfulness-Based Intervention on Relieving Prenatal Depression and Anxiety in Hospitalized High-Risk Pregnant Women: Exploratory Pilot Study. J Med Internet Res. 2020 Aug 11;22(8):e17593. doi:10.2196/17593.

18. Kornstein SG, Joseph AC, Graves WC, Wallenborn JT. Prenatal Depression Severity and Postpartum Care Utilization in a Medicaid Population. Women's Health Rep (New Rochelle). 2020 Oct 8;1(1):468-473. doi: 10.1089/whr.2020.0079.

19. Avalos LA, Caan B, Nance N, Zhu Y, Li DK, Quesenberry C, Hyde RJ, Hedderson MM. Prenatal Depression and Diet Quality During Pregnancy. J Acad Nutr Diet. 2020 Jun;120(6):972-984. doi: 10.1016/j.jand.2019.12.011.

20. Van Niel MS, Payne JL. Perinatal depression: A review. Cleve Clin J Med. 2020 May;87(5):273-277. doi: 10.3949/ccjm.87a.19054.

21. Anderson KN, Lind JN, Simeone RM, Bobo WV, Mitchell AA, Riehle-Colarusso T, Polen KN, Reefhuis J. Maternal Use of Specific Antidepressant Medications During Early Pregnancy and the Risk of Selected Birth Defects. JAMA Psychiatry. 2020 Dec 1;77(12):1246-1255. doi: 10.1001/jamapsychiatry.2020.2453.

22. Bałkowiec-Iskra E, Mirowska-Guzel DM, Wielgoś M. Effect of antidepressants use in pregnancy on foetus development and adverse effects in newborns. Ginekol Pol. 2017;88(1):36-42. doi: 10.5603/GP.a2017.0007.

23. McAllister-Williams RH, et al. endorsed by the British Association for Psychopharmacology. British Association for Psychopharmacology consensus guidance on the use of psychotropic

medication preconception, in pregnancy and postpartum 2017. J Psychopharmacol. 2017 May;31(5):519-552. Doi: 10.1177/0269881117699361.

24. Sprague J, Wisner KL, Bogen DL. Pharmacotherapy for depression and bipolar disorder during lactation: A framework to aid decision making. Semin Perinatol. 2020 Apr;44(3):151224. doi: 10.1016/j.semperi.2020.151224.

25. Sezgin AU, Punamäki RL. Impacts of early marriage and adolescent pregnancy on mental and somatic health: the role of partner violence. Arch Womens Ment Health. 2020 Apr;23(2):155-166. doi: 10.1007/s00737-019-00960-w.

26. Miller L, Campo JV. Depression in Adolescents. N Engl J Med. 2021 Jul 29;385(5):445-449. doi: 10.1056/NEJMra2033475.

27. Guintivano J, Manuck T, Meltzer-Brody S. Predictors of Postpartum Depression: A Comprehensive Review of the Last Decade of Evidence. Clin Obstet Gynecol. 2018 Sep;61(3):591-603. doi: 10.1097/GRF.0000000000000368.

28. Slomian J, Honvo G, Emonts P, Reginster JY, Bruyère O. Consequences of maternal postpartum depression: A systematic review of maternal and infant outcomes. Women's Health (Lond). 2019 Jan-Dec;15:1745506519844044. doi: 10.1177/1745506519844044.

29. Vieira ES, Caldeira NT, Eugênio DS, Lucca MMD, Silva IA. Breastfeeding self-efficacy and postpartum depression: a cohort study. Rev Lat Am Enfermagem. 2018 Sep 6;26:e3035. doi: 10.1590/1518-8345.2110.3035.

30. National Institute of Mental Health [Internet]. Mental Health Information. Anxiety Disorders. Available at: NIMH » Anxiety Disorders (nih.gov). Accessed September 2021.

31. Nishimura A, Furugen A, Umazume T, Kitamura S, Soma M, Noshiro K, Takekuma Y, Sugawara M, Iseki K, Kobayashi M. Benzodiazepine Concentrations in the Breast Milk and Plasma of Nursing Mothers: Estimation of Relative Infant Dose. Breastfeed Med. 2021 May;16(5):424-431. doi: 10.1089/bfm.2020.0259

32. American Psychiatric Association [Internet]. Anxiety Disorders. Available at: What Are Anxiety Disorders? (psychiatry.org). Accessed September 2021.

33. Spielmans GI, Spence-Sing T, Parry P. Duty to Warn: Antidepressant Black Box Suicidality Warning Is Empirically Justified. Front Psychiatry. 2020 Feb 13;11:18. doi: 10.3389/fpsyt.2020.00018

34. National Institute of Mental Health [Internet]. Mental Health Information. Post-Traumatic Stress Disorder. Available at: NIMH » Post-Traumatic Stress Disorder (nih.gov). Accessed September 2021.

35. American Psychiatric Association [Internet]. Post-Traumatic Stress Disorder. Available at: What Is PTSD? (psychiatry.org). Accessed September 2021.

36. Anxiety & Depression Association of America [Internet]. Facts and Statistics. Available at: Facts & Statistics | Anxiety and Depression Association of America, ADAA. Accessed September 2021.

37. Cook N, Ayers S, Horsch A. Maternal posttraumatic stress disorder during the perinatal period and child outcomes: A systematic review. Journal of Affective Disorders. 2018. January 225(1):18-31. doi: https://doi.org/10.1016/j.jad.2017.07.045.

38. National Institute of Mental Health [Internet]. Mental Health Information. Obsessive Compulsive Disorder Available at: NIMH » Obsessive-Compulsive Disorder (nih.gov). Accessed September 2021.

39. American Psychiatric Association [Internet]. Obsessive Compulsive Disorder. Available at: What Is Obsessive-Compulsive Disorder? (psychiatry.org). Accessed September 2021.

40. American Psychiatric Association [Internet]. Personality Disorders. Available at: What Are Personality Disorders? (psychiatry.org). Accessed April 2022.

41. National Institute of Mental Health [Internet]. Mental Health Information. Bipolar Disorder. Available at: NIMH » Bipolar Disorder (nih.gov). Accessed September 2021.

42. American Psychiatric Association [Internet]. Bipolar Disorders. Available at: What Are Bipolar Disorders? (psychiatry.org). Accessed September 2021.

43. Gehrmann A, Fiedler K, Leutritz AL, Koreny C, Kittel-Schneider S. Lithium Medication in Pregnancy and Breastfeeding-A Case Series. Medicina (Kaunas). 2021 Jun 18;57(6):634. doi: 10.3390/medicina57060634.

44. National Institute of Mental Health [Internet]. Mental Health Information. Schizophrenia. Available at: NIMH » Schizophrenia (nih.gov). Accessed September 2021.

45. American Psychiatric Association [Internet]. Schizophrenia. Available at: What Is Schizophrenia? (psychiatry.org). Accessed September 2021.

46. Khokhar JY, Dwiel LL, Henricks AM, Doucette WT, Green AI. The link between schizophrenia and substance use disorder: A unifying hypothesis. Schizophr Res. 2018 Apr;194:78-85. doi: 10.1016/j.schres.2017.04.016.

47. National Institute of Mental Health [Internet]. Mental Health Information. ADHD. Available at: NIMH » Attention-Deficit/Hyperactivity Disorder (nih.gov). Accessed September 2021.

48. American Psychiatric Association [Internet]. ADHD. Available at: What Is ADHD? (psychiatry.org). Accessed September 2021.

49. Bremner JD, et al. Diet, Stress and Mental Health. Nutrients. 2020 Aug 13;12(8):2428. doi: 10.3390/nu12082428.

50. Kołomańska-Bogucka D, Mazur-Bialy AI. Physical Activity and the Occurrence of Postnatal Depression-A Systematic Review. Medicina (Kaunas). 2019 Sep 2;55(9):560. doi: 10.3390/medicina55090560.

51. American Psychiatric Association [Internet]. Stigma, Prejudice and Discrimination against people with mental illness. Available at: Stigma and Discrimination (psychiatry.org). Accessed March 2022.

362 Developmental, Sensory or Motor Disabilities Interfering with the Ability to Eat

Definition/Cut-off Value

Developmental, sensory or motor disabilities that restrict the ability to intake chew or swallow food or require tube feeding to meet nutritional needs. Disabilities include but are not limited to:

Disability	
Minimal brain function	Head trauma
Feeding problems due to a developmental disability such as pervasive development disorder (PDD) which includes autism	Brain damage
Birth injury	Other disabilities

Participant Category and Priority Level

Category	Priority
Pregnant Women	I
Breastfeeding Women	I
Non-Breastfeeding Women	III, IV, V or VI
Infants	I
Children	III

Justification

Infants and children with developmental disabilities are at increased risk for nutritional problems. Education, referrals, and service coordination with WIC will aid in early intervention of these disabilities. Prenatal, lactating and non-lactating women with developmental, sensory or motor disabilities may: 1) have feeding problems associated with muscle coordination involving chewing or swallowing, thus restricting or limiting the ability to consume food and increasing the potential for malnutrition; or 2) require enteral feedings to supply complete nutritional needs which may potentially increase the risk for specific nutrient deficiencies.

Pervasive Developmental Disorder (PDD) is a category of developmental disorders with autism being the most severe. Young children may initially have a diagnosis of PDD with a more specific diagnosis of autism usually occurring at 2 1/2 to 3 years of age or older. Children with PDD have very selective eating habits that go beyond the usual "picky eating" behavior and that may become increasingly selective over time, i.e., foods they used to eat will be refused. This picky behavior can be related to the color, shape, texture or temperature of a food. Common feeding concerns include:

- Difficulty with transition to textures, especially during infancy;
- Increased sensory sensitivity; restricted intake due to color, texture, and/or temperature of foods;
- Decreased selection of foods over time;
- Difficulty accepting new foods; difficulty with administration of multivitamin/mineral supplementation and difficulty with changes in mealtime environment.

Nutrition education, referrals, and service coordination with WIC will assist the participant, parent or caregiver in making dietary changes/adaptations and finding assistance to assure she or her infant or child is consuming a nutritionally adequate diet.

References

1. Quinn, Heidi Puelzl; "Nutrition Concerns for Children With Pervasive Developmental Disorder/Autism" published in Nutrition Focus by the Center on Human Development and Disability; University of Washington, Seattle, Washington; September/October 1995.
2. Paper submitted by Betty Lucas, MPH, RD, CD to the Risk Identification and Selection Collaborative (RISC); November, 1999.
3. Zeman, Frances J.; Clinical Nutrition and Dietetics, 2nd Edition; 1991; pp.713-14, 721-22, 729-730.

363 Pre-Diabetes

Definition/Cut-off Value

Impaired fasting glucose (IFG) and/or impaired glucose tolerance (IGT) are referred to as pre-diabetes. These conditions are characterized by hyperglycemia that does not meet the diagnostic criteria for diabetes mellitus (1). See Clarification for more information.

Presence of condition diagnosed, documented, or reported by a physician or someone working under a physician's orders, or as self reported by applicant/participant/caregiver. See Clarification for more information about self-reporting a diagnosis.

Participant Category and Priority Level

Category	Priority
Breastfeeding Women	I
Non-Breastfeeding Women	III, IV, V or VI

Justification

An individual who is identified as having pre-diabetes is at relatively high risk for the development of type 2 diabetes and cardiovascular disease (CVD).

The Expert Committee on the Diagnosis and Clarification of Diabetes Mellitus (2, 3) recognized a group of individuals whose glucose levels, although not meeting criteria for diabetes, are nevertheless too high to be considered normal. The blood tests used to measure plasma glucose and to diagnose pre-diabetes include a fasting plasma glucose test and a glucose tolerance test (see Clarification for more information). Individuals with a fasting plasma glucose level between 100-125 mg/dl are referred to as having impaired fasting glucose (IFG). Individuals with plasma glucose levels of 140-199 mg/dl after a 2-hour oral glucose tolerance test are referred to as having impaired glucose tolerance (IGT).

Many individuals with IGT are euglycemic and, along with those with IFG, may have normal or near normal glycosylated hemoglobin (HbA1c) levels. Often times, individuals with IGT manifest hyperglycemia only when challenged with the oral glucose load used in standardized oral glucose tolerance test.

The prevalence of IFG and IGT increases greatly between the ages of 20-49 years. In people who are > 45 years of age and overweight (BMI ≥ 25), the prevalence of IFG is 9.3%, and for IGT, it is 12.8% (4).

Screening for pre-diabetes is critically important in the prevention of type 2 diabetes. The American Diabetes Association recommends (5) that testing to detect pre-diabetes should be considered in all asymptomatic adults who are overweight (BMI ≥ 25) or obese (BMI ≥ 30) and who have one or more additional risk factors (see Table 1 in Clarification).

IFG and IGT are not clinical entities in their own right but, rather, risk factors for future diabetes as well as CVD. (Note: During pregnancy, IFG and IGT are diagnosed as gestational diabetes.) They can be observed as intermediate stages in many of the disease processes. IFG and IGT are associated with the metabolic syndrome, which includes obesity (especially abdominal or visceral obesity), dyslipidemia (the high-triglyceride and/or low HDL type), and hypertension. Dietary recommendations include monitoring of calories, reduced carbohydrate intake and high fiber consumption. Medical nutrition therapy (MNT) aimed

at producing 5-10% loss of body weight and increased exercise have been variably demonstrated to prevent or delay the development of diabetes in people with IGT. However, the potential impact of such interventions to reduce cardiovascular risk has not been examined to date (2, 3).

WIC nutrition services can support and reinforce the MNT and physical activity recommendations that participants receive from their health care providers. In addition, WIC nutritionists can play an important role in providing women with counseling to help them achieve or maintain a healthy weight after delivery.

The WIC food package provides high fiber, low fat foods emphasizing consumption of whole grains, fruits, vegetables and dairy products. This will further assist WIC families in reducing their risk for diabetes.

References

1. American Diabetes Association. Clinical practice recommendations: standards of medical care in diabetes. Diabetes Care. 2008 Jan; 31 Suppl 1:S12-54.
2. The Expert Committee on the Diagnosis and Classification of Diabetes Mellitus. Report of the expert committee on the diagnosis and classification of diabetes mellitus. Diabetes Care. 1997; 20:1183-1197.
3. The Expert Committee on the Diagnosis and Classification of Diabetes Mellitus. Follow-up report on the diagnosis of the diabetes mellitus. Diabetes Care. 2003; 26:3160-3167.
4. American Diabetes Association National Institute of Diabetes and Digestive and Kidney Diseases. Position statement on prevention or delay of type 2 diabetes. Diabetes Care. 2004; 27:S47.
5. American Diabetes Association. Executive summary: standards of medical care in diabetes. Diabetes Care. 2008 Jan; 31 Suppl 1:S5-11.

Additional Reference

1. Garber A-J, et al. Diagnosis and management of pre-diabetes in the continuum of Hyperglycemia: When do the risks of diabetes begin? A consensus statement from the American College of Endocrinology and the American Association of Clinical Endocrinologists. ACE/AACE Consensus Statement Endocrine Practice 2008 Oct; 14(7):933-946.

Clarification

Self-reporting of a diagnosis by a medical professional should not be confused with self-diagnosis, where a person simply claims to have or to have had a medical condition without any reference to professional diagnosis. A self-reported medical diagnosis ("My doctor says that I have/my son or daughter has…") should prompt the CPA to validate the presence of the condition by asking more pointed questions related to that diagnosis.

Hyperglycemia is identified through a fasting blood glucose or an oral glucose tolerance test (1).

Impaired fasting glucose (IFG) is defined as fasting plasma glucose (FPG) $\underline{\geq}$ 100 or $\underline{\geq}$125 mg/dl ($\underline{\geq}$ 5.6 or ≥ 6.1 mmol/l), depending on study and guidelines (2).

Impaired glucose tolerance (IGT) is defined as a 75-g oral glucose tolerance test (OGTT) with 2-h plasma glucose values of 140-199 mg/dl (7.8-11.0 mmol/l).

The cumulative incidence of diabetes over 5-6 years was low (4-5%) in those individuals with normal fasting and normal 2-h OGTT values, intermediate (20-34%) in those with IFG and normal 2-h OGTT or IGT and a normal FPG, and highest (38-65%) in those with combined IFG and IGT (4).

Recommendations for testing for pre-diabetes and diabetes in asymptomatic, undiagnosed adults are listed in Table 1 below.

Table 1. Criteria and Methods for Testing for Pre-Diabetes and Diabetes in Asymptomatic Adults

1. Testing should be considered in all adults who are overweight (BMI > 25*) and have additional risk factors:
    - Physical inactivity
    - First-degree relative with diabetes
    - Members of a high-risk ethnic population (e.g., African American, Latino, Native American, Asian American, Pacific Islander)
    - Women who delivered a baby weighing > 9 lb or were diagnosed with gestational diabetes mellitus
    - Hypertension (blood pressure > 140/90 mmHg or on therapy for hypertension)
    - HDL cholesterol level < 35 mg/dl and/or a triglyceride level > 250 mg/dl
    - Women with polycystic ovarian syndrome (PCOS)
    - IGT or IFG on previous testing
    - Other clinical conditions associated with insulin resistance (e.g., severe obesity and acanthosis nigricans)
    - History of CVD
2. In the absence of the above criteria, testing for pre-diabetes and diabetes should begin at age 45 years.
3. If results are normal, testing should be repeated at least at 3-year intervals, with consideration of more frequent testing depending on initial results and risk status.
4. To test for pre-diabetes or diabetes, either an FPG test or 2-hour oral glucose tolerance (OGTT; 75-g glucose load), or both, is appropriate.
5. An OGTT may be considered in patients with impaired fasting glucose (IFG) to better define the risk of diabetes.
6. In those identified with pre-diabetes, identify and if appropriate, treat other CVD risk factors.

**At-risk BMI may be lower in some ethnic groups.*

371 Nicotine and Tobacco Use

Definition/Cut-off Value

Any use of products that contain nicotine and/or tobacco to include but not limited to cigarettes, pipes, cigars, electronic nicotine delivery systems (e-cigarettes, vaping devices), hookahs, smokeless tobacco (chewing tobacco, snuff, dissolvables), or nicotine replacement therapies (gums, patches).

Participant Category and Priority Level

Category	Priority
Pregnant Women	I
Breastfeeding Women	I
Postpartum Women	III, IV, V, VI, VII

Justification

Tobacco products, made with the dried leaves of the tobacco plant, contain a variety of harmful chemicals. The use of tobacco can lead to serious illnesses, including cancers, lung disease, and heart disease. Nicotine, one of the chemicals in tobacco, is highly addictive and associated with additional health risks (1). During pregnancy, the use of nicotine and/or tobacco products is harmful to both the mother and fetus, with potential consequences including low birth weight or even miscarriage (2). Nicotine can be found in breastmilk, therefore, the use of nicotine products may directly impact breastfed infants (3). Women, infants, and children living in a smoking environment also face adverse health outcomes that are outlined in risk #904 Environmental Tobacco Smoke Exposure.

Tobacco Smoking

Tobacco smoke is a toxic mix of more than 7,000 chemicals that cause immediate damage to the body. According to the Centers for Disease Control and Prevention (CDC), smoking remains the single largest preventable cause of death and disease in the United States. Cigarette smoking kills more than 480,000 Americans each year. (2)

According to 2018 CDC data, 14.1% of adult women in the US use tobacco products (4). In 2016, one in fourteen women who gave birth smoked cigarettes during pregnancy. The women most likely to smoke during pregnancy were aged 20-24, identified as non-Hispanic American Indian or Alaska Native, and whose highest level of educational attainment was high school or less (5). Additionally, CDC data from 2014 indicated that women who received WIC benefits were more likely to smoke before and during pregnancy than women who did not receive WIC benefits (6). There are no CDC data that report on the incidence of smoking among breastfeeding women.

Electronic Nicotine Delivery Systems (ENDS)

Vapes, vaporizers, vape pens, hookah pens, electronic cigarettes (e-cigarettes or e-cigs), and e-pipes are some of the many terms used to describe electronic nicotine delivery systems (ENDS) (7). ENDS are noncombustible tobacco products used to smoke or "vape" a solution that often contains nicotine. The solution, or "e-liquid", is heated to create an aerosol that the user inhales (7). An individual's level of

exposure to nicotine depends on the amount of nicotine in the ENDS product, as well as on product characteristics, device operation, and the user's inhalation pattern. Exhaled ENDS vapor has been shown to contain chemicals that can cause cancer, can harm the fetus, and are a source of indoor air pollution (8, 9, 10).

Data from the CDC's 2015 Pregnancy Risk Assessment Monitoring System (PRAMS) for Oklahoma and Texas indicated that maternal use of ENDS was 10% before pregnancy and 7% around the time of conception. Among the women who reported using ENDS during the last 3 months of their pregnancy, over one-third said that the ENDS used contained nicotine while about a quarter said they were unsure of the nicotine content. Reported reasons for ENDS use around the time of pregnancy included curiosity, the perception that ENDS might help with quitting or reducing smoking, and the perception of reduced harm to the mother when compared to cigarette smoking. (11)

The CDC has stated that ENDS use is not safe for pregnant women (12). The continual innovation of novel ENDS makes health risk assessments difficult, and additional research is needed to fully understand ENDS' safety, health effects, and cessation efficacy (13). Women who are pregnant or trying to become pregnant should consult with their health care provider on the risks that ENDS pose for both maternal and neonatal health (14, 15).

Smokeless Tobacco

According to the CDC, 0.5% of females 18 years and over used smokeless tobacco in 2016 (16). Smokeless tobacco products are either chewed or placed in between the cheek and gum or teeth. The tobacco can come as loose dried leaves or finely ground. While these products are meant to be alternatives to cigarettes, no form of smokeless tobacco is a safe substitute.

The following table summarizes the conditions associated with increased risk from nicotine and/or tobacco use for the mother and infant:

Substance	Effects on Mother	Effects on Birth Outcomes	Effects on Infant
Smoking Tobacco	Respiratory Conditions (2): • Chronic obstructive pulmonary disease (COPD) • Emphysema • Chronic bronchitis • Asthma Heart Conditions (2): • Cardiovascular disease • Increased heart rate and blood pressure • Blood clots Cancers (2):	• Ectopic pregnancy (2, 17) • Miscarriage (2, 17) • Placental abruption (2,17) • Early delivery* (2) • Low birth weight† (2) • Preeclampsia‡ (18)	• Sudden Unexpected Infant Death (SUID) (2, 19) • Brain and lung damage (2) • Cleft lip and/or cleft palate (2) • Asthma (20) • Respiratory illnesses (19) • Potential for nicotine use later in life (21)

Substance	Effects on Mother	Effects on Birth Outcomes	Effects on Infant
Smoking Tobacco (continued)	• Bladder • Blood • Cervix <u>Cancers (2) (continued):</u> • Colon and rectum • Esophagus • Kidney and ureter • Larynx and throat • Liver • Lung • Pancreas • Stomach <u>Other Conditions (2):</u> • Stroke • Poor oral health • Diabetes • Weaker bones • Inflammation and decreased immune function		
Electronic Nicotine Delivery Systems (ENDS)	<u>Limited data, but potential association with (13):</u> • Cardiovascular disease	<u>Nicotine exposure effects (13):</u> • Preterm birth* • Stillbirth	<u>Nicotine exposure effects (13):</u> • Sudden Unexpected Infant Death (SUID) • Impaired brain development • Deficits in auditory processing • Attention and cognition problems • Potential for nicotine use later in life (21)
Smokeless Tobacco	• Cancer of the mouth, esophagus, and pancreas (22)	• Stillbirth (2, 21, 22) • Early delivery* (2, 22)	• Impaired brain development (22) • Apnea, which is associated with

Substance	Effects on Mother	Effects on Birth Outcomes	Effects on Infant
Smokeless Tobacco (continued)	• Gum disease, tooth decay, and tooth loss (22) • Death from heart disease and stroke (22)	• Low birth weight† (2, 21)	increased risk of Sudden Unexpected Infant Death (2)

*See risk #142 *Preterm or Early Term Delivery* for more information about early delivery.

†See risk #141 *Low Birth Weight and Very Low Birth Weight* for more information about low birth weight.

‡See risk #345 *Hypertension and Prehypertension* for more information about preeclampsia.

Nutrition

The research on tobacco use and its impact on nutritional status has focused on cigarette smoking. Cigarette smoking causes a generalized upward shift in hemoglobin concentration and hematocrit, which lowers the effectiveness of anemia screening tools. Therefore, pregnant women who smoke may require additional iron supplementation even if their hemoglobin/hematocrit results show they are not anemic. (See risk #201 *Low Hematocrit/Low Hemoglobin* for more information about cut-offs for determining iron deficiency for women who smoke.) Smoking also increases oxidative stress and affects metabolism. Vitamin C is the only micronutrient with a Dietary Reference Intake (DRI) specific to individuals who smoke, with the recommendation of consuming an additional 35 mg per day compared to those who do not (23). Research indicates that those who smoke have lower concentrations of certain nutrients (i.e., B-carotene, vitamin B-12, vitamin B-6 and folic acid), but due to the observational nature of the research, the exact cause remains unclear (24). Additional research is needed to determine smoking's effect on micronutrients and if additional DRI recommendations for other micronutrients are needed for those who smoke.

Smoking Cessation

Pregnancy offers an opportunity to quit smoking because pregnant women are highly motivated to take actions to protect the health of their babies. Around 50% of women who smoked during the three months before they conceived quit during pregnancy. However, of those who did quit during pregnancy, about 50% of them returned to smoking after the baby was born. (25)

Research has shown that both dosage (number of cigarettes smoked in a day) and timing of maternal smoking (during particular trimesters) are associated with neonatal birth weight. Women who stopped smoking before their third trimester gave birth to infants with similar weights to those infants who were never exposed to smoking. Therefore, efforts for smoking cessation should not only be made in the early stages of pregnancy, but should continue throughout pregnancy with an emphasis on the health benefits for the infant if smoking stops before the third trimester. (26)

Nicotine replacement therapy (NRT) is used as an aid for smoking cessation. NRT delivers small doses of nicotine, most commonly using nicotine gum or transdermal nicotine patches. Little research has been conducted to prove the effectiveness and safety for pregnant or postpartum women who engage in NRT (27).

The optimal cessation intervention for a pregnant tobacco user is behavioral, as the safety and efficacy of neonatal nicotine exposure while using NRT has not been established. If a behavioral smoking cessation

intervention alone is unsuccessful, the American College of Obstetricians and Gynecologists recommends that NRT only be considered in conjunction with a behavioral intervention and with close monitoring by a health care provider (27).

ENDS are often marketed as smoking cessation devices. However, due to the differences between products (e.g. tank sizes, nicotine amounts, etc.), it is difficult for health organizations and researchers to determine how effective all ENDS are for helping people to quit smoking (25). The FDA does not approve of using ENDS to help people quit smoking (28).

Breastfeeding

In 2001, the American Academy of Pediatrics removed nicotine from its list of contraindicated substances during breastfeeding, indicating that the benefits of breastfeeding while smoking outweigh the alternative of smoking and formula feeding (29). Therefore, maternal use of nicotine and tobacco should not prohibit a mother from breastfeeding her child (30 31). Breastfeeding while smoking may help reduce some of the harmful effects of prenatal smoking on infants, including acute respiratory illness and asthma (32, 33). However, women who smoke cigarettes are less likely to initiate breastfeeding than those who do not, possibly revealing that there is a psychosocial factor responsible for lower rates of breastfeeding among women who smoke cigarettes (31, 34). This is an opportunity for WIC staff to inform participants of the health benefits and to encourage them to breastfeed despite their use of tobacco.

Nicotine has been found to have multiple effects on breastmilk. Nicotine can transfer to an infant through breastmilk (3). Nicotine lowers prolactin levels (35, 36), which has been associated with reduced breastmilk supply (37, 38) and reduced milk fat content (3). Additional changes in milk composition and flavor due to maternal smoking may contribute to an infant's early weaning from breastmilk (39).

Smoking in the presence of an infant or child can expose them to secondhand smoke, which has negative health outcomes (30). (See risk #904 *Environmental Tobacco Smoke Exposure* for more information.) If a woman chooses to continue her nicotine and tobacco use while breastfeeding, she should not do it in the presence of the infant (30, 31). Additionally, it is recommended that a breastfeeding woman who uses nicotine should first breastfeed her infant and then use the product (8, 30, 40). This timing will help minimize the amount of nicotine in her breastmilk the next time she breastfeeds (8, 30, 40).

Implications for WIC Nutrition Services

WIC staff can provide the following nutrition services to women who use nicotine and/or tobacco:

- Administer State or local agency substance use screening methods. For more information, please see: *WIC Substance Use Prevention* resource, Chapter 5: https://wicworks.fns.usda.gov/resources/wic-substance-use-prevention-guide
- Provide a safe and supportive environment when discussing nicotine and/or tobacco use. For more information on techniques for delivering effective messages, please see: *WIC Substance Use Prevention* resource, Chapter 6: https://wicworks.fns.usda.gov/resources/wic-substance-use-prevention-guide
- Consider all potential nicotine and/or tobacco delivery methods participants may be using.
- Explain the importance of eliminating or reducing the amount of tobacco and/or nicotine use, especially before the third trimester if pregnant.
- Explain that ENDS have variable amounts of nicotine and are not safer alternatives to cigarettes.

- Encourage fruit and vegetables that are high in vitamin C intake to achieve adequate antioxidant and vitamin C consumption.
- Highlight WIC foods, especially 100% juice that are good sources of vitamin C and other important nutrients.
- Encourage high iron fruits and vegetables. If the participant is taking an iron supplement, provide recommendations for minimizing gastro-intestinal side effects and foods that can improve iron bioavailability. For more information, please see: https://ods.od.nih.gov/factsheets/Iron-HealthProfessional/.
- Offer the following suggestions to minimize secondhand smoke exposure to the infant (30, 35):
    - Avoid smoking in infant's presence.
    - Smoke outside.
    - Ask other smokers to avoid smoking around the infant or other children.
    - Have smoke-free rules for the car and home.
    - Change clothes and wash hands after smoking and prior to handling the infant.
- Refer to a state quit line (1-800-QUIT-NOW), text-based program (text QUIT to 47848) or a local in-person smoking cessation program.
- Refer to their health care provider to discuss the health implications of using NRT while pregnant or breastfeeding.

WIC staff can provide the following nutrition services to breastfeeding women who use nicotine and/or tobacco:

- Provide breastfeeding promotion and support and inform participants of the health benefits of human milk for infants of mothers who smoke.
- Utilize the participant-focused WIC Breastfeeding Support website topic articles that can be found at: https://wicbreastfeeding.fns.usda.gov/breastfeeding-and-alcohol-drugs-and-smoking.
- Recommend mothers to refrain from smoking/vaping until right after a feeding so that nicotine level will have time to decrease before the next feeding.
- Counsel women who use NRT to time its use for after breastfeeding and to not use at night.
- Provide anticipatory guidance about the possible effect of nicotine on breast milk supply.

Additional Resources available to WIC Staff:

- See risk #904 *Environmental Tobacco Smoke Exposure* for more information.
- WIC participant handbook: https://wicworks.fns.usda.gov/resources/give-your-baby-healthy-start-tips-pregnant-women-and-new-mothers
- WIC Infant Nutrition and Feeding Guide: https://wicworks.fns.usda.gov/resources/infant-nutrition-and-feeding-guide
- FDA Tobacco Products Labeling: https://www.fda.gov/TobaccoProducts/Labeling/ProductsIngredientsComponents/ucm456610.htm.

- WIC Substance Use Prevention resource: https://wicworks.fns.usda.gov/resources/wic-substance-use-prevention-guide
- Centers for Disease Control and Prevention – Electronic Cigarettes: https://www.cdc.gov/tobacco/basic_information/e-cigarettes/index.htm
- American Academy of Pediatrics - Resources on E-cigarettes: https://www.aap.org/en-us/advocacy-and-policy/aap-health-initiatives/Pages/Resources-on-E-cigarettes.aspx
- Smoking & Your Baby: https://women.smokefree.gov/pregnancy-motherhood/quitting-while-pregnant/smoking-your-baby

References

1. American Lung Association [Internet]. Chicago (IL): American Lung Association. Nicotine. 2019 Feb 12 [cited 2019 Mar 22]. Available from: https://www.lung.org/stop-smoking/smoking-facts/nicotine.html
2. U.S. Department of Health and Human Services [Internet]. Washington (DC): U.S. Department of Health and Human Services, 2015. The health consequences of smoking—50 years of progress: a report of the Surgeon General. 2015 July [cited 2017 Apr 20]. [24 pages]. Available from: https://www.surgeongeneral.gov/library/reports/50-years-of-progress/consumer-guide.pdf.
3. Morrison B, Wambach K. Women's health and breastfeeding. In: Wamback K and Riodan J, editors. Breastfeeding and human lactation. 5th edition. Boston (MA): Jones and Bartlett Learning; c2016. Chapter 15; p 594.
4. Centers for Disease Control and Prevention [Internet]. Atlanta (GA): Centers for Disease Control and Prevention. Tobacco product use and cessation indicators among adults: United States, 2018. Morb Mortal Wkly Rep. 2019 Nov 15 [cited 2020 Jul 30];68(45). Available from: https://www.cdc.gov/tobacco/data_statistics/fact_sheets/adult_data/cig_smoking/index.htm.
5. Drake P, Driscoll AK, Mathews TJ. Cigarette smoking during pregnancy: United States, 2016. NCHS Data Brief, no 305. Hyattsville, MD: National Center for Health Statistics. 2018 [cited 2019 May 15] Available from: https://www.cdc.gov/nchs/data/databriefs/db305.pdf.
6. Curtin SC, Mathews TJ. Smoking prevalence and cessation before and during pregnancy: Data from the birth certificate, 2014. National vital statistics reports, vol 65 no 1. Hyattsville (MD): National Center for Health Statistics. 2016 [cited 2019 May 21] Available from: https://www.cdc.gov/nchs/data/nvsr/nvsr65/nvsr65_01.pdf.
7. U.S. Food & Drug Administration [Internet]. Washington (DC): US FDA, 2019. Vaporizers, e-cigarettes, and other electronic nicotine delivery systems (ENDS). 2019 Feb 05 [cited 2019 Mar 1]. Available from: https://www.fda.gov/TobaccoProducts/Labeling/ProductsIngredientsComponents/ucm456610.htm.
8. Grana R, Benowitz N, Glantz SA. E-cigarettes: a scientific review. Circulation. 2014 [cited 2019 Mar 27];129(19): 1972-86. Available from: https://www.ahajournals.org/doi/full/10.1161/CIRCULATIONAHA.114.007667.
9. Bahl V, Lin S, Xu N, Davis B, Wang YH, Talbot P. Comparison of electronic cigarette refill fluid cytotoxicity using embryonic and adult models. Reprod Toxicol. 2012 Dec [cited 2019 Mar

27];34(4): 529-37. Available from: https://www.sciencedirect.com/science/article/pii/S0890623812002833.

10. Schober W, Szendrei K, Matzen W, et al. Use of electronic cigarettes (e-cigarettes) impairs indoor air quality and increases FeNO levels of e-cigarette consumers. Int J Hyg Environ Health. 2014 Jul [cited 2019 Mar 27];217(6): 628-37. Available from: https://www.ncbi.nlm.nih.gov/pubmed/24373737.
11. Kapaya M, D'Angelo DV, Ton VT, et al. Use of electronic vapor products before, during, and after pregnancy among women with a recent live birth – Oklahoma and Texas, 2015. Morbidity and Mortality Weekly Report 2010 Mar 1 [cited 22 Mar 2019]; 68(8): 189-94. Available from: https://www.cdc.gov/mmwr/volumes/68/wr/mm6808a1.htm.
12. Centers for Disease Control and Prevention [Internet]. Atlanta (GA): Centers for Disease Control and Prevention. About electronic cigarettes. 2020 24 Feb [2020 July 27]. Available from: https://www.cdc.gov/tobacco/basic_information/e-cigarettes/about-e-cigarettes.html
13. U.S. Department of Health and Human Services [Internet]. Atlanta (GA): U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2016. E-cigarette use among youth and young adults: a report of the Surgeon General. 2016 July [cited 2019 Apr 20]. [24 pages]. Available from: https://www.cdc.gov/tobacco/data_statistics/sgr/e-cigarettes/index.htm.
14. Siu AL. Behavioral and pharmacotherapy interventions for tobacco smoking cessation in adults, including pregnant women: U.S. Preventive Services Task Force recommendation statement. Ann Intern Med. 2015 [cited 2019 Mar 27];163(8): 622-634. Available from: https://www.ncbi.nlm.nih.gov/pubmed/26389730.
15. American Academy of Pediatrics [Internet]. Washington (DC): American Academy of Pediatrics, 2017. ENDS fact sheet for physicians. Available from: https://www.aap.org/en-us/Documents/5AsENDSfactsheet.pdf.
16. Centers for Disease Control and Prevention [Internet]. Atlanta (GA): Centers for Disease Control and Prevention. Smokeless tobacco use in the United States. 2018 Aug 29 [cited 2019 Mar 12]. Available from: https://www.cdc.gov/tobacco/data_statistics/fact_sheets/smokeless/use_us/index.htm.
17. U.S. Department of Health and Human Services [Internet]. Washington (DC): U.S. Department of Health and Human Services, 2001. Women and smoking: a report of the Surgeon General. [cited 2019 Apr 17]. Available from: https://www.ncbi.nlm.nih.gov/books/NBK44303/.
18. U.S. Department of Health and Human Services [Internet]. Bethesda (MD): National Institutes of Health, National Cancer Institute. Smoking and your baby. [cited 2019 June 24] Available from: https://women.smokefree.gov/pregnancy-motherhood/quitting-while-pregnant/smoking-your-baby.
19. U.S. Department of Agriculture [Internet]. Washington (DC): USDA Food and Nutrition Service, 2013. Substance use prevention: Screening, education, and referral resource guide for local WIC agencies. [cited 2019 June 20]. Available from: https://wicworks.fns.usda.gov/sites/default/files/media/document/ResourceManual%20rev%204-17-18.pdf.

20. Zacharasiewicz A. Maternal smoking in pregnancy and its influence on childhood asthma. ERJ Open Res. 2016 July [cited 2019 May 15];2(3): 00042-2016. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5034599/.

21. Wickstrom, R. Effects of nicotine during pregnancy: human and experimental evidence. Current neuropharmacology. 2007 [cited 2019 Mar 8]; 5: 213-22. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2656811/.

22. Centers for Disease Control and Prevention [Internet]. Atlanta (GA): Centers for Disease Control and Prevention. Smokeless tobacco: health effects. 2018 Jan 29 [cited 2019 Mar 12]. Available from: https://www.cdc.gov/tobacco/data_statistics/fact_sheets/smokeless/health_effects/index.htm.

23. Institute of Medicine [Internet]. Washington (DC): National Academy of Sciences. Dietary reference intakes for vitamin c, vitamin e, selenium, and carotenoids. 2000 [cited 2019 Mar 1]; [about 507 pages]. Available from: https://www.ncbi.nlm.nih.gov/pubmed/25077263.

24. Cogswell ME, Weisberg P, Spong, C. Cigarette smoking, alcohol use and adverse pregnancy outcomes: implications for micronutrient supplementation. Journal of Nutrition. 2003 May 1 [cited 2019 Mar 1];133(5): 1722S–31S. Available from: https://doi.org/10.1093/jn/133.5.1722S.

25. U.S. Department of Health and Human Services [Internet]. Washington (DC): U.S. Department of Health and Human Services, 2020. Smoking cessation: a report of the Surgeon General. 2020 [cited 2020 July 27]. [700 pages]. Available from: https://www.hhs.gov/sites/default/files/2020-cessation-sgr-full-report.pdf

26. Harrod CS, Reynolds RM, Chasan-Taber L, et al. Quantity and timing of maternal prenatal smoking on neonatal body composition: the health start study. Journal of Pediatrics. 2014 Oct [cited 2019 Mar 27];165(4): 707-12. Available from: https://doi.org/10.1016/j.jpeds.2014.06.031.

27. American College of Obstetricians and Gynecologists [Internet]. Committee Opinion No 721: Smoking cessation during pregnancy. Washington (DC): American College of Obstetricians and Gynecologists, 2017c. 2017 Oct [cited 2019 Mar 17]. Available from: https://www.acog.org/Clinical-Guidance-and-Publications/Committee-Opinions/Committee-on-Obstetric-Practice/Smoking-Cessation-During-Pregnancy.

28. Centers for Disease and Control and Prevention [Internet]. Atlanta (GA): Centers for Disease and Prevention. E-cigarettes and pregnancy. 2019 Feb 25 [cited 2019 Mar 25]. Available from: https://www.cdc.gov/reproductivehealth/maternalinfanthealth/substance-abuse/e-cigarettes-pregnancy.htm.

29. American Academy of Pediatrics. The transfer of drugs and other chemicals into human milk. Pediatrics. 2001 Sept [cited 2019 April 30];93(1): 137. Available from: https://pediatrics.aappublications.org/content/108/3/776.

30. U.S. Department of Agriculture [Internet]. Washington (DC): USDA Food and Nutrition Service, 2010. Infant nutrition and feeding: a guide for use in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). 2019 April [cited 2019 Aug 7]. Available from: https://wicworks.fns.usda.gov/sites/default/files/media/document/Infant_Feeding_Guide_Final_508c_0.pdf

31. American Academy of Pediatrics [Internet]. Washington (DC): American Academy of Pediatrics, 2012. Policy statement: Breastfeeding and the use of human milk. [cited 2019 June 20] Available from: www.pediatrics.org/cgi/doi/10.1542/peds.2011-3552.

32. Karmaus W, Dobai AL, Ogbuanu I, et al. Long-term effects of breastfeeding, maternal smoking during pregnancy, and recurrent lower respiratory tract infections on asthma in children. Journal of Asthma. 2008 Oct [cited 2019 Mar 22];45(8):688-95. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2700345/.

33. Woodward A, Douglas RM, Graham NM, et al. Acute respiratory illness in Adelaide children: breast feeding modifies the effect of passive smoking. J Epidemiol Community Health 1990 Sept [cited 2019 April 30];44(3): 224–30. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1060647/.

34. Amir LH, Donath SM. Does maternal smoking have a negative physiological effect on breastfeeding? The epidemiological evidence. Birth. 2002 [cited 2019 Mar 1];29:112-23. Available from: https://www.ncbi.nlm.nih.gov/pubmed/12000412.

35. Centers for Disease Control and Prevention [Internet]. Atlanta (GA): Centers for Disease Control and Prevention, 2018. Breastfeeding: tobacco and e-cigarettes. 2018 Jan 24 [cited 2018 Mar 21]. Available from: https://www.cdc.gov/breastfeeding/breastfeeding-special-circumstances/vaccinations-medications-drugs/tobacco-and-e-cigarettes.html.

36. Andersen AN, Lund-Andersen C, Larsen JF et al. Suppressed prolactin but normal neurophysin levels in cigarette smoking breast-feeding women. Clin Endocrinol (Oxf). 1982 [cited 2019 Mar 1]; 17:363-8. Available from: https://www.researchgate.net/publication/19788598_Milk_production_by_mothers_of_premature_infants.

37. Vio F, Salazar G, Infante C. Smoking during pregnancy and lactation and its effects on breast-milk volume. Am J Clin Nutr. 1991 [cited 2019 Mar 1]; 54:1011-6. Available from: https://www.researchgate.net/publication/21197821_Smoking_during_pregnancy_and_lactation_and_its_effects_on_breast-milk_volume.

38. Hopkinson JM, Schanler RJ, Fraley JK, Garza C. Milk production by mothers of premature infants: influence of cigarette smoking. Pediatrics. 1992 [cited 2019 Mar 1];90:934-8. Available from PubMed; PMID: 1437437.

39. Primo CC, Ruela PBF, Brotto LDdA, et al. Effects of maternal nicotine on breastfeeding infants. Revista Paulista de Pediatria. 2013 [cited 2019 Mar 1];31(3): 392-97. Available from: https://dx.doi.org/10.1590/S0103-05822013000300018.

40. Napierala M, Mazela J, Merritt TA, et al. Tobacco smoking and breastfeeding: Effect on the lactation process, breast milk composition and infant development. A critical review. Environmental Research. 2016 Nov [cited 2019 July 3];151: 321-38. Available from: https://www.sciencedirect.com/science/article/pii/S0013935116303437.

Clarification

Self-reporting of a diagnosis by a health care provider should not be confused with self-diagnosis, where a person simply claims to have or to have had a medical condition without any reference to professional diagnosis. A self-reported medical diagnosis ("My doctor says that I have/my son or daughter has…")

should prompt the CPA to validate the presence of the condition by asking more pointed questions related to that diagnosis.

372 Alcohol and Substance Use

Definition/Cut-off Value

For Pregnant Women:

- Any alcohol use.
- Any illegal substance use and/or abuse of prescription medications.
- Any marijuana use in any form.

For Breastfeeding and Non-Breastfeeding Postpartum Women:

- Alcohol Use (1):
    - High Risk Drinking: Routine consumption of ≥8 drinks per week or ≥4 drinks on any day.
    - Binge Drinking: Routine consumption of ≥4 drinks within 2 hours.

  Note: A serving or standard sized drink is: 12 oz. beer; 5 oz. wine; or 1½ fluid ounces 80 proof distilled spirits (e.g., gin, rum, vodka, whiskey, cordials or liqueurs).
- Any illegal substance use and/or abuse of prescription medications.
- Any marijuana use in any form (breastfeeding women only).

Participant Category and Priority Level

Category	Priority
Pregnant Women	I
Breastfeeding Women	I
Non-Breastfeeding Women	III, IV, V or VI

Justification

Substance use and misuse during pregnancy and postpartum may have physical and mental health consequences ranging from mild to serious (2). The use of alcohol, marijuana, illegal drugs and misuse of prescription drugs can threaten both maternal and fetal health. Misuses of prescription drugs include using medications as follows: for nonmedical reasons, prescribed for someone else, more often than the prescribed frequency, in larger-than-prescribed doses, and/or over a longer time than prescribed (3).

Substance use is known to lead to vitamin and mineral deficiencies that threaten physical and mental health, damage vital organs and the nervous system, and decrease immunity. Malnutrition occurs when the substance replaces other dietary nutrients or as a result from improper nutrient metabolism, absorption, utilization, or excretion even though the diet may be adequate. Harmful lifestyles are often associated with addiction, such as poor eating patterns, lack of exercise, and changes in sleep patterns. These compounding factors result in an increased risk of long-term health problems, including metabolic syndrome, diabetes, hypertension, weight problems, and eating disorders. People with substance addiction may suffer from calorie and protein malnutrition. In one study over 90% were underweight and 70% had

vitamin D deficiency and low levels of vitamin C. Another study showed that 50% were deficient either in iron or vitamins (vitamins A, C, and E being the most common). (4)

Substance use can impact the family and parenting in a number of ways, and may be linked with poor parenting practices, child neglect, and abuse due to (2):

- Impairments (both physical and mental) caused by alcohol or other drugs.
- Domestic violence, which may be a result of substance use.
- Expenditure of often limited resources on purchasing alcohol or other drugs.
- Frequent arrests, incarceration, and court dates.
- Time spent seeking out manufacturing or using alcohol or other drugs.
- Estrangement from primary family and related support.

While substance use has long been a public health concern, there is growing recognition that the United States is facing an epidemic due to an increase in opioid misuse, use disorders, and overdose, and that disparities exist between men and women with regard to both prescription opioid and heroin use (5). Although between 1999 and 2014 men were more likely than women to die of opioid overdoses, the gap in mortality has been closing (6). Between 1999 and 2010, overdose deaths from prescription pain killers increased more than 400% among women, compared to an increase of 237% among men (7). Although nonmedical use of prescription opioids among women has generally been decreasing since then, heroin use among women has been increasing, and at a faster rate among women than among men (8, 9, 10). For example, between 2002 and 2013, heroin use among women increased 100% compared to an increase of 50% among men (5).

Predictors of substance use among women of child bearing age include (2, 11, 12):

- Early Substance Use – Tobacco or marijuana use at an early age (12- 18 years of age) is a risk factor for continued use as an adult.
- Prepregnancy Substance Use – Alcohol and drug use prior to pregnancy is a predictor of continued use during pregnancy.
- Demographic Characteristics – Use and substance choice vary by demographic group:
    - Substance use after pregnancy is more likely for Native Americans and African Americans.
    - African American women and economically disadvantaged women are more likely to use illicit substances, particularly cocaine.
    - White women and women with higher education levels are more likely to use alcohol.
- Trauma – Substance use is increased among women who:
    - Were raised by parents who abused substances.
    - Have experienced physical and/or sexual abuse.
    - Have experienced intimate partner violence.
- Mental Health – Women with a diagnosis of substance use or chemical dependency may have one or more psychiatric disorders.

Alcohol and Substance Use during Pregnancy

Maternal substance use during and after pregnancy can have a long-term impact on both the mother and her child and can impact many areas of life such as: (2, 13, 14)

- Obstetrical and Prenatal Complications - Substance use (and withdrawal from them) during pregnancy may cause constriction of uterine blood vessels leading to insufficient blood flow to the placenta, separation of the placenta from the uterus, maternal hypertension, maternal hemorrhage, and/or premature labor. These complications may in turn increase risk of fetal loss, premature birth and still birth.
- Personal Health and Safety – Substance use is associated with increased likelihood of death by illness, accident or suicide; intimate partner violence; sexually transmitted diseases and unintended pregnancy. Although 31% to 47% of U.S. pregnancies are unintended, the proportion of unintended pregnancies for women with opioid use disorder was higher than 85%, according to recent research.
- Societal Impacts - Substance use is associated with an unstable family structure, separation and divorce, and potential for involvement of Child Protective Services (CPS). The Child Abuse Prevention and Treatment Act [42 U.S.C. § 5106a(b)] requires States to have policies and procedures in place to notify CPS agencies of substance-exposed newborns and to establish a plan of safe care for newborns identified as being affected by illegal substance abuse or having withdrawal symptoms resulting from prenatal drug exposure. For more information about State-specific requirements please see: https://www.childwelfare.gov/topics/systemwide/laws-policies/state/.
- Impact on Children - Children who are exposed to alcohol and other substances prior to birth can experience long-term cognitive, behavioral, social and emotional developmental consequences.

Based on data collected by the Substance Abuse and Mental Health Services Administration (SAMHSA), in 2012-2013 alcohol use among pregnant women aged 15-44 was 9.4%; 2.3% reported binge drinking and 0.4% reported heavy drinking. These rates were lower than the rates for non-pregnant women in the same age group (55.4%, 24.6% and 5.3% respectively). Alcohol use in 2012-2013 was lower among pregnant women aged 15 to 44 during the second and third trimesters than during the first trimester (5.0% and 4.4% vs. 19.0%). (3)

Nutritional needs during pregnancy are 10 to 30 percent greater than normal (15). Alcohol can disrupt body functions by causing nutrient deficiencies of vitamins and minerals (4). Alcohol inhibits fat absorption and thereby impairs absorption of vitamins A, E, and D which are normally absorbed along with dietary fats. Deficiencies of minerals such as calcium, magnesium, iron, and zinc are common in people who misuse alcohol, although alcohol itself does not seem to affect the absorption of these minerals (4).

There is no safe consumption of alcohol during pregnancy. Exposure to alcohol in utero can damage the developing fetus at any stage and is the leading preventable cause of birth defects and intellectual and neurodevelopmental disabilities (16, 17). Not only can nutritional deficiencies of a mother who misuses alcohol adversely affect the nutrition of the fetus, but alcohol itself can also restrict nutrient flow to the fetus. These prenatal factors can result in the infant being born with a Fetal Alcohol Spectrum Disorder (FASD). Fetal Alcohol Syndrome (FAS) is the most severe type of FASD. Fetal Alcohol Syndrome can affect children in different ways. A child with FAS might have abnormal facial features, growth and central

nervous system problems as well as problems with learning, memory, attention span, communication, vision, or hearing (18). (See risk 382 - *Fetal Alcohol Syndrome* for more information.)

In 2012 and 2013 illicit drug use (to include marijuana use) among pregnant women aged 15 to 44 was 5.4%. This was lower than the rate among women in this age group who were not pregnant (11.4%). Illicit drug use in 2012-2013 was lower among pregnant women aged 15 to 44 during the third trimester than during the first and second trimesters (2.4%t vs. 9.0% and 4.8%). (3)

Marijuana is the illicit drug used most frequently by women of child-bearing age (19). There is no known safe amount of marijuana use during pregnancy. Marijuana contains tetrahydrocannabinol (THC), which is the chemical in marijuana that makes one feel "high". Marijuana may be ingested in the form of marijuana edibles (cookies, brownies, candy, etc.) or inhaled when smoked. When inhaled, the smoke goes in to the lungs and immediately passes through the membranes and enters the bloodstream (2). THC can pass from the mother to the unborn child through the placenta if marijuana is ingested or inhaled during pregnancy. Children who are exposed to THC prior to birth can experience decreased academic ability, cognitive function and ability to remain attentive (20). Although some states have legalized marijuana for a variety of medical conditions upon a doctor's recommendation, as well as for recreational use, marijuana has been shown to have negative effects on brain development. Therefore, it is recommended that pregnant and breastfeeding women not use marijuana (2).

National Surveys on Drug Use and Health done by SAMHSA indicate that an annual average of about 21,000 pregnant women aged 15 to 44 misused opioids in the past month (21). The percentage of women misusing opioids in the past month was lower among pregnant women aged 15 to 44 than among non-pregnant women in that age range (0.9% vs. 2.6%) (21). Opiates and synthetic narcotics (e.g., heroin, oxycodone, Vicodin, Narco, Percocet, morphine, dilaudid) have serious health risks associated with their use including endocarditis; coma or sudden death from overdose; risk of HIV; and, if injected, viral hepatitis and other infections (2). A mother's use of these substances during pregnancy can lead to neonatal abstinence syndrome (NAS), which is a series of withdrawal symptoms experienced by an infant after birth due to intrauterine exposure to substances. Prenatal exposure to opioids increases the risk of low birth weight, stillbirth and sudden infant death syndrome (see risk 383 - *Neonatal Abstinence Syndrome* for more information).

For a summary of the effects of alcohol, marijuana, opioids and more information about the effects of other specific drugs during pregnancy, see table on page 5.

Alcohol and Substance Use during Breastfeeding

The breastfeeding mother should minimize alcohol use and avoid the use of other substances since most maternally ingested substances are transferred to human milk, though the concentration and potential danger to the breastfed baby is affected by interaction among a variety of factors. The American Academy of Pediatrics (AAP) recommends that the ingestion of beverages containing alcohol be minimized and limited to occasional intake for breastfeeding women. The following are recommendations for breastfeeding women who choose to drink (2, 22, 23, 24):

- Consult with health care provider before consuming alcohol.
- Do so only if breastfeeding is well established, consistent and predictable (no earlier than 3 months postpartum).
- Minimize ingestion of alcoholic beverages and limit it to occasional intake.

- Consume only a single alcoholic drink and wait at least 4 hours before breastfeeding or expressing milk to ensure the alcohol is not present in the milk.
- Breastfeed the infant or express human milk before consuming the alcohol.

Due to the lipophilic nature of THC found in marijuana, it is tremendously fat-soluble and therefore is readily transferred to human milk. Marijuana can impact the neurobehavioral development of the infant, and the AAP considers it to be a contraindication to breastfeeding. (2, 22, 23)

The maternal use of illegal substances and the misuse of prescription medicine is a contraindication to breastfeeding. However, according to the AAP, appropriate maternal use of prescribed medication is not a categorical contraindication to breastfeeding. For situations in which the mother is undergoing pharmacologic therapy, breastfeeding must balance the benefits to infants and mother against the potential risk of substance exposure to the infant. For example, research has shown that adequately nourished narcotic-dependent mothers should be encouraged to breastfeed if they are enrolled in a supervised medication-assisted treatment program and have negative toxicology screens for HIV and illicit drugs. (22) (See risk 383 - *Neonatal Abstinence Syndrome* for more information.)

The following table is a summary of effects of specific drugs on the mother, birth outcomes and breastfeeding (2). For more information, please see the *Substance Use and Prevention Manual: Screening, Education and Referral Resource Guide for Local WIC Agencies*: https://wicworks.fns.usda.gov/resources/wic-substance-use-prevention-guide.

Substance	Effects on Mother	Effects on Birth Outcomes	Effects on Baby*
Alcohol	• Impaired judgment, reflexes, memory, and coordination • Heart and liver damage • Pancreatitis • Peptic ulcers • Malnutrition • Alteration of menstrual cycle	• Miscarriage • Stillbirth • Low birth weight • Preterm delivery • Increased incidence of fetal distress at delivery • Sudden Infant Death Syndrome • Fetal Alcohol Spectrum Disorders	• Reduced growth • Reduced milk consumption • Delayed motor development • Altered postnatal growth, sleep patterns, and/or psychomotor patterns
Marijuana	• Increased blood pressure • Increased heart rate • Rapid pulse • Anxiety sensory distortions	• Visual abnormalities • Ocular hypertelorism (widely spaced eyes) • Severe epicanthus (skin folds at the corner of the upper eyelids)	• Poor sucking • Sedation • Reduced muscle tone • Delayed growth • Delayed motor development
Amphetamines (e.g., methamphetamine and dextroamphetamine)	• Irritability and confusion • Decreased appetite • Convulsions • Stroke • Heart failure	• Premature delivery • Low birth weight • Small for gestational age	• Poor sleep patterns • Irritability • Extreme agitation • Hallucinations • Seizures
Cocaine and Crack	• Increased heart rate • Increased blood	• Preterm delivery • Reduced head	• Vomiting • Diarrhea

Substance	Effects on Mother	Effects on Birth Outcomes	Effects on Baby*
Cocaine and Crack (continued)	pressure • Sudden death from cardiac arrhythmia or respiratory arrest • Irritability • Separation of the placenta from the uterus prior to delivery	circumference • Increased risk of spontaneous abortion • Increased risk of seizures • Neurological abnormalities	• High blood pressure • Seizures • Choking • Irritability • Neurobehavioral problems
Opiates & Synthetic Narcotics (e.g., heroin, morphine, codeine, oxycodone, and hydrocodone)	• Endocarditis • Decreased appetite • Respiratory depression • Coma or sudden death from overdose	• Low birth weight • Still birth • Neonatal Abstinence Syndrome • Sudden Infant Death Syndrome	• Irritability • Extreme agitation • Seizures • Poor sleep patterns • Hallucinations
Sedative – Hypnotics (e.g., benzodiazepines, barbiturates, and sleep medications)	• Apprehensiveness • Convulsions • Dilated pupils • Respiratory depression • Confusion • Slurred speech	• Increased risk of fetal malformations	• Restlessness • Tremor • Apnea • Diarrhea • Vomiting • Poor feeding

*The effect of substances on the baby should be carefully considered when providing support to breastfeeding dyads as these effects may be barriers to successful breastfeeding.

Implications for WIC Nutrition Services

Through established linkages and coordination with local resources, WIC staff are required to refer participants suspected of substance use, and those who disclose substance use, to existing assessment agencies for professional evaluation and treatment, as appropriate. In addition to providing referrals and coordinating/facilitating services, WIC's role in preventing substance abuse is to educate women participants, parents, and caretakers of participating infants and children about substance use–related problems with the intended effects of increasing participants' access to information about the dangers of substance use and abuse during pregnancy and breastfeeding as well as postpartum. WIC also provides supplemental foods that are rich in the nutrients lost from alcohol and substance misuse. WIC staff can assist participants by:

- Providing referrals (and follow-up on the referral) for professional assessment and treatment. Do not advise a woman who uses narcotics to stop use on her own. This step should be taken only under the supervision of a physician or treatment specialist.
- Encouraging women to improve their lifestyle and health habits during pregnancy and postpartum, since the concern for fetal health and/or the desire to be a good role model can be a powerful motivator to reduce or stop substance use (25).
- Emphasizing the importance of substance abuse treatment during the postpartum period to safeguard the health of the mother and reduce the risk in subsequent pregnancies.

- Recommending the Dietary Guidelines for Americans to address nutrition deficiencies associated with substance use.
- Providing breastfeeding promotion and support to women enrolled in supervised medication-assisted treatment programs.
- Recommending that the ingestion of beverages containing alcohol be minimized and limited to occasional intake for breastfeeding women. Provide instruction to wait at least 4 hours after consuming one alcoholic drink before breastfeeding or expressing milk. (If the appropriate amount of time has elapsed the woman may breastfeed or express her milk – it is not necessary to pump and discard the milk.)
- Referring to community resources for alcohol and substance use support groups.

References

1. U.S. Department of Agriculture and U.S. Department of Health and Human Services [Internet]. Washington, DC: [2015-2020; cited 2017 May 30]. Dietary Guidelines for Americans; 2015-2020, 8th Edition. Available from: https://health.gov/dietaryguidelines/2015/guidelines/appendix-9/.
2. U.S. Department of Agriculture [Internet]. Virginia: Food and Nutrition Service [FNS-276 revised; Sep 2013; cited 2017 April 28] Substance Use and Prevention Manual: Screening, Education and Referral Resource Guide for Local WIC agencies. Available from: https://wicworks.fns.usda.gov/wicworks/Topics/ResourceManual.pdf.
3. U.S. Department of Health and Human Services [Internet]. Washington, DC: Substance Abuse and Mental Health Services Administration [Sep 2014; cited 2017 May 31]. Results from the 2013 National Survey on Drug Use and Health: Summary of National Findings. Available from: https://www.samhsa.gov/data/sites/default/files/NSDUHresultsPDFWHTML2013/Web/NSDUHresults2013.pdf.
4. Salz A. Substance Abuse and Nutrition. Today's Dietitian. 2014 Dec;16(12)(44). Available from: http://www.todaysdietitian.com/newarchives/120914p44.shtml.
5. U.S. Department of Health and Human Services [Internet]. Washington, DC: Office of Women's Health [Dec 2016: cited 2017 May 31]. White Paper: Opioid Use, Misuse, and Overdose in Women. Available from: https://www.womenshealth.gov/files/documents/white-paper-opioid-508.pdf.
6. Centers for Disease Control and Prevention [Internet]. Atlanta: National Center for Health Statistics; [Dec 2016: cited 2017 May 31]. Prescription Opioid Overdose Data. Available From: http://www.cdc.gov/drugoverdose/data/overdose.html .
7. Centers for Disease Control and Prevention [Internet]. Atlanta: CDC Vital Signs; [July 2013: cited 2017 May 31]. Prescription Painkiller Overdoses. Available from: http://www.cdc.gov/vitalsigns/prescriptionpainkilleroverdoses/index.html.
8. Jones CM. The paradox of decreasing nonmedical opioid analgesic use and increasing abuse or dependence - an assessment of demographic and substance use trends, United States, 2003-2014. Addict Behav. 2016 Aug 17. pii: S0306-4603(16)30306-9. doi: 10.1016/j.addbeh.2016.08.027.
9. Jones CM, et al. Demographic and substance use trends among heroin users, US, 2002-2013. MMWR 2015; 64 (26): 719-25.

10. Cicero TJ, Ellis MS, Surratt HL. The changing face of heroin use in the United States: a retrospective analysis of the past 50 years. JAMA Psychiatry. 2014;71(7):821-826. doi:10.1001/jamapsychiatry.2014.366.

11. Verona E, Murphy B, Javdani S. Gendered pathways: violent childhood maltreatment, sex exchange and drug use. Psychol Violence. 2015 April 20; doi:10.1037/a0039126.

12. Choi NG, DiNitto DM, Marti CN, Choi BY. Association of adverse childhood experiences with lifetime mental and substance use disorders among men and women aged 50+ years. International Psychogeriatrics.2017 Jun; 29(3), 359–372.

13. Patrick SW, Schiff DM. A public health response to opioid use in pregnancy. American Academy of Pediatrics, Committee on Substance Use and Prevention. Pediatrics. 2017 Mar: 139(3), e2 0164070.

14. Child Welfare Information Gateway [Internet]. Washington, DC: U.S. Department of Health and Human Services, Children's Bureau. [2016; cited 2017 Jul 7]. Parental Drug Use as Child Abuse. Available from: https://www.childwelfare.gov/pubPDFs/drugexposed.pdf.

15. Brown JE. Nutrition through the lifecycle. 4th ed. Boston: Wadsworth, Cengage Learning; 2011.

16. Williams JF, Smith, VC. Fetal alcohol spectrum disorders. American Academy of Pediatrics, Committee on Substance Use. Pediatrics. 2015 Nov: 136(5).

17. National Institute on Alcohol Abuse and Alcoholism [Internet]. Washington, DC: U.S. Department of Health and Human Services, National Institutes of Health. [2010; cited 2018 Apr 27]. Fetal Alcohol Exposure. Available from: https://www.niaaa.nih.gov/alcohol-health/fetal-alcohol-exposure.

18. Centers for Disease Control and Prevention [Internet]. Atlanta: [updated 2015 April 16; cited 2017 May 31]. Facts about FASDs. Available from: https://www.cdc.gov/ncbddd/fasd/facts.html.

19. National Academy of Science, Engineering and Medicine [Internet]. Washington, DC: Health and Medicine Division; [2017; cited 2017 Jun 2]. The Health Effects of Cannabis and Cannabinoids: The Current State of Evidence and Recommendations for Research. Available from: http://nationalacademies.org/hmd/reports/2017/health-effects-of-cannabis-and-cannabinoids.aspxl.

20. National Institute on Drug Abuse [Internet]. Washington, DC: U.S. Department of Health and Human Services, National Institutes of Health. [2016; cited 2018 Apr 27]. Substance Use in Women. Available from: https://www.drugabuse.gov/publications/research-reports/substance-use-in-women/substance-use-while-pregnant-breastfeeding.

21. U.S. Department of Health and Human Services [Internet]. Washington, DC: Substance Abuse and Mental Health Services Administration [17 Jan 2017; cited 2017 Jun 2]. Women of Childbearing age and Opioids. Available from: https://www.samhsa.gov/data/sites/default/files/report_2724/ShortReport-2724.pdf.

22. Breastfeeding and the use of human milk. Pediatrics. Mar 2012; 129(3). Available from: http://pediatrics.aappublications.org/content/pediatrics/129/3/e827.full.pdf.

23. Reece-Stremtan S, Marinelli, KA, and the Academy of Breastfeeding Medicine. ABM Clinical Protocol #21: Guidelines for breastfeeding and substance use or substance disorder. Breastfeeding Medicine. 2015;10(3).

24. U.S. Department of Agriculture and U.S. Department of Health and Human Services [Internet]. Washington, DC: [2015-2020; cited 2017 May 30]. Scientific Report of the 2015 Dietary Guidelines Advisory Committee: Advisory Report to the Secretary of Health and Human Services and the Secretary of Agriculture, Part D, Ch. 2, 44. Available from: https://health.gov/dietaryguidelines/2015-scientific-report/07-chapter-2/d2-6.asp.

25. Massey, SH, Lieberman, DZ, Reiss, D et al. Association of clinical characteristics and cessation of tobacco, alcohol, and illicit drug use during pregnancy. Am. J. Addict. 2011;20(2):143-50.

381 Oral Health Conditions

Definition/Cut-off Value

Oral health conditions include, but are not limited to:

- Dental caries, often referred to as “cavities” or “tooth decay”, is a common chronic, infectious, transmissible disease resulting from tooth-adherent specific bacteria, that metabolize sugars to produce acid which, over time, demineralizes tooth structure (1).
- Periodontal diseases are infections that affect the tissues and bone that support the teeth. Periodontal diseases are classified according to the severity of the disease. The two major stages are gingivitis and periodontitis. Gingivitis is a milder and reversible form of periodontal disease that only affects the gums. Gingivitis may lead to more serious, destructive forms of periodontal disease called periodontitis.(2)

  More information on types of periodontal disease is available at: http://www.perio.org/consumer/2a.html.
- Tooth loss, ineffectively replaced teeth or oral infections which impair the ability to ingest food in adequate quantity or quality

Presence of oral health conditions diagnosed, documented, or reported by a physician, dentist, or someone working under a physician’s orders, or as self reported by applicant/participant/caregiver. See Clarification for more information about self-reporting a diagnosis.

Participant Category and Priority Level

Category	Priority
Pregnant Women	I
Breastfeeding Women	I
Non-Breastfeeding Women	III, IV, V or VI
Infants	I
Children	III

Justification

Oral health reflects and influences general health and well being. Good oral health care and nutrition during pregnancy, infancy and childhood are often overlooked factors in the growth and development of the teeth and oral cavity.

Infants and Children

The Centers for Disease Control and Prevention (CDC) reports that dental caries may be the most prevalent infectious disease in U.S. children. More than 40% of children have tooth decay by the time they reach kindergarten. Infants that consume sugary foods, are of low socioeconomic status, and whose mothers have a low education level, are 32 times more likely to have caries at the age of 3 years than children who

do not have those risk factors. Despite its high prevalence, early childhood caries (ECC) is a preventable disease. (3)

ECC may develop as soon as teeth erupt. Bacteria, predominantly mutans streptococci (MS), metabolize simple sugars to produce acid that demineralizes teeth, resulting in cavities. The exact age at which MS colonization occurs in children is controversial, but it does not happen until teeth erupt. The earlier colonization occurs, the greater the risk of caries. MS typically originates in the mother and is transmitted to the child via saliva (often through cup and utensil sharing). Elevated maternal levels of MS, due to active or untreated caries and frequent sugar consumption, increase the risk of transmission. In addition, recent evidence suggests that exposure to environmental tobacco smoke increases the likelihood of MS colonization in children. (4)

Historically, ECC has been attributed to inappropriate and prolonged bottle use; formally called "baby bottle tooth decay." However, recent studies indicate that the disease is multifactorial, which suggests any feeding practice that allows frequent sugar consumption in the presence of MS may result in caries formation: propped bottles containing sweetened liquids or formula, frequent consumption of juice or sweetened liquids from infant and "sippy" cups, and frequent snacking of high cariogenic foods. (4)

The frequency of sugar consumption is the main dietary variable in caries etiology. After bacteria metabolize sugar into acid, it takes 20-40 minutes for the acid to be neutralized or washed away by saliva. Therefore, if sugars are frequently consumed, the potential for demineralization is greater. Although MS can metabolize many different carbohydrates, they produce acid most efficiently from sugars, especially sucrose. Sugars within the cellular structure of food (such as fructose in whole fruit) are thought to be less cariogenic than sugars intentionally added to foods. (4) See Table 1 for more information on the cariogenic potential of children's foods and snacks.

Milk is widely consumed, especially by children, and thus the interaction between different kinds of milk consumed and caries development has been a research topic of interest. Lactose is one of the least cariogenic sugars because it is poorly metabolized by MS. Researchers have reported cows' milk to be a protective, anticariogenic agent due to its high concentration of calcium and phosphate. The buffering activity of proteins present in cows' milk also might allow the formation of very stable complexes of calcium phosphate. Other anticariogenic properties in cows' milk include antibacterial enzymes, vitamin D and fluoride. (4,5)

Infant formulas, on the other hand, have a high potential for inducing caries due to their high carbohydrate variability. The cariogenic potential of human milk is inconclusive. Human milk has been found to contain more lactose (8.3%) than cows' milk (4.9%). A higher human milk lactose concentration and the possibility that lactose fermentation of cows' milk is slower than in human milk, may make human milk caries risk slightly higher. Some evidence indicates that breastfeeding for over 1 year during the night after tooth eruption might be associated with ECC, however other investigations showed no relationship between prevalence of caries and breastfeeding. Regardless of the type of milk consumed, sufficient dental care and cleaning after drinking milk/formula and breastfeeding can help prevent ECC. Avoiding inappropriate dietary practices, such as frequent juice consumption or snacking on highly cariogenic foods also remain important ECC preventive practices. (4,5)

Table 1. Cariogenic Potential of Children's Foods and Snacks		
Noncariogenic	**Low Cariogenicity**	**High Cariogenicity**
Cheese Chicken Cottage Cheese Eggs Flavored Club Soda Nuts and seeds* Plain Cow's Milk (unflavored) Plain Yogurt Popcorn* Seltzer Vegetables	Flavored Milk Fresh fruits Whole grain products	Breakfast Bars Cake Candies** Cookies Doughnuts Granola bars Pretzels Raisins and other dried fruits Soda crackers Sweetened beverages (including fruit juice) Sweetened dry cereals
*Not appropriate for infants and toddlers due to potential choking problems.		
**Sticky candy and/or slowly eaten candy are extremely cariogenic.		
Adapted from: Faine, MP. Nutrition and oral health. In: Proceedings of Promoting Oral Health of Children with Neurodevelopmental Disabilities and Other Special Health Care Needs. May 4-5, 2001. Seattle, WA.		

Women

Maternal periodontal disease and dental caries may impact pregnancy outcome, and the offspring's risk of developing early and severe dental caries. Periodontal disease and caries may also increase the women's risk of atherosclerosis, rheumatoid arthritis and diabetes. These oral health problems are highly prevalent in women of childbearing age, particularly among low-income women and members of racial and ethnic minority groups. Socioeconomic factors, lack of resources to pay for care, barriers to access care, lack of public understanding of the importance of oral health and effective self-care practices all represent underlying reasons cited for observed inadequacies in oral health. (6)

Maternal periodontal disease, a chronic infection of the gingiva (gums) and supporting tooth structures, has been associated with preterm birth, low birthweight and development of preeclampsia (6, 7). Studies indicate that periodontal infection can result in placental-fetal exposure and, when coupled with a fetal inflammatory response, can lead to preterm delivery (7). Additionally, in a cohort of 164 young, minority, pregnant and postpartum women, the preterm/low birthweight rate was 5.4% lower among women who received periodontal treatment than those who did not receive treatment (7). In a case-control study, researchers found that preeclamptic patients were 3.5 times more likely to have periodontal disease than normotensive patients (6). (See nutrition risk criterion #304 *History of Preeclampsia* for more information.)

Fluoride and Fluorosis

Use of fluorides for the prevention and control of caries is documented to be both safe and highly effective. Fluoride, a naturally occurring substance, has several caries-protective mechanisms of action, including enamel remineralization and altering bacterial metabolism to help prevent caries. Excessive intake of fluoride can cause dental fluorosis which is a change in the appearance of the tooth's enamel. In the U.S., fluorosis appears mostly in the very mild or mild form - as barely visible lacy white markings or spots. The severe form of dental fluorosis, staining and pitting of the tooth surface, is rare in the U.S. The CDC reports that 32% of American children have some form of dental fluorosis, with 2.45% of children having the moderate to severe stages. (8, 9, 10, 11)

Parents and caregivers may have questions and concerns about fluoride content in water supplies and in infant formula. Fluoridated water can be found in communities that supplement tap water with fluoride and it may also be found in well water. The CDC's *My Water's Fluoride* website: http://apps.nccd.cdc.gov/MWF/Index.asp, allows consumers in currently participating States to learn the fluoridation status of their water system.

All formula, including powdered, concentrate and ready-to-feed, contain fluoride, but most infant formula manufacturers ensure low levels of fluoride (8). WIC State and local agencies should refer caregivers of formula fed infants with questions regarding the use of fluoridated vs. non-fluoridated water to prepare infant formula to the infants' health care provider.

Dental Care and Anxiety

It is reported that 50% of the U.S. population does not seek regular dental care. Of the entire U.S. population, 8-15% has dental phobias. Dental fear can be directly learned from previous painful or negative experiences or indirectly learned from family, friends and the media. Negative portrayal of dentistry by these sources adds to an individual's anxiety. Anxiety and/or fear of dental procedures may prevent participants from seeking necessary dental care during high risk periods of the life cycle (e.g., pregnancy). Dental providers are learning to understand the causes of dental fear, have techniques to assess the level of fear and have modified treatments to accommodate patients with high anxiety levels. (12)

Oral Health Problems and Special Health Care Needs

The following special health care needs can increase the risk for oral health problems and can also make the overall effects of poor oral health more severe (13):

- **Prematurity and intrauterine malnutrition**- can have adverse effects on an individual's oral health. A study of infants who weighed <2000g at birth indicated more porous dental enamel and subsurface lesions. Infants with very low birthweights (<1500g) are more apt to have enamel

defects of the primary teeth. Malnutrition in the first few months of life (when oral structures develop) can increase the risk for oral problems.

- **Gastroesophageal Reflux Disease (GERD)-** common among children with cerebral palsy, Down syndrome and other conditions. GERD can contribute to oral health problems. As acidic gastric contents are regurgitated, primary and permanent teeth can be eroded.
- **Failure to thrive and other problems with weight gain and growth-** frequent meals and snacks (which may contribute to caries development) may be needed to maintain an adequate energy intake, or if mealtime is longer than usual, the demineralization period may exceed remineralization. Delayed weaning and children sipping on a bottle throughout the day, could also contribute to oral health problems.
- **Craniofacial malformations**– individuals with these malformations are at higher risk of developing oral problems. For example, children with cleft lip/palate disorders have more decayed, missing, and filled teeth than children without.
- **Compromised immune function**- individuals with AIDS or those who take immunosuppressive medications are more susceptible to oral infections such as candidiasis, viral infections, dental caries, and periodontal disease.
- **Down syndrome (Trisomy 21)-** individuals with Down syndrome often have delayed dental development*, may be missing permanent teeth, and may have under-developed teeth or teeth with thin enamel. In addition, the potential for eating problems and GERD make oral care for individuals with Down's especially important. (13)

*Delayed Tooth Eruption (DTE) is the emergence of a tooth into the oral cavity at a time that deviates significantly from norms established for different races, ethnicities, and sexes. Variation in the normal eruption of teeth is a common finding, but significant deviations from established norms should alert the clinician to further investigate the patient's health and development. Eruption depends on genetics, growth of the jaw, muscular action and other factors. DTE is seen in children with certain genetic disorders, particularly Down syndrome, and in children with general developmental delays that involve the oral musculature. Whenever DTE is generalized, the child should be examined for systemic diseases affecting eruption, such as endocrine disorders, organ failures, metabolic disorders, drugs and inherited disorders. (14) Additional information about tooth eruption is available at: http://www.ada.org/2930.aspx.

Dentate Status, Diet Quality and General Health

By the time individuals reach adulthood, the human mouth has progressed from 20 primary teeth to 32 permanent (adult) teeth (2). The extent to which tooth loss can adversely affect nutritional status is not completely known. However, diet quality tends to decline as the degree of dental impairment increases. Studies have shown that intake of vitamin A, fiber, calcium and other key nutrients decline as the number of teeth decline. In The Health Professionals study, participants without teeth had diets that contained fewer vegetables, less carotene and fiber, and more cholesterol, saturated fat, and calories than persons with 25 teeth or more (15). Despite the trend toward increased tooth retention throughout adult life in developed countries, 11% of adults aged 25 and older have lost all of their natural teeth. This number increases to 30% for people over age 65 and is even higher in those living in poverty. Loss of teeth is not a normal result of the aging process; the major cause of tooth loss is extractions resulting from dental caries and/or periodontal disease. (15)

Implications for WIC Nutrition Services

To help prevent oral health problems from developing and ensure the best possible health and developmental outcomes, WIC staff can encourage participants and caregivers to:

Diet

- Breastfeed infants during the first year of life and beyond as mutually desired.
- Avoid having an infant/child sleep with a bottle. Any bottle taken to bed should contain only water. (See Risks 425.3 and 411.2)
- Gradually introduce a cup between 6 and 12 months of age, wean from the bottle by 12 months of age.
- Drink/provide only water and milk between meals.
- Limit sugary foods and drinks (if sweets are eaten, it's best to restrict to mealtimes.)
- Avoid carbonated beverages and juice drinks. (See Risk 425.2)
- Limit the intake of 100% fruit juice to no more than 4-6 ounces per day.
- Establish eating patterns that are consistent with the Dietary Guidelines for Americans and the infant feeding practice guidelines of the American Academy of Pediatrics.
- Consume/provide a varied, balanced diet during gestation and throughout childhood to set the stage for optimal oral health. (1,3,4,15)

Oral Hygiene

- Wipe the gums of even a very small infant with a soft washcloth or soft toothbrush, even prior to tooth eruption, to establish a daily oral hygiene routine (17, 18).
- Brush teeth (including an infant's, as soon as teeth erupt) thoroughly twice daily (morning and evening) and floss at least once every day.
- Minimize saliva sharing activities (i.e., sharing a drinking cup and utensils). (1,3,4,15)

Fluoride

- Use fluoride toothpaste approved by the American Dental Association ("pea-size" for 2-5 year olds and, "smear" for under the age of two and at moderate or high caries risk). (1)
- Rinse every night with an alcohol-free over-the- counter mouth rinse with 0.05% sodium fluoride (guidance for woman participant and caregiver only). (3)
- Contact the infant's (if formula fed) health care provider with questions regarding the use of local drinking water or bottled water to prepare infant formula. (3)
- Talk to the dentist about fluoride supplements. These may be of benefit in reducing dental decay for children living in fluoride-deficient areas (See Risk 411.11).
- Check if the public water systems have added fluoride at: http://apps.nccd.cdc.gov/MWF/Index.asp.
- Access the following website for more information about fluoride: http://www.cdc.gov/fluoridation/safety.htm .

Referrals

- Establish a dental home within 6 months of eruption of the first tooth and no later than 12 months of age. (3)
- See a dentist for examinations (every 6 months) and/or restoration of all active decay as soon as possible. (WIC staff should provide dental referrals as necessary.)

Oral Health Resources/Handouts

- Summary of Pediatric Oral Health Anticipatory Guidance: http://www.aafp.org/afp/2004/1201/p2113.html#afp20041201p2113-t2.
- Table: Oral health and dietary management for mothers and children (see page 3 of pdf.) http://www.sciencedirect.com/science/article/pii/S0002822398000443.
- Oral Health Care During Pregnancy: A National Consensus Statement: http://www.mchoralhealth.org/materials/consensus_statement.html.
- *Your Baby's Teeth:* http://www.aafp.org/afp/2004/1201/p2121.html.
- *Two Healthy Smiles: Tips to Keep You and Your Baby Healthy:* http://www.mchoralhealth.org/PDFs/pregnancybrochure.pdf.
- *Tips for Good Oral Health Care During Pregnancy:* http://www.mchoralhealth.org/PDFs/OralHealthPregnancyHandout.pdf.
- *A Healthy Smile for Your Baby* (English): http://www.mchoralhealth.org/PDFs/babybrochure.pdf.
- *A Healthy Smile for Your Baby* (Spanish): http://www.mchoralhealth.org/PDFs/babybrochure_sp.pdf.

References

1. Policy on Early Childhood Caries (ECC): Classifications, consequences and preventive strategies. Am Academy of Pediatric Dentistry (2011) 47-49.
2. ADA Dental 101: Taking care of your teeth and gums. American Dental Association, 2008: 1-28.
3. American Academy of Pediatrics Policy Statement: Oral health risk assessment timing and establishment of the dental home. Pediatrics, (2003) Vol 11, No 5: 1113-1116.
4. Douglass BDS, et al. A practical guide to infant oral health. America Family Physician, (2004) Vol 70, No 11: 2113-2120.
5. Rocha Peres RC, et al. Cariogenic potential of cows', human and infant formula milks and effect of fluoride supplementation. British Journal of Nutrition (2009), 101, 376-382.
6. Boggess K, Edelstein B. Oral health in women during preconception and pregnancy: implications for birth outcomes and infant oral health. Matern Child Health J. (2006) 10: S169-S174.
7. Bobetsis Y, et al. Exploring the relationship between periodontal disease and pregnancy complications. J Am Dent Assoc. Vol 137, Suppl 2, 7S-13S, 2006.
8. Review Council, Guideline on Fluoride Therapy. American Academy of Pediatric Dentistry. Reference Manual 33/No 6. 11/12 153-156.

9. J Berg, et al. Evidence-based clinical recommendations regarding fluoride intake from reconstituted infant formula and enamel fluorosis: a report of the American Dental Association Council on Scientific Affairs. JADA, Jan 2011 Vol 142 79-87.
10. Position of the Academy of Nutrition and Dietetics: the impact of fluoride on health. Journal of the Academy of Nutrition and Dietetics, Sept 2012, Vol 112, No. 9 1443-1453.
11. HHS Proposed Guidelines on Fluoride in Drinking Water, Commentary by Dr. Howard Koh, Jan 2011.
12. Krochak M, Rubin JG. An overview of the treatment of anxious and phobic dental patients. Compend Contin Educ Denta, Vol XIV, No 5: 604-614.
13. Ogata B, Trahms C. For children with special health care needs. Nutrition Focu.s Nov/Dec 2003 Vol 18, No 6.
14. Suri L, et al. Delayed Tooth Eruption: Pathogenesis, diagnosis, and treatment. A Literature Review Am J of Orthodontics and Dentofacial Orthopedics, (Oct 2004) 432-445.
15. Palmer CA. Diet and nutrition in oral health, 2nd ed. Pearson Education Inc. 2007. Chapter 15, 315-330.
16. Policy Statement: Preventive oral health intervention for pediatricians. Pediatrics (2008). Vol 122, No 6: 1387-1394.
17. American Academy of Pediatrics. *A Pediatric Guide to Oral Health Flip Chart and Reference Guide*. 2011. Copyright 2012.
18. Holt K, et al. Bright Futures Nutrition, 3rd Edition. American Academy of Pediatrics, 2011.

Clarification

Self-reporting of a diagnosis by a medical professional should not be confused with self-diagnosis, where a person simply claims to have or to have had a medical condition without any reference to professional diagnosis. A self-reported medical diagnosis ("My doctor says that I have/my son or daughter has…") should prompt the CPA to validate the presence of the condition by asking more pointed questions related to that diagnosis.

382 Fetal Alcohol Spectrum Disorders

Definition/Cut-off Value

Fetal alcohol spectrum disorders (FASDs) are a group of conditions that can occur in a person whose mother consumed alcohol during pregnancy (1). FASDs is an overarching phrase that encompasses a range of possible diagnoses, including fetal alcohol syndrome (FAS), partial fetal alcohol syndrome (pFAS), alcohol-related birth defects (ARBD), alcohol-related neurodevelopmental disorder (ARND), and neurobehavioral disorder associated with prenatal alcohol exposure (ND-PAE) (2).

Presence of condition diagnosed, documented, or reported by a physician or someone working under a physician's orders, or as self-reported by applicant/participant/caregiver. See Clarification for more information about self-reporting a diagnosis.

Participant Category and Priority Level

Category	Priority
Pregnant Women	I
Breastfeeding Women	I
Non-Breastfeeding Women	III, IV, V or VI
Infants	I
Children	III

Justification

Prenatal exposure to alcohol can damage the developing fetus and is the leading preventable cause of birth defects and intellectual and neurodevelopmental disabilities (2). (See risk #372 *Alcohol and Substance Use* for more information.)

FASD is an umbrella term describing the range of effects that can occur in an individual whose mother consumed alcohol during pregnancy (2). These effects include physical, mental, behavioral, and/or learning disabilities with possible lifelong implications (1, 2). Often, a person with FASD has a mix of these conditions (1).

The term FASDs is *not* meant for use as a clinical diagnosis and encompasses all other diagnostic terms, such as fetal alcohol syndrome (FAS) (1, 2). FASDs refer to the whole range of effects that can occur in a person whose mother consumed alcohol during pregnancy. These conditions can affect each person in different ways and can range from mild to severe. A person with FASD might have any or a combination of the following conditions (1):

- Facial abnormalities, such as a smooth ridge between the nose and upper lip (this ridge is called the philtrum).
- Small head size, short stature, low body weight.
- Sleep and sucking problems as an infant.

- Hyperactive behavior, difficulty with attention, poor memory, difficulty in school (especially with math), learning disabilities, poor reasoning and judgment skills.
- Poor coordination, speech and language delays, intellectual disability or low IQ.
- Problems with the heart, kidneys, bones, vision, or hearing.

The severity of alcohol's effects on a fetus primarily depends on the following (3, 4):

- Quantity – the amount of alcohol consumed by a pregnant woman per occasion.
- Frequency – the rate at which alcohol is consumed or is repeatedly consumed by the pregnant woman.
- Timing – the specific gestational age of the fetus when alcohol is consumed by the pregnant woman.

Fetal Alcohol Spectrum Disorders Diagnoses

Different terms are used to describe FASDs, depending on the type of symptoms.

Fetal Alcohol Syndrome (FAS) was the first form of FASD discovered and is the most well-known. It represents the most involved end of the FASD spectrum. A diagnosis of FAS requires evidence of prenatal alcohol exposure; evidence of central nervous system (CNS) abnormalities (structural or functional); a specific pattern of the following three facial abnormalities: narrow eye openings, a smooth area between the lip and the nose (vs. the normal ridge), and a thin upper lip; and growth deficits either prenatally, after birth, or both (1). Fetal Alcohol Syndrome can affect children in different ways. A child with FAS may have problems with learning, memory, attention span, communication, vision, and/or hearing (3). Also, people with FAS often have a hard time in school and trouble getting along with others (1).

The Centers for Disease Control and Prevention worked with a group of experts and organizations to review the research and issued guidelines for diagnosing FAS in 2004. The guidelines were developed for FAS only. Diagnosing FAS can be challenging due to other medical disorders, such as attention deficit/hyperactivity disorder (ADHD) and Williams syndrome, having similar symptoms and the lack of standard medical tests. (1)

Partial FAS (pFAS) involves prenatal alcohol exposure and includes some, but not all, of the characteristics of full FAS (3). A diagnosis of pFAS requires a confirmed history of prenatal alcohol exposure and CNS abnormalities at the same level as FAS. Individuals with pFAS sometimes have growth deficiency or one or more of the facial abnormalities associated with FAS. Individuals with pFAS have the same functional disabilities but may not have the physical appearance of an individual with FAS (5).

Alcohol-Related Neurodevelopmental Disorder (ARND) requires evidence of both prenatal alcohol exposure and CNS abnormalities, which may be structural or functional. Functional abnormalities may involve a complex pattern of cognitive or behavioral problems that are not consistent with developmental level and that cannot be explained by factors other than prenatal alcohol exposure (e.g., family background, environment, and other toxicities). Facial abnormalities and growth deficits need not be present (3). People with ARND might have intellectual disabilities and problems with behavior and learning. They might do poorly in school and have difficulties with math, memory, attention, judgment, and impulse control (1).

Alcohol-Related Birth Defects (ARBD) include problems with the heart, kidneys, bones, or hearing. People with ARBDs might have a combination of these (1). ARBD is rarely seen alone but rather as a secondary disorder accompanying other FASD conditions (e.g., FAS and ARBD) (3).

Neurobehavioral Disorder Associated with Prenatal Alcohol Exposure (ND-PAE) was first included as a recognized condition in the Diagnostic and Statistical Manual 5 of the American Psychiatric Association (APA) in 2013. ND-PAE requires evidence of both prenatal alcohol exposure and CNS involvement, as indicated by impairments in the following three areas: cognition, self-regulation, and adaptive functioning. A child or youth with ND-PAE will have problems in three areas: 1) thinking and memory, where the child may have trouble planning or may forget material he or she has already learned; 2) behavior problems, such as severe tantrums, mood issues (for example, irritability), and difficulty shifting attention from one task to another; and 3) trouble with day-to-day living, which can include problems with bathing, dressing for the weather, and playing with other children. In addition to the child having problems in these three areas, the mother of the child must have consumed more than minimal levels of alcohol during pregnancy. The APA defines minimal levels of alcohol as more than 13 alcoholic drinks per month of pregnancy (that is, any 30-day period of pregnancy) or more than 2 alcoholic drinks in one sitting. (1, 3)

Prenatal Alcohol Exposure (PAE) may be associated with altered acquisition and distribution of body mass with increasing age. In a study conducted by Werts and colleagues, the exploratory data suggested that children with PAE may be at risk for nutritional deficiencies, which are influenced by inappropriate food preferences, disordered eating patterns, medication use, and the stressful dynamics surrounding food preparation and mealtime. PAE may be associated with female obesity, constant snacking, lack of satiety, constipation, and low vitamin D status. The obesity/overweight incidence for the female subjects was 50% (a rate substantially greater than the U.S. average of 31.3%), while the obesity/overweight incidence for the males was well below the U.S. average. The sample size was too small to determine whether obesity rates significantly differed between the sexes. (6)

Fetal Alcohol Effects (FAE) was previously used to describe intellectual disabilities and problems with behavior and learning in a person whose mother consumed alcohol during pregnancy. In 1996, the Institute of Medicine (IOM) replaced FAE with the terms alcohol-related neurodevelopmental disorder (ARND) and alcohol-related birth defects (ARBD). (1)

Growth and Development of Children with FASD

The estimated prevalence of FASD in populations of first-grade schoolchildren (~6.5-7.8 years old) is as high as 20-50 per 1,000 in the United States and some Western European countries. (7)

In a study conducted by Spohr and others, it was found that although the characteristic craniofacial malformations of FAS/FAE diminished over time, microcephaly, a poorly developed philtrum, a thin upper lip, and, to a lesser degree, short stature and underweight (in boys) persisted. In females, adult body weight increased. Although some catch-up growth occurred, a large proportion of the subjects had growth deficiency. (8)

Retrospective research demonstrated that children may be more affected by prenatal alcohol exposure based on the following variables regarding the mother (3, 4):

- Poor pre-pregnancy or prenatal nutrition
- Multiple pregnancies and births
- Lower-than-average pre-pregnancy or prenatal weight, height, and body mass index (BMI)
- Maternal smoking
- Maternal age (effect on child increases with mother's age)
- Has family members or peers who drink heavily

One study indicated that, anecdotally, children with FASD are often "picky eaters", some have autistic-like taste and texture sensitivities, and many have behavioral challenges such as rigidity and oppositionality. Children with FASD had lower intakes of saturated fats, vitamin D, and calcium. They may not meet the recommended intakes for several nutrients and have a dietary pattern that could benefit from improving intakes of dairy products, green leafy vegetables, vegetable oils, nuts, eggs, and fish. Most (>50%) did not meet the Adequate Intake for fiber, n-3 fatty acids, vitamin K, or choline, or the Recommended Dietary Allowance for vitamin D, vitamin E, or calcium. (9)

Another study indicated that children with FASD were more likely to have a past diagnosis of underweight. Mean BMI was significantly reduced for males but not females. Abnormal eating patterns are common in children with FASD and may contribute to their delayed growth and nutritional inadequacies. Children with FASD were significantly more likely to experience delayed acquisition of age-appropriate eating skills, compared with controls. The median age for solid foods introduction was significantly older for children with FASD as was their age at self-feeding. (10)

Breastfeeding may prevent or improve neurodevelopmental disorders for children with FASD and has been shown to improve IQ (11, 12). Infants with facial abnormalities may have breastfeeding challenges such as difficulty with latch, sucking, or swallowing; and individualized breastfeeding support will likely be needed (13). (See risk #372 *Alcohol and Substance Use* for more information regarding breastfeeding and alcohol use.)

There is no cure for FASDs, but research shows that early intervention treatment services can improve a child's development. There are many types of treatment options, including medication to help with some symptoms, behavior and education therapy, parent training, and other alternative approaches. Certain protective factors can help reduce the effects of FASD and help people with these conditions reach their full potential. Protective factors include diagnosis before 6 years of age; loving, nurturing, and stable home environment during the school years; absence of violence; and involvement in special education and social services. (1)

Adults with FASD

FASDs last a lifetime. Research to date indicates that, compared to controls, adults with FASDs have increased behavioral problems; are perhaps less efficient and more distractible when completing tasks; have more difficulty with paying attention, learning, memory, planning, and analyzing social situations; and feel less confident that they have sufficient resources to cope with their environment. Adults with FASDs have a high rate of psychiatric and personality disorders, problems with drugs and alcohol, and difficulties with the law. They are also less likely to obtain a degree, have stable employment, and live independently. Young adults with PAE have increased risks for mental health problems and secondary disabilities, which impacts their ability to live independently. (1, 14)

Implications for WIC Nutrition Services

When speaking with a biological mother of a child with an FASD, the American Academy of Pediatrics recommends the following (15):

- Building a rapport with the mother and allow her to express her emotions and concerns related to her child's health and the demands of parenting a child with an FASD.
- Reaffirming the parent as a key part of the child's care team.

- Keeping all lines of communication and advocacy open as the child's care is coordinated through the medical home.
- Referring to the National Organization on Fetal Alcohol Syndrome's Circle of Hope Birth Mother's Network that can be contacted in person or online: https://www.nofas.org/circleofhope/.

WIC staff can assist parents/caregivers of infants and children with FASD by:

- Providing anthropometric monitoring to address underweight, delayed growth, nutritional inadequacies, or overweight issues and concerns.
- Providing individualized food packages tailored to meet the needs of participants.
- Providing nutrition information regarding how to improve the intake of dairy products, green leafy vegetables, vegetable oils, nuts, eggs and fish when appropriate as this may be beneficial (9).
- Providing nutrition guidance to help with making appropriate choices for healthy snacks and satiety.
- Providing suggestions for addressing age-appropriate feeding skills and behavioral and developmental issues associated with feeding.
- Encouraging physical activity as it improves glucose tolerance, muscle development, motor coordination, and may stimulate neurogenesis and synaptogenesis (10).
- Referring to their health care provider to discuss nutritional supplements and any growth and development concerns (3).
- Providing referrals to promote caregiver and infant/child feeding skills, including referrals to local home visiting programs, parenting programs, and early intervention services.
- Referring to their health care provider for breastfeeding support. These infants may need frequent growth monitoring and re-evaluation of their feeding capacity, so feeding plans will need to be adjusted accordingly. (13)

WIC staff can assist adult participants with FASD by (also see risk #902 *Woman or Infant/Child of Primary Caregiver with Limited Ability to Make Appropriate Feeding Decisions and/or Prepare Food*):

- Providing individualized nutrition education in an easy-to-understand format that is appropriate for the learning level of the participant/caregiver. Most education materials should be written for a 5th to 7th grade reading level. Be sensitive to the unique learning needs and style of the participant/caregiver, which may mean using food models, posters, and handouts.
- Providing referrals to promote parenting and infant/child feeding skills, including referrals to local home visiting programs, parenting programs, and early intervention services.
- Encouraging participants/caregivers to follow health care provider's plan of care. Coordinate with health care providers as needed.
- Providing individualized food packages, tailored to meet the needs of participants. Some adults with FASD with a limited ability to make appropriate feeding decisions/prepare food may be unable to prepare powder or concentrated infant formula. Thus, for the safety of the infant, State WIC Agencies may allow ready-to-feed (RTF) WIC formulas to be issued when it is determined that the caregiver may have difficulty correctly diluting powder or concentrated formulas. Please refer

to your State WIC Agency's specific policies regarding the issuance of RTF, as policies vary from state to state.

- Referring to their health care provider to discuss nutritional supplements for pregnant women (3).
- Referring to Substance Use and Prevention Manual: Screening, Education and Referral Resource Guide for Local WIC agencies. Available from: https://wicworks.fns.usda.gov/resources/wic-substance-use-prevention-guide.

References

1. Centers for Disease Control and Prevention [Internet]. Atlanta (GA): Centers for Disease Control and Prevention. Facts about FASDs. 2017 June 6 [cited 2017 September 11]. Available from: https://www.cdc.gov/ncbddd/fasd/facts.html.
2. Williams JF, Smith, VC. Committee on Substance Use. Fetal alcohol spectrum disorders. Pediatrics. 2015 Nov [cited 2019 Mar 6]: 136(5): e1395-1406. Available from: http://pediatrics.aappublications.org/content/136/5/e1395.
3. National Institutes of Health [Internet]. Bethesda (MD): National Institutes of Health, National Institute on Alcohol Abuse and Alcoholism. Fetal alcohol exposure fact sheet. 2015 Apr [cited 2019 Mar 5]. Available from: https://pubs.niaaa.nih.gov/publications/FASDFactsheet/FASD.pdf.
4. May, PA and Gossage, JP. Maternal risk factors for fetal alcohol spectrum disorders. Alcohol Research & Health 2011 [cited 2019 Mar 7];34(1). 15-23. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3860552/.
5. National Organization on Fetal Alcohol Syndrome. Washington (DC): National Organization on Fetal Alcohol Syndrome. Recognizing FASD. [cited 2019 Mar 7]. Available from: www.nofas.org/recognizing-fasd.
6. Werts RL, Van Calcar SC, Wargowski DS, et al. Inappropriate feeding behaviors and dietary intakes in children with fetal alcohol spectrum disorder or probable prenatal alcohol exposure. Alcohol Clin Exp Res. 2013 Oct 24 [cited 2019 Mar 7];38(3):871-78. Available from: https://doi.org/10.1111/acer.12284.
7. Young JK, Giesbrecht HE, Eskin MN, et al. Nutrition implications for fetal alcohol spectrum disorders. Adv. Nutr. 2014 Nov [cited 2019 Mar 7];5(6): 675-92. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4224205/.
8. Spohr HL, Willms J, Steinhausen HC. Fetal alcohol spectrum disorders in young adulthood. J Pediat. 2007 Feb [cited 2019 Mar 7];150(2):175-9. Available from: https://doi.org/10.1016/j.jpeds.2006.11.044.
9. Fugelstad AJ, Fink BA, Eckerle JK, et al. Inadequate intake of nutrients essential for neurodevelopment in children with fetal alcohol spectrum disorders. Neurotox Teratol. 2013 Sep-Oct [cited 2019 Mar 7];0:128-32. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3795902/.
10. Amos-Kroohs RM, Fink BA, Smith CJ, et al. Abnormal eating behaviors are common in children with fetal alcohol spectrum disorders. J Pediatr. 2016 Feb [cited 2019 Mar 7];169:194-200. Available from: https://doi.org/10.1016/j.jpeds.2015.10.049.

11. International Lactation Consultant Association. ILCA abstracts. J Hum Lact. 2004 Nov 1 [cited 2019 Mar 7];20(4):446-52. Available from: https://doi.org/10.1177/0890334404269874.

12. American Academy of Pediatrics. Policy Statement: Breastfeeding and the use of human milk. Pediatrics. 2012 Mar [cited 2019 Mar 7];129(3); 827-41. Available from: www.pediatrics.org/cgi/doi/10.1542/peds.2011-3552.

13. Page-Goertz S. The ill child: breastfeeding implications. In: Wambach K and Riordan J, editors. Breastfeeding and human lactation. 5th ed. Boston (MA): Jones & Bartlett Learning; c2016. Chapter 19; p. 741-747.

14. Moore EM and Rilery EP. What happens when children with fetal alcohol spectrum disorders become adults? Curr Dev Disord Rep. 2015 Sep [cited 2019 Mar 8];2(3):219-27. Available from: https://link.springer.com/article/10.1007%2Fs40474-015-0053-7.

15. American Academy of Pediatrics. Washington (DC): American Academy of Pediatrics; c2019. Fetal alcohol spectrum disorders toolkit, frequently asked questions. [cited 2019 April 23] Available from: https://www.aap.org/en-us/advocacy-and-policy/aap-health-initiatives/fetal-alcohol-spectrum-disorders-toolkit/Pages/Frequently-Asked-Questions.aspx#ques4.

Additional References and Resources

1. Centers for Disease Control and Prevention [Internet]. Atlanta (GA): Centers for Disease Control and Prevention. Learn the signs. Act early. 2018 June 11 [cited 2019 Mar 8]. Available from: https://www.cdc.gov/ncbddd/actearly/index.html.

2. FASD competency-based curriculum development guide for medical and allied health education and practice. Medical Assistant FASD Practice Improvement Collaborative. Reno (NV); 2015 [cited 2019 Mar 8]. 180 p. Available from: https://www.cdc.gov/ncbddd/fasd/curriculum/index.html. Funding provided by the U.S. Department of Health and Human Services, Centers for Disease Control and Prevention.

Clarification

Self-reporting of a diagnosis by a medical professional should not be confused with self-diagnosis, where a person simply claims to have or to have had a medical condition without any reference to professional diagnosis. A self-reported medical diagnosis ("My doctor says that I have/my son or daughter has…") should prompt the CPA to validate the presence of the condition by asking more pointed questions related to that diagnosis.

383 Neonatal Abstinence Syndrome

Definition/Cut-off Value

Neonatal abstinence syndrome (NAS) is a drug withdrawal syndrome that occurs among drug-exposed (primarily opioid-exposed) infants as a result of the mother's use of drugs during pregnancy (1). NAS is a combination of physiologic and neurologic symptoms that can be identified immediately after birth and can last up to 6 months after birth (2,3).

This condition must be present within the first 6 months of birth and diagnosed, documented, or reported by a physician or someone working under a physician's orders, or as self-reported by the infant's caregiver. See the clarification section for more information about self-reporting a diagnosis.

Participant Category and Priority Level

Category	Priority
Infants	I

Justification

Neonatal abstinence syndrome occurs when an infant is born dependent on prescription or illicit drugs the mother was taking during pregnancy. NAS is a combination of withdrawal symptoms that involve multiple bodily systems. It is most commonly associated with chronic opioid exposure during fetal development; however, can also result from chronic intrauterine exposure to other substances including: benzodiazepines, barbiturates, selective serotonin reuptake inhibitors and ethanol (3). Although these non-opioid substances can lead to NAS, these infants typically respond well to non-pharmacological methods of intervention (4).

Withdrawal in the newborn varies based on the type of substance, dose, and timing of exposure (4). Opioid is a general term for a variety of illicit and prescription drugs that decrease pain. Prescription opioid pain relievers include oxycodone, hydrocodone, codeine, morphine, and fentanyl. Opioids are water soluble and are, therefore, able to move easily across the placenta to the infant. This transfer of opioids increases as gestational age increases (3).

Heroin is an illegal opioid that is synthesized from morphine and can be injected, inhaled, or smoked. About 23% of individuals who use heroin become dependent (5). Furthermore, those who take any form of opioid, including prescription opioids as directed for chronic pain, can become addicted. Due to the risk of the transmission of infectious diseases such as Human Immunodeficiency Virus (HIV) and Hepatitis C, women who become pregnant while using illicit opioids, such as heroin, are often put on opioid maintenance therapy. Opioid maintenance therapy involves the prescribed use of either methadone or buprenorphine. These prescribed opioids can still lead to NAS; however, since they are not injected, they decrease the risk of the mother contracting blood borne infectious diseases. Opioid maintenance therapy can also help protect the fetus from repeated opioid withdrawal in utero (6).

The incidence of NAS has increased from 1.2 to 3.39 per 1,000 live births from 2000 to 2009 in the United States. This increased incidence is due to an increase in antepartum opioid use from 1.19 to 5.63 per 1,000 live births in the same period (7). In another study, it was reported that 5.9% of all women who were pregnant in 2012 reported some illicit drug use during pregnancy (4). Infants born with NAS are often

premature, have low birth weights, and are growth-restricted (see risks #142 *Preterm or Early Term Delivery*, #141 *Low Birth Weight*, and #151 *Small for Gestational Age* for more information about these conditions). (3) In addition to the concerns of exposure to substances in utero, additional factors, including social, nutritional, physical, and mental health problems can also contribute to the health status of the infant. An increased risk of certain birth defects has also been associated with early pregnancy opioid use (8). These birth defects include: spina bifida, hydrocephaly, glaucoma, gastroschisis, and heart defects (9).

Neonatal Abstinence Syndrome Symptoms

Symptoms of NAS generally involve the central nervous system, autonomic nervous system, and the gastrointestinal tract (3). The severity of the infant's symptoms is commonly assessed using the Modified Finnegan Score Sheet. The Modified Finnegan Score Sheet consists of 21 symptoms that are associated with NAS. Following the determination of a baseline score, infants are assessed every 4 hours unless the severity of the symptoms requires more frequent monitoring (10). The following list includes symptoms associated with NAS (1, 6):

- Loud, high-pitched crying
- Sweating
- Yawning
- Sleep disturbances
- Feeding difficulties
- Poor weight gain
- Excessive sucking
- Regurgitation
- Diarrhea

Neonatal Abstinence Syndrome Treatment

Infants with NAS typically have longer hospital stays, can experience serious complications, and have costly treatment (2). The first treatment option for infants with NAS is to manage symptoms without medication by rooming in with the mother, encouraging skin-to-skin contact, swaddling, having a calm environment, avoiding overstimulation, and supporting breastfeeding (11). Infants who are at risk for NAS and who room-in with their mothers are not only at a lower risk of needing pharmacological treatment for NAS, but they also have a shortened hospital stay (12). If withdrawal is severe or if the initial treatment is not successful in managing symptoms of NAS, medications such as morphine, methadone, phenobarbital or clonidine may be used. An infant given these medications may have side effects that could include: slow or shallow breathing, slow heart rate, difficulty waking-up, excessive sleepiness, constipation, and fewer wet diapers (11).

Nutritional Considerations for Neonatal Abstinence Syndrome

The timing and type of feedings play an important role in the management of NAS symptoms. Infants with NAS may have impaired feeding behaviors such as excessive sucking, regurgitation, diarrhea and poor feeding that is characterized by fussiness, crying, and sleepiness (13, 14). Infants with NAS have higher caloric requirements due to their energy expenditure. This combined with the impaired feeding behaviors may result in difficulty with weight gain (14). The American Academy of Pediatrics (AAP) recommends

breastfeeding if not contraindicated (15). The AAP also recommends that infants with NAS be fed frequent small volumes of human milk or high calorie formula, as needed, in a quiet and calm environment, to aid the infant in tolerating feedings and improving digestion and to allow for adequate growth (11, 15).

The Academy of Breastfeeding Medicine recommends breastfeeding for women who are on a prescribed stable dose of methadone maintenance because the concentrations of methadone in human milk are low (16). Studies have indicated that, although the amount of methadone in human milk is dependent on the mother's dose, the methadone transferred in human milk averages less than 2.8% of the maternal dose (17). Breastfeeding has been found to provide protection against the development of NAS symptoms and lessen the severity of symptoms, which would decrease the need for pharmacological intervention for the infant (18, 19, 20). The amount of methadone that is in human milk is small and therefore, it is thought that breastfeeding, and not the methadone in human milk, is responsible for its protective impact against NAS (18). Gradual weaning, when mutually desired by the mother and infant, is recommended for breastfeeding women who are being treated for opioid addiction. Gradual weaning (rather than an abrupt stop to breastfeeding) decreases the risk of the infant developing NAS (11, 17).

Implications for WIC Nutrition Services

NAS can be a difficult subject to talk about with WIC participants due to the stigma of addiction. In the WIC clinic, caregivers may not be forthcoming with the infant's diagnosis of NAS and an addiction history of the mother may not be available at the initial assessment. WIC staff can assist caregivers by:

- Educating to recognize infant hunger cues.
- Reviewing feeding frequency and/or formula type and amount to help manage gastrointestinal symptoms of NAS.
- Providing growth monitoring to assess adequate weight gain.
- Encouraging supportive interventions to include:
    - Skin-to-skin contact
    - Swaddling
    - Quiet environment with little stimulation
- Encouraging breastfeeding unless medically contraindicated.
- Providing referrals for support services such as drug and alcohol counseling, parenting support, and medical evaluations.
- Encouraging mothers who are on medication-assisted therapy (e.g., methadone or buprenorphine) and who are breastfeeding, to speak with their health care provider if they have questions about the timing and dose of their medication.
- Educating mothers who are on medication-assisted therapy and who are breastfeeding on the importance of gradual weaning when mutually desired by the mother and infant.

References

1. Centers for Disease Control and Prevention [Internet]. Georgia: [cited 2017 May 19]. The Problem of Neonatal Abstinence Syndrome; [about 3 screens]. Available from: http://www.ncbi.nlm.nih.gov/pubmedhealth/PMHT0024264/.

2. Centers for Disease Control and Prevention. Infant and maternal characteristics in neonatal abstinence syndrome-selected hospitals in Florida, 2010-2011. MMWR. 2015 Mar 6.

3. Kocherlakota, P. Neonatal Abstinence Syndrome. Pediatrics. 2014; 134(2):e547-e561.

4. Wiles JR, Isemann B, Ward LP, Vinks AA, Akinbi H. Current management of neonatal abstinence syndrome secondary to intrauterine opioid exposure. J Pediatr. 2014;165(3):440-446.

5. National Institute on Drug Abuse [Internet]. Maryland: [updated 2014 Oct; cited 2016 Feb 3]. DrugFacts: Heroin; [about 4 screens]. Available from: https://www.drugabuse.gov/publications/drugfacts/heroin.

6. Kaltenbach K, Holbrook A, Coyle MG, Heil SH, Salisbury A, Stine S, Martin P, Jones H. Addiction. 2012; 107: 45-52.

7. Bagley SM, Wachman EM, Holland E, Brogly SB. Addiction Science and Clinical Practice. 2014; 9:19.

8. Broussard CS, Rasmussen SA, Reefhuis J, Friedman JM, Jann MW, Riehle-Colarusso T, Honein MA. Maternal treatment with opioid analgesics and risk for birth defects. Am J of Obstetrics and Gynecology. 2011;204(4):314.e1-314.e11.

9. Centers for Disease Control and Prevention [Internet]. Georgia: [updated 2014 Oct 22; cited 2016 Feb 3]. Key findings: maternal treatment with opioid analgesics and risk for birth defects. [about 4 screens]. Available from: http://www.cdc.gov/ncbddd/birthdefects/features/birthdefects-opioid-analgesics-keyfindings.html.

10. University of Iowa Children's Hospital [Internet]. Iowa: [updated 2013 Feb 2; cited 2016 Mar 31]. Identifying neonatal abstinence syndrome (NAS) and treatment guidelines. Available from: http://www.uichildrens.org/uploadedFiles/UIChildrens/Health_Professionals/Iowa_Neonatology_Handbook/Pharmacology/Neonatal%20Abstinence%20Syndrome%20Treatment%20Guidelines%20Feb2013%20revision.pdf.

11. Wisconsin Association for Perinatal Care [Internet]. Wisconsin: [updated June 2014; cited 2016 Feb 12]. Assessment and Intervention in the Home: Women and Infants Affected by Opioids. [about 2 screens]. Available from: http://www.perinatalweb.org/assets/cms/uploads/files/Opioid%20Tip%20Sheet_v4.pdf.

12. McKnight S, Coo H, Davies G, Holmes B, Newman A, Newton L, Dow K. Rooming-in for infants at risk of neonatal abstinence syndrome. Am J Perinatol. 2015 Nov 20.

13. Maguire DJ, Rowe MA, Spring H, Elliott AF. Patterns of disruptive feeding behaviors in infants with neonatal abstinence syndrome. Adv Neonatal Care. 2015; 15(6): 429-439.

14. MacMullen NJ, Dulski LA, Blobaum P. Evidence-based intervention for neonatal abstinence syndrome. J Ped Nurs. 2014; 40(4): 165-203.

15. American Academy of Pediatrics, Committee on Drugs and the Committee on Fetus and Newborn. Clinical report: neonatal drug withdrawal. Pediatrics. 2012; 129:e540–e56.

16. Reece-Stremtan S, Marinelli KA. ABM Clinical Protocol #21: Guidelines for breastfeeding and substance use or substance use disorder. Breastfeeding Medicine. 2015; 10(3): 135-141.

17. Hale TW, Rowe HE. Medications & mothers' milk. Hale Publishing. 2014.

18. Liu A, Juarez J, Nair A, Nanan R. Feeding modalities and the onset of the neonatal abstinence syndrome. Frontiers in Pediatrics. 2015; 3(14).

19. Pritham UA. Breastfeeding promotion for management of neonatal abstinence syndrome. J Obstet Gynecol Neonatal Nurs. 2013; 42(5): 517-526.

20. Welle-Strand GK, Skurtveit S, Jansson LM, Bakstad B, Bjarko L, Ravndal E. Breastfeeding reduces the need for withdrawal treatment in opioid-exposed infants. Acta Paediatr. 2013; 102(11): 1060-1066.

Additional Reference:

Food and Nutrition Service, U.S. Department of Agriculture. Substance use prevention: screening, education, and referral resource guide for local WIC agencies.2013;FNS-276 revised. [cited 2016 Jul 12]. Available from: https://wicworks.fns.usda.gov/wicworks/Topics/ResourceManual.pdf.

Clarification

Self-reporting of a diagnosis by a medical professional should not be confused with self-diagnosis, where a person simply claims to have or have had a medical condition without any reference to professional diagnosis. A self-reported medical diagnosis ("My doctor says that I have/my son or daughter has…") should prompt the CPA to validate the presence of the condition by asking more pointed questions related to that diagnosis.

401 Failure to Meet Dietary Guidelines for Americans

Definition/Cut-off Value

Women and children two years of age and older who meet the income, categorical, and residency eligibility requirements may be presumed to be at nutrition risk for *failure to meet Dietary Guidelines for Americans [Dietary Guidelines]* (1). Based on an individual's estimated energy needs, the *failure to meet Dietary Guidelines* risk criterion is defined as consuming fewer than the recommended number of servings from one or more of the basic food groups (grains, fruits, vegetables, milk products, and meat or beans)

Note: The *Failure to meet Dietary Guidelines for Americans* risk criterion can only be used when a complete nutrition assessment has been completed **and** no other risk criteria have been identified. This includes assessing for risk #425, *Inappropriate Nutrition Practices for Children* or risk #427, *Inappropriate Nutrition Practices for Women*.

Participant Category and Priority Level

Category	Priority
Pregnant Women	IV
Breastfeeding Women	IV
Non-Breastfeeding Women	VI
Children ≥ 2 years of age	V

Justification

The 1996 Institute of Medicine (IOM) report, *WIC Nutrition Risk Criteria: A Scientific Assessment,* raised questions on the quality of traditional dietary assessment methods (e.g., 24-hour recall and food frequency questionnaires) and recommended further research on the development and validation of diet assessment methodologies (2). In response to the 1996 IOM report, the Food and Nutrition Service (FNS) commissioned the IOM to review the use of various dietary assessment tools and to make recommendations for assessing inadequate diet or inappropriate dietary patterns, especially in the category of f*ailure to meet Dietary Guidelines* (see Clarification) (3).

The IOM Committee on Dietary Risk Assessment in the WIC Program approached this task by using the Food Guide Pyramid* recommended number of servings, based on energy needs, as cut-off points for each of the five basic food groups to determine if individuals were meeting the *Dietary Guidelines*. As a result of the review of the cut-off points for food groups and dietary assessment methods, the IOM published the 2002 report, *Dietary Risk Assessment in the WIC Program*. The IOM Committee's findings related to dietary risk, the summary evidence, and the Committee's concluding recommendation are provided below. (4)

IOM Committee Findings Related to Dietary Risk (4) (For more information, refer to the specific pages listed.)

- A dietary risk criterion that uses the WIC applicant's usual intake of the five basic Pyramid* food groups as the indicator and the recommended number of servings based on energy needs as the cut-off points is consistent with *failure to meet Dietary Guidelines.* (page 130)
- Nearly all U.S. women and children usually consume fewer than the recommended number of servings specified by the Food Guide Pyramid* and, therefore, would be at dietary risk based on the criterion *failure to meet Dietary Guidelines*. (page 130)
- Even research-quality dietary assessment methods are not sufficiently accurate or precise to distinguish an **individual's** eligibility status using criteria based on the Food Guide Pyramid* or on nutrient intake. (page 131)

Summary Evidence Supporting a Presumed Dietary Risk Criterion (4) (For more information, refer to the specific page listed.)

- Less than 1 percent of all women meet recommendations for all five Pyramid* groups. (page 127)
- Less than 1 percent of children ages 2 to 5 years meet recommendations for all five Pyramid* groups. (page 127)
- The percentage of women consuming fruit during 3 days of intake increases with increasing income level. (page 127)
- Members of low-income households are less likely to meet recommendations than are more affluent households. (page 127)
- Food-insecure mothers are less likely to meet recommendations for fruit and vegetable intake than are food-secure mothers. (page 127)
- The percentage of children meeting recommendations for fat and saturated fat as a percentage of food energy increases with increasing income level. (page 127)
- Low-income individuals and African Americans have lower mean Healthy Eating Index scores than do other income and racial/ethnic groups. (page 127)

**The Food Guide Pyramid was the Dietary Guidelines icon at the time the 2002 IOM Committee on Dietary Risk Assessment in the WIC Program conducted the review. The Dietary Guidelines icon has been changed to MyPlate. Although the icon has changed, the Findings and the Supporting Research are still applicable to this criterion. Please see Clarification for more information.*

Summary Evidence Suggesting that Dietary Assessment Methods are Not Sufficient to Determine a WIC Applicant's Dietary Risk (4) (For more information, refer to the specific page listed.)

- 24-hour diet recalls and food records are not good measures of an individual's usual intake unless a number of independent days are observed. (page 61)
- On average, 24-hour diet recalls and food records tend to underestimate usual intake–energy intake in particular. (page 61)
- Food Frequency Questionnaires and diet histories tend to overestimate mean energy intakes. (page 61)

IOM Committee Concluding Recommendation (4) (For more information, refer to the specific page listed.)

"In summary, evidence exists to conclude that nearly all low-income women in the childbearing years and children ages 2 to 5 years are at dietary risk, are vulnerable to nutrition insults, and may benefit from WIC's services. Further, due to the complex nature of dietary patterns, it is unlikely that a tool will be developed to fulfill its intended purpose with WIC, i.e., to classify individuals accurately with respect to their true dietary risks. Thus, any tools adopted would result in misclassification of the eligibility status of some, potentially many, individuals. By presuming that all who meet the Program's categorical and income eligibility requirements are at dietary risk, WIC retains its potential for preventing and correcting nutrition-related problems while avoiding serious misclassification errors that could lead to denial of services to eligible individuals." (page 135)

Implications for WIC Nutrition Services

As indicated in the 2002 IOM report, most Americans (including most WIC participants) fail to adhere to the *Dietary Guidelines*. Through participant-centered counseling, WIC staff can:

- Guide the participant in choosing healthy foods and age-appropriate physical activities as recommended in the *Dietary Guidelines*.
- Reinforce positive lifestyle behaviors that lead to positive health outcomes.
- Discuss nutrition-related topics of interest to the participant such as food shopping, meal preparation, feeding relationships, and family meals.
- Refer participants, as appropriate, to the Supplemental Nutrition Assistance Program (SNAP), community food banks and other available nutrition assistance programs.

References

1. United States Department of Agriculture and the United States Department of Health and Human Services. Dietary Guidelines for Americans, 7th Edition, 2010. Available at: www.usda.gov/cnpp.
2. Institute of Medicine (IOM); Committee on Scientific Evaluation of WIC Nutrition Risk Criteria. WIC nutrition risk criteria: A scientific assessment. Washington, DC: National Academy Press; 1996.
3. United States Department of Agriculture and the United States Department of Health and Human Services. Dietary Guidelines for Americans, 5th Edition, 2000. Available at: www.usda.gov/cnpp.
4. Institute of Medicine (IOM); Committee on Dietary Risk Assessment in the WIC Program. Dietary risk assessment in the WIC program. Washington, DC: National Academy Press; 2002. Available at: http://www.iom.edu/Reports/2002/Dietary-Risk-Assessment-in-the-WIC-Program.aspx.

Clarification

The recommendation and findings of the IOM Committee were developed using the *2000 Dietary Guidelines* as the standard for a healthy diet. Subsequent to the 2002 IOM report, the *Dietary Guidelines* have been updated with the release of the *2005 and 2010 Dietary Guidelines*. Although the subsequent editions of the *Dietary Guidelines* are different from the 2000 edition, there is no evidence to suggest that the 2002 IOM recommendation and findings are invalid or inaccurate. The fact remains that diet assessment methodologies may not reflect usual intakes and therefore are insufficient to determine an individual's eligibility status. In addition, future research will be necessary to determine if there is a change in the IOM finding that nearly all Americans fail to consume the number of servings from the basic food groups as recommended in the *Dietary Guidelines*.

411 Inappropriate Nutrition Practices for Infants

Definition/Cut-off Value

Routine use of feeding practices that may result in impaired nutrient status, disease, or health problems. These practices, with examples, are outlined below. Refer to "Attachment to 411-Justification and References" for this criterion.

Participant Category and Priority level

Category	Priority
Infants	IV

Inappropriate Nutrition Practices for Infants	Examples of Inappropriate Nutrition Practices (including but not limited to)
411.1 Routinely using a substitute(s) for human milk or for FDA approved iron-fortified formula as the primary nutrient source during the first year of life.	Examples of substitutes: • Low iron formula without iron supplementation. • Cow's milk, goat's milk, or sheep's milk (whole, reduced fat, low-fat, skim), canned evaporated or sweetened condensed milk. • Imitation or substitute milks (such as rice- or soy-based beverages, non-dairy creamer), or other "homemade concoctions."
411.2 Routinely using nursing bottles or cups improperly.	• Using a bottle to feed fruit juice. • Feeding any sugar-containing fluids, such as soda/soft drinks, gelatin water, corn syrup solutions, and sweetened tea. • Allowing the infant to fall asleep or be put to bed with a bottle at naps or bedtime. • Allowing the infant to use the bottle without restriction (e.g., walking around with a bottle) or as a pacifier. • Propping the bottle when feeding. • Allowing an infant to carry around and drink throughout the day from a covered or training cup. • Adding any food (cereal or other solid foods) to the infant's bottle.

Inappropriate Nutrition Practices for Infants	Examples of Inappropriate Nutrition Practices (including but not limited to)
411.3 Routinely offering complementary foods* or other substances that are inappropriate in type or timing. **Complementary foods are any foods or beverages other than human milk or infant formula.*	Examples of inappropriate complementary foods: • Adding sweet agents such as sugar, honey, or syrups to any beverage (including water) or prepared food, or used on a pacifier. • Introducing any food other than human milk or iron-fortified infant formula before 6months of age.
411.4 Routinely using feeding practices that disregard the developmental needs or stage of the infant.	• Inability to recognize, insensitivity to, or disregarding the infant's cues for hunger and satiety (e.g., forcing an infant to eat a certain type and/or amount of food or beverage or ignoring an infant's hunger cues). • Feeding foods of inappropriate consistency, size, or shape that put infants at risk of choking. • Not supporting an infant's need for growing independence with self-feeding (e.g., solely spoon-feeding an infant who is able and ready to finger-feed and/or try self-feeding with appropriate utensils). • Feeding an infant food with inappropriate textures based on his/her developmental stage (e.g., feeding primarily pureed or liquid foods when the infant is ready and capable of eating mashed, chopped or appropriate finger foods).
411.5 Feeding foods to an infant that could be contaminated with harmful microorganisms or toxins.	Examples of potentially harmful foods: • Unpasteurized fruit or vegetable juice. • Unpasteurized dairy products or soft cheeses such as feta, Brie, Camembert, blue-veined, and Mexican-style cheese. • Honey (added to liquids or solid foods, used in cooking, as part of processed foods, on a pacifier, etc.). • Raw or undercooked meat, fish, poultry, or eggs. • Raw vegetable sprouts (alfalfa, clover, bean, and radish). • Deli meats, hot dogs, and processed meats (avoid unless heated until steaming hot). • Donor human milk acquired directly from individuals or the Internet.
411.6 Routinely feeding inappropriately diluted formula.	• Failure to follow manufacturer's dilution instructions (to include stretching formula for household economic reasons). • Failure to follow specific instructions accompanying a prescription.

Inappropriate Nutrition Practices for Infants	Examples of Inappropriate Nutrition Practices (including but not limited to)
411.7 Routinely limiting the frequency of nursing of the exclusively breastfed infant when human milk is the sole source of nutrients.	Examples of inappropriate frequency of nursing: • Scheduled feedings instead of demand feedings. • Less than 8 feedings in 24 hours if less than 2 months of age.
411.8 Routinely feeding a diet very low in calories and/or essential nutrients.	Examples: • Strict vegan diet. • Macrobiotic diet. • Other diets very low in calories and/or essential nutrients.
411.9 Routinely using inappropriate sanitation in the feeding, preparation, handling, and/or storage of expressed human milk or formula.	Limited or no access to a: • Safe water supply (documented by appropriate officials e.g., municipal or health department authorities). • Heat source for sterilization. • Refrigerator or freezer for storage. Failure to prepare, handle, and store bottles, storage containers or breast pumps properly; examples include: Human Milk • Thawing/heating in a microwave. • Refreezing. • Adding freshly expressed unrefrigerated human milk to frozen human milk. • Adding freshly pumped chilled human milk to frozen human milk in an amount that is greater than the amount of frozen human milk. • Feeding thawed refrigerated human milk more than 24 hours after it was thawed. • Saving human milk from a used bottled for another feeding. • Failure to clean breast pump per manufacturer's instruction. • Feeding donor human milk acquired directly from individuals or the Internet. Formula • Failure to prepare and/or store formula per manufacturer's or physician instructions. • Storing at room temperature for more than 1 hour. • Using formula in a bottle one hour after the start of a feeding.

Inappropriate Nutrition Practices for Infants	Examples of Inappropriate Nutrition Practices (including but not limited to)
411.9 (continued) Routinely using inappropriate sanitation in preparation, handling, and/or storage of expressed human milk or formula.	• Saving formula from a used bottle for another feeding. • Failure to clean baby bottle properly.
411.10 Feeding dietary supplements with potentially harmful consequences.	Examples of dietary supplements which, when fed in excess of recommended dosage, may be toxic or have harmful consequences: • Single or multi-vitamins. • Mineral supplements. • Herbal or botanical supplements/remedies/teas.
411.11 Routinely not providing dietary supplements recognized as essential by national public health policy when an infant's diet alone cannot meet nutrient requirements.	• Infants who are 6 months of age or older who are ingesting less than 0.25 mg of fluoride daily when the water supply contains less than 0.3 ppm fluoride. • Infants who are exclusively breastfed, or who are ingesting less than 1 liter (or 1 quart) per day of vitamin D-fortified formula, and are not taking a supplement of 400 IU of vitamin D.

Attachment to 411: Justification and References

Inappropriate Nutrition Practices for Infants

Justification

411.1 Routinely using a substitute(s) for human milk or for FDA approved iron-fortified formula as the primary nutrient source during the first year of life.

During the first year of life, breastfeeding is the normative standard method of infant feeding. The American Academy of Pediatrics (AAP) recommends human milk for the first 12 months of life because of its acknowledged benefits to infant nutrition, gastrointestinal function, host defense, and psychological well-being (1). In addition, the AAP has established exclusive breastfeeding as the standard against which all alternative feeding methods must be measured with regard to growth, health, development, and all other short and long-term outcomes for children (2). For infants fed infant formula, iron-fortified formula is generally recommended as a substitute for breastfeeding (1- 5). Rapid growth and increased physical activity significantly increase the need for iron and utilize iron stores (1). Body stores are insufficient to meet the increased iron needs making it necessary for the infant to receive a dependable source of iron to prevent iron deficiency anemia (1). Iron deficiency anemia is associated with cognitive and psychomotor impairments that may be irreversible, and with decreased immune function, apathy, short attention span, and irritability (1, 6). Feeding of low-iron infant formula can compromise an infant's iron stores and lead to iron deficiency anemia. Cow's milk has insufficient and inappropriate amounts of nutrients and can cause occult blood loss that can lead to iron deficiency, stress on the kidneys from a high renal solute load, and allergic reactions (1, 4, 6-9). Sweetened condensed milk has an abundance of sugar that displaces other nutrients or causes over-consumption of calories (10). Homemade formulas prepared with canned evaporated milk do not contain optimal kinds and amounts of nutrients infants need (1, 6, 9, 10). Goat's milk, sheep's milk, imitation milks, and substitute milks do not contain nutrients in amounts appropriate for infants (1, 4, 6, 11, 12).

411.2 Routinely using nursing bottles or cups improperly.

Dental caries is a major health problem in U.S. preschool children, especially in low-income populations (13). Eating and feeding habits that affect tooth decay and are started during infancy may continue into early childhood. Most implicated in this disease process is prolonged use of baby bottles during the day or night, containing fermentable sugars, (e.g., fruit juice, soda, and other sweetened drinks), pacifiers dipped in sweet agents such as sugar, honey or syrups, or other high frequency sugar exposures (14). The AAP and the American Academy of Pedodontics recommend that juice should be offered to infants ($\geq$ 6 months of age) in a cup, not a bottle, and that infants not be put to bed with a bottle in their mouths (15, 16). While sleeping with a bottle in his or her mouth, an infant's swallowing and salivary flow decreases, thus creating a pooling of liquid around the teeth (17). The practice of allowing infants to carry or drink from a bottle or training cup of juice for periods throughout the day leads to excessive exposure of the teeth to fermentable carbohydrates, which promotes the development of dental caries (15).

Allowing infants to sleep with a nursing bottle containing fermentable carbohydrates or to use it unsupervised during waking hours provides an almost constant supply of carbohydrates and sugars (1). This leads to rapid demineralization of tooth enamel and an increase in the risk of dental caries due to prolonged contact between cariogenic bacteria on the susceptible tooth surface and the sugars in the

consumed liquid (1, 18). The sugars in the liquid pool around the infant's teeth and gums, feed the bacteria there, and decay is the result (19). The process may start before the teeth are even fully erupted. Upper incisors (upper front teeth) are particularly vulnerable; the lower incisors are generally protected by the tongue (19). The damage begins as white lesions and progresses to brown or black discoloration typical of caries (19). When early childhood caries is severe, the decayed crowns may break off and the permanent teeth developing below may be damaged (19). Undiagnosed dental caries and other oral pain may contribute to feeding problems and failure to thrive in young children (19).

Unrestricted use of a bottle containing fermentable carbohydrates is a risk because the more times an infant consumes solid or liquid food, the higher the caries risk (1). Feeding behaviors such as unrestricted use of the bottle and frequent snacking can be habit forming in later infancy and may carry over into toddler-hood. Frequent cariogenic snacks eaten between meals place the toddler at high risk for caries development; this includes the habit of continually sipping from cups (or bottles) containing cariogenic liquids (juice, milk, soda, or sweetened liquid) (19). If inappropriate use of the bottle persists, the child is at risk of toothaches, costly dental treatment, loss of primary teeth, and developmental lags on eating and chewing. If this continues beyond the usual weaning period, there is a risk of decay to permanent teeth.

Propping the bottle deprives infants of vital human contact and nurturing which makes them feel secure. It can also cause ear infections because of fluid entering the middle ear and not draining properly; choking from liquid flowing into the lungs; and tooth decay from prolonged exposure to carbohydrate-containing liquids (20).

Adding solid food to a nursing bottle results in force-feeding, inappropriately increases the energy and nutrient composition of the formula, deprives the infant of experiences important in the development of feeding behavior, and could cause an infant to choke (1, 11, 21, 22).

411.3 Routinely offering complementary foods or other substances that are inappropriate in type or timing.

Infants, especially those living in poverty, are at high risk for developing early childhood caries (13). Most implicated in this disease process are: prolonged use of baby bottles containing fermentable sugars, (e.g., fruit juice, soda, and other sweetened drinks) during the day or night; pacifiers dipped in sweet agents such as sugar, honey or syrups; or other high frequency sugar exposures (14).

The AAP recommends exclusive breastfeeding through 6 months of age (1). Feeding solid foods too early (i.e., before 6 months of age) by, for example, adding diluted cereal or other solid foods to bottles deprives infants of the opportunity to learn to feed themselves (4, 11, 23). The major objection to the introduction of solids before 6 months of age is based on the possibility that it may interfere with establishing sound eating habits and may contribute to overfeeding (6,24). In early infancy, the infant possesses an extrusion reflex that enables him/her to swallow only liquid foods (1, 13, 25). The extrusion reflex is normally diminished by 6 months of age (1). Breast milk or iron-fortified infant formula is all the infant needs. Gastric secretions, digestive capacity, renal capacity and enzymatic secretions are low, which makes digestion of solids inefficient and potentially harmful (6, 24, 25). Furthermore, there is the potential for antigens to be developed against solid foods, due to the undigested proteins that may permeate the gut; however, the potential for developing allergic reactions may primarily be in infants with a strong family history of atopy (6, 24). If solid foods are introduced before the infant is developmentally ready, breast milk or iron-fortified formula necessary for optimum growth is displaced (1, 25). Around 6 months of age, the infant is developmentally ready for solid foods when: the infant is better able to express certain feeding

cues such as turning head to indicate satiation; oral and gross motor skills begin to develop that help the infant to take solid foods; the extrusion reflex disappears; and the infant begins to sit upright and maintain balance with little or no support (1, 6, 24, 25).

The AAP advises against giving fruit juice to infants younger than 6 months since it offers no nutritional benefit at this age (1). Offering juice before solid foods are introduced into the diet could risk having juice replace breast milk or infant formula in the diet (15). This can result in reduced intake of protein, fat, vitamins, and minerals such as iron, calcium, and zinc (26). It is prudent to give juice only to infants who can drink from a cup (15).

411.4 Routinely using feeding practices that disregard the developmental needs or stage of the infant.

Infants held to rigid feeding schedules are often underfed or overfed. Caregivers insensitive to signs of hunger and satiety, or who over-manage feeding may inappropriately restrict or encourage excessive intake. Findings show that these practices may promote negative or unpleasant associations with eating that may continue into later life, and may also contribute to obesity. Infrequent breastfeeding can result in lactation insufficiency and infant failure-to-thrive. Infants should be fed foods with a texture appropriate to their developmental level. (4, 6, 11, 13, 23)

411.5 Feeding foods to an infant that could be contaminated with harmful microorganisms or toxins.

Only pasteurized juice is safe for infants, children, and adolescents (15). Pasteurized fruit juices are free of microorganisms (15). Unpasteurized juice may contain pathogens, such as Escherichia coli, Salmonella, and Cryptosporidium organisms (15, 27). These organisms can cause serious disease, such as hemolytic-uremic syndrome, and should never be fed to infants and children (15). Unpasteurized juice must contain a warning on the label that the product may contain harmful bacteria (15, 28). Infants or young children should not eat raw or unpasteurized milk or cheeses (1)—unpasteurized dairy products could contain harmful bacteria, such as Brucella species, that could cause young children to contract a dangerous food borne illness. The AAP also recommends that young children should not eat soft cheeses such as feta, Brie, Camembert, blue-veined, and Mexican-style cheese—these foods could contain Listeria bacteria (1). Hard cheeses, processed cheeses, cream cheese, cottage cheese, and yogurt need not be avoided (1).

Honey has been implicated as the primary food source of *Clostridium botulinum* during infancy. These spores are extremely resistant to heat, including pasteurization, and are not destroyed by present methods of processing honey. Botulism in infancy is caused by ingestion of the spores, which germinate into the toxin in the lumen of the bowel (10, 11, 29, 30).

Infants or young children should not eat raw or undercooked meat or poultry, raw fish or shellfish, including oysters, clams, mussels, and scallops —these foods may contain harmful bacteria or parasites that could cause children to contract a dangerous food-borne illness (1).

According to the AAP, to prevent food-borne illness, the foods listed below should not be fed to infants or young children (1). All of the foods have been implicated in selected outbreaks of food-borne illness, including in children. Background information regarding foods that could be contaminated with harmful microorganisms is also included below (1):

- Raw vegetable sprouts (alfalfa, clover, bean, and radish) -- can cause potentially dangerous Salmonella and E. coli O157 infection. Sprouts grown under clean conditions in the home also present a risk because bacteria may be present in the seeds. Cook sprouts to reduce the risk of illness significantly (31).

- Deli meats, hot dogs, and processed meats (avoid unless heated until steaming hot) --These foods have been found to be contaminated with Listeria monocytogenes; if adequately cooked, this bacteria is destroyed.

Please see section 411.9 below under "Human Milk", for information related to the use of donor human milk acquired via the internet or directly from an individual.

411.6 Routinely feeding inappropriately diluted formula.

Over-dilution can result in water intoxication resulting in hyponatremia; irritability; coma; inadequate nutrient intake; failure to thrive; and/or poor growth (1, 4, 6, 11, 32). Underdilution of formula increases calories, protein, and solutes presented to the kidney for excretion, and can result in hypernatremia, tetany, and obesity (4, 6, 11, 32).

Dehydration and metabolic acidosis can occur with under-dilution of formula (4, 6, 11, 32). Powdered formulas vary in density so manufacturers' scoops are formula-specific to assure correct dilution (6). One clue for staff to identify incorrect formula preparation is to determine if the parent/caregiver is using the correct manufacturer's scoop to prepare the formula.

411.7 Routinely limiting the frequency of nursing of the exclusively breastfed infant when human milk is the sole source of nutrients.

Exclusive breastfeeding provides ideal nutrition to an infant and is sufficient to support optimal growth and development in the first 6 months of life (5). Human colostrum and milk have been studied extensively. They are composed of a mixture of nutritive components and other bioactive factors that are easy to digest and absorb and have strong physiologic effects upon the infant, and their composition changes over time to meet the infant's changing nutritional needs (1).

Frequent breastfeeding is critical to the establishment and maintenance of an adequate milk supply for the infant (5, 33-37). Inadequate frequency of breastfeeding may lead to lactation failure in the mother and dehydration, poor weight gain, diarrhea, vomiting, illness, and malnourishment in the infant (5, 35, 38-43). Exclusive breastfeeding protects infants from early exposure to contaminated foods and liquids (41). Infants who receive human milk more than infant formulas have a lower risk of being overweight in childhood and adolescence (44, 45). In addition, a summary report of several primary studies and meta-analyses has reported that a history of breastfeeding is associated with a reduction in the risk of otitis media, gastroenteritis, hospitalization for lower respiratory tract infections, atopic dermatitis, sudden infant death syndrome, childhood asthma, childhood leukemia, and type 1 and 2 diabetes (46).

411.8 Routinely feeding a diet very low in calories and/or essential nutrients.

Highly restrictive diets prevent adequate intake of nutrients, interfere with growth and development, and may lead to other adverse physiological effects (4). Infants older than 6 months are potentially at the greatest risk for overt deficiency states related to inappropriate restrictions of the diet, although deficiencies of vitamins B12 and essential fatty acids may appear earlier (1, 47, 48). Infants are particularly vulnerable during the weaning period if fed a macrobiotic diet and may experience psychomotor delay in some instances (1, 49, 50). Well-balanced vegetarian diets with dairy products and eggs are generally associated with good health. However, strict vegan diets may be inadequate in calories, vitamin B12, vitamin D, calcium, iron, protein and essential amino acids needed for growth and development (51). The more limited the diet, the greater the health risk. Given the health and nutrition risks associated with

highly restrictive diets, WIC can help the parent to assure that the infant consumes an adequate diet to optimize health during critical periods of growth as well as for the long term.

411.9 Routinely using inappropriate sanitation in the feeding, preparation, handling, and/or storage of expressed human milk or formula.

Lack of sanitation in the preparation, handling and storage of expressed human milk or formula may cause gastrointestinal infection. The water used to prepare concentrated or powdered infant formula and prepare bottles and nipples (for formula and human milk) must be safe for consumption. Water contaminated with toxic substances (such as nitrates, lead, or pesticides) poses a hazard to an infant's health and should NOT be used (10). In addition, a heat source is necessary to sterilize bottles and other items used in the storage of both human milk and formula. Adequate refrigeration (40 Degrees Fahrenheit or below) is necessary to safely store human milk and prepared formula (10).

Human Milk

Published guidelines on the handling and storage of human milk may differ among pediatric nutrition authorities (1, 10, 52-55). However, the following human milk feeding, handling, and storage practices are considered inappropriate and unsafe (10, 52, 56-59):

- Thawing frozen human milk in the microwave oven.
- Refreezing human milk.
- Adding freshly expressed unrefrigerated human milk to already frozen milk in a storage container.
- Feeding previously frozen human milk thawed in the refrigerator that has been refrigerated for more than 24 hours.
- Saving human milk from a used bottle for use at a subsequent feeding.
- Failure to clean a breast pump per manufacturer's instruction.
- Feeding donor human milk acquired directly from individuals or the internet.

Another consideration when recommending length of storage time is its effect on protective properties in human milk. There is evidence that after 48 hours of refrigeration, human milk significantly loses important antibacterial and antioxidant properties (60). These properties of human milk are specifically important for the prevention of necrotizing enterocolitis, retinopathy, and bronchopulmonary dysplasia of premature infants (5). Although some properties may be reduced with longer refrigerated storage, this does not diminish the overall superiority of human milk over formula, as formula does not contain these protective properties or many of the other benefits of human milk.

Participant circumstances (e.g., adequate refrigeration, safe water, heat source), the health of the infant and health care provider directions need to be considered when recommending the length of time human milk should be stored .

If the breastfeeding mother uses a breast pump, it is essential for her to fully understand the importance of the specific manufacturer's instructions for cleaning the breast pump. Improper cleaning of breast pumps and pump parts can increase the risk of expressed human milk contamination (58).

With increased awareness of the benefits and efforts to promote breastfeeding, more mothers are choosing to breastfeed, as evidenced by data from CDC in the Breastfeeding Report Card (61). But in situations such as illness, physical inability to produce human milk, decisions to not breastfeed, or adoptive

parents seeking human milk, the desire to provide human milk may prompt parents/caregivers to turn to alternate methods of obtaining human milk to feed their infant. Since the cost of banked human milk can be prohibitive for WIC clients, these mothers may turn to informal milk sharing from known sources such as friends or relatives, or from unknown sources such as internet sites or other advertisements.

A study that evaluated human milk shared via the internet concluded that there was a high overall rate of bacterial growth and contamination, which suggests poor collection, storage, and shipping practices (62). In another study, researchers looked at current and past infection among potential donors to a human milk bank. It was revealed that a minimum of 3% of potential donors had positive serology for disease conditions such as syphilis, HIV, hepatitis B, hepatitis C, HTLV-1 or HTLV-2 (63). It was concluded that if these relatively low risk potential donors tested positive then the untested or unscreened women of donor human milk may present a significant health risk (63).

Although sharing human milk between those with an excess milk supply and those seeking milk for their infant may be growing in popularity (often facilitated by web sites established to link providers and recipients), both the AAP and the Food and Drug Administration (FDA) recommend against feeding infants human milk obtained directly from individuals or through the internet (59, 64). Obtaining donor human milk via these means is discouraged due to the lack of adequate screening for infectious diseases and the risk of contamination (59).

The FDA suggests that a decision to give donor human milk should be made in consultation with the infant's health care provider and only screened donor human milk should be used. Also, caregivers should consult with the infant's health care provider on where to obtain screened donor human milk (59). Due to the lack of Federal guidelines and standards pertaining to the operation, quality, and safety of human milk banks and potential liability concerns, the U.S. Department of Agriculture, Food and Nutrition Service does not authorize banked human milk as an allowable substitute for WIC-eligible formulas (see WIC Policy Memorandum 2000-2: *Use of Banked Human Breast Milk in the WIC Program*).

Formula

Formula must be properly prepared in a sanitary manner to be safe for consumption. Furthermore, prepared infant formula is a perishable food, and must be handled and stored properly in order to be safe for consumption (4, 10).

Most babies who are hospitalized for vomiting and diarrhea are bottle fed. This has often been attributed to the improper handling of formula rather than sensitivities to the formula. In rare cases, the contaminated powdered formulas may cause infections in preterm or immune compromised infants. To reduce the risk of infection in infants it is important that formulas be carefully prepared and handled. All formula should be prepared according to the manufacturer's instruction on the label, or those given by the health care provider.

Manufacturers' instructions vary, depending on the product, in the length of time it is considered safe to store prepared infant formula without refrigeration before bacterial growth accelerates to an extent that the infant is placed at risk (1). Published guidelines on the handling and storage of infant formula indicate that it is unsafe to use prepared formula which (1):

- Has been held at room temperature longer than 1 hour or longer than recommended by the manufacturer.

- Has been held in the refrigerator longer than the safe storage time indicated by the manufacturer.
- Remains in a bottle one hour after the start of feeding.
- Remains in a bottle from an earlier feeding.
- Is fed using improperly cleaned baby bottles.

411.10 Feeding dietary supplements with potentially harmful consequences.

An infant consuming inappropriate or excessive amounts of single or multivitamin or mineral or herbal remedy not prescribed by a physician is at risk for a variety of adverse effects including harmful nutrient interactions, toxicity, and teratogenicity (1, 65). While some herbal teas may be safe, some have undesirable effects, particularly on infants who are fed herbal teas or who receive breast milk from mothers who have ingested herbal teas (66). Examples of teas with potentially harmful effects to infants and children include: licorice, comfrey leaves, sassafras, senna, buckhorn bark, cinnamon, wormwood, woodruff, valerian, foxglove, pokeroot or pokeweed, periwinkle, nutmeg, catnip, hydrangea, juniper, Mormon tea, thorn apple, yohimbe bark, lobelia, oleander, maté, kola nut or gotu cola, and chamomile (66-68). Like drugs, herbal or botanical preparations have chemical and biological activity, may have side effects, and may interact with certain medications--these interactions can cause problems and can even be dangerous (69). Botanical supplements are not necessarily safe because the safety of a botanical depends on many things, such as its chemical makeup, how it works in the body, how it is prepared, and the dose used (69).

411.11 Routinely not providing dietary supplements recognized as essential by national public health policy when an infant's diet alone cannot meet nutrient requirements.

Depending on an infant's specific needs and environmental circumstances, certain dietary supplements may be recommended by the infant's health care provider to ensure health. For example, fluoride supplements may be of benefit in reducing dental decay for children living in fluoride-deficient areas (1, 70).

To prevent rickets and vitamin D deficiency in healthy infants and children, the AAP recommends a supplement of 400 IU per day for the following (5,71):

- All breastfed and partially breastfed infants unless they are weaned to at least 1 liter (or 1 quart) per day of vitamin D-fortified formula.
- All nonbreastfed infants who are ingesting less than 1 liter (or 1 quart) per day of vitamin D-fortified formula.

References

1. Committee on Nutrition, American Academy of Pediatrics. Pediatric nutrition handbook. 7th Ed. Elk Grove Village, Ill: American Academy of Pediatrics, 2014.
2. American Academy of Pediatrics. Policy Statement Breastfeeding and the Use of Human Milk. Organizational Principles to Guide and Define the Child Health Care System and/or Improve the Health of All Children. Section on Breastfeeding. (Downloaded from pediatrics.aappublications.org accessed on January 6, 2015.)
3. American Academy of Pediatrics, Committee on Nutrition. Iron fortification of infant formula. Pediatrics 1999; 104:119-123.

4. Institute of Medicine. WIC nutrition risk criteria: a scientific assessment. National Academy Press, Washington, D.C.; 1996.
5. American Academy of Pediatrics, Section on Breastfeeding: Breastfeeding and the use of human milk. Pediatrics 2005 Feb; 115(2):496-506.
6. Fomon SJ. Nutrition of normal infants. St. Louis: Mosby, 1993.
7. Whitney EN, Rolfes SR. Understanding nutrition. 9th Ed. Wadsworth: Thomson Learning, 2002: p. 541.
8. American Academy of Pediatrics, Committee on Nutrition. The use of whole cow's milk in infancy. Pediatrics 1992; 89(6):1105-1109.
9. Friel JK, et al. Eighteen-month follow-up of infants fed evaporated milk formula. Canadian Journal of Public Health. Revue Canadienne de Sante Publique, 90.4 (Jul-Aug 1999): 240-3. Abstract.
10. United States Department of Agriculture, Food and Nutrition Service. Infant nutrition and feeding, a guide for use in the WIC and CSF programs. Alexandria, VA: Special Supplemental Nutrition Programs, revised 2008. [FNS-288]. [Publication currently being updated.]
11. Trahms CM, Pipes PL, editors. Nutrition in Infancy and Childhood. WCB/McGraw- Hill; 1997.
12. Bellioni-Businco B, Paganelli R, Lucenti P, Giampietro PG, Perborn H, Businco L. Allergenicity of goat's milk in children with cow's milk allergy. J. Allergy Clin. Immunol. 1999; 103:1191-1194.
13. Tang J, Altman DS, Robertson D, O'Sullivan DM, Douglass JM, Tinanoff N. Dental caries prevalence and treatment levels in Arizona preschool children. Public Health Rep. 1997; 112:319-29.
14. Tinanoff N and Palmer CA. Dietary determinants of dental caries and dietary recommendations for preschool children. J. Public Health Dent. 2000; 60(3):197-206.
15. American Academy of Pediatrics, Committee on Nutrition. The use and misuse of fruit juice in pediatrics. Pediatrics 2001; 107:1210-1213.
16. American Academy of Pediatrics and American Academy of Pedodontics. Juice in ready-to-use bottles and nursing bottle caries. AAP News. 1978; 29(1):11.
17. Samour PQ, Helm KK, Lang CE. Handbook of pediatric nutrition. 2nd Ed. Gaithersburg, MD: Aspen Publishers, Inc.; 1999.
18. American Academy of Pediatric Dentistry. Baby Bottle Tooth Decay/Early Childhood Caries. Pediatr Dent 2000-2001 (revised May 1996); 2001 Mar-Apr; 23(2):18.
19. Fitzsimons D, Dwyer JT, Palmer C, Boyd LD. Nutrition and oral health guidelines for pregnant women, infants, and children. J. Am. Diet. Assoc. Feb 1998; 98(2):182-6.
20. Shelov SD. Caring for your baby and young child: birth to age 5. Elk Grove Village, IL: American Academy of Pediatrics; 1998.
21. American Academy of Pediatrics. Bright Futures Nutrition. 3rd ed. 2011.
22. Tamborlane WV, editor. The Yale guide to children's nutrition. Connecticut: Yale University; 1997.
23. Williams CP, editor. Pediatric manual of clinical dietetics. Chicago: American Dietetic Association; 1998.

24. Fomon SJ. Feeding normal infants: rationale for recommendations. J. Am. Diet. Assoc. 2001; 101:1002-1005.
25. Rolfes, DeBruyne, Whitney. Life span nutrition: conception through life; 1990; pp. 231-237.
26. Gibson SA. Non-milk extrinsic sugars in the diets of pre-school children: association with intakes of micronutrients, energy, fat and NSP. Br. J. Nutr. 1997; 78:367-378.
27. Parish ME. Public health and non-pasteurized fruit juices. Crit. Rev. Microbiol. 1997; 23:109-119.
28. Food Labeling. Warning and Notice Statement: Labeling of juice products; Final Rule. 63 Federal Register 37029-37056 (1998) (codified at 21 CFR §101, 120).
29. Botulism Fact Sheet [electronic file]. Atlanta (GA): Centers for Disease Control and Prevention; 1995.
30. Centers for Disease Control and Prevention (US). Botulism in the United States, 1899-1996. Atlanta (GA): Centers for Disease Control and Prevention; 1998.
31. Food and Drug Administration. Updates: Avoid raw sprouts to reduce food poisoning risk, agency advises. FDA Consumer magazine, September-October 1999.
32. Fein SB, Falci CD. Infant formula preparation, handling, and related practices in the United States. J. Am. Diet. Assoc. 1999. 99:1234-1240.
33. Biancuzzo M. Breastfeeding the newborn: clinical strategies for nurses. St. Louis, MO; Morby, 1999, Pages 103-104.
34. Mochbracher N, Stock J. The Breastfeeding answer book (Revised edition). La Leche League International, 1997, Pages 20-23.
35. Eiger MS, Olds SW. The complete book of breastfeeding. New York: Workman Publishing; 1999, p. 88, 112-114.
36. Rosenthal MS. The breastfeeding sourcebook. Los Angeles: Lowell House; 1996, p. 157.
37. Sears M, Sears W. The breastfeeding book. Boston: Little, Brown and Company; 2000, p. 108-110.
38. Johnson DB. Nutrition in infancy: evolving views on recommendations. Nutrition Today 1998; 32: 63-68.
39. Mark DH. Breastfeeding and infant illness: a dose-response relationship. J Amer Med Assoc 1990; 281: 1154.
40. Muztagh M. Optimal breastfeeding duration. J. Am. Diet. Assoc. 1997; 97: 1252-1255.
41. Raisler J, Alexander C, O'Campo P. Breastfeeding and infant illness: a dose-response relationship? Am. J. Pub. Health 1999; 89: 25-30.
42. Scariest PD, Grummer-Strawn LM, Fein SB. A longitudinal analysis of infant mortality and the extent of breastfeeding in the United States. Pediatrics 1997; 99:6.
43. Story M, Hoyt K, Sofka D. Bright futures in practice. National Center for Education in Maternal and Child Health. Arlington: Georgetown University; 2000, p. 25.

44. Gillman MW, Rifas-Shiman SL, Camargo CA Jr, Berkey CS, Frazier AL, Rockett HR, Field AE, Colditz GA. Risk of overweight among adolescents who were breastfed as infants. J. Amer. Med. Assoc. 2001; 285(19): 2461-7.

45. Von Kries R, Koletzko B, Sauerwald T, von Mutius E, Barnert D, Grunert V, Von Voss H. Breastfeeding and obesity: cross-sectional study. Br. Med. J. 1999; 319(7203):147-50.

46. Ip S, Chung M, Raman G, Trikalinos TA, Lau J. A Summary of the Agency for Healthcare Research and Quality's Evidence Report on Breastfeeding in Developed Countries. Breastfeed Med. 2009;4(suppl 1):S17–S30.

47. Sanders TA, Reddy S. Vegetarian diets and children. Am J Clin Nutr. 1994; 59(suppl):1176S-1181S.

48. Sanders TA. Essential fatty acid requirements of vegetarians in pregnancy, lactation and infancy. Am. J. Clin. Nutr. 1999; 70:555S-559S.

49. Sanders TA. Vegetarian diets and children. Pediatric Clin. North Am. 1995; 42:955-965.

50. Dagnelie PC, Vergote FJ, van Staveren, WA, et al. High prevalence of rickets in infants on macrobiotic diets. Am. J. Clin. Nutr. 1990; 51:202-208.

51. Duyff RL. American Dietetic Association. The American Dietetic Association's complete food and nutrition guide. Minneapolis, MN: Chronimed Pub; 1996.

52. American Academy of Pediatrics: A woman's guide to breastfeeding. 1999, pp. 13-14.

53. United States Department of Agriculture (USDA), Food and Nutrition Service. Breastfeed Babies Welcome Here [Program Aid 1516]. Alexandria, VA: USDA, 1995, pp. 12-15.

54. Lawrence RA. Breastfeeding: a guide for the medical profession. 5th edition. St. Louis, MO: Mosby, 1999, pp. 677-710.

55. Academy of Breastfeeding Medicine Protocol Committee. ABM clinical protocol #8: human milk storage information for home use for full-term infants; Revision #1. Academy of Breastfeeding; March 2010. Available from: http://www.bfmed.org/Media/Files/Protocols/Protocol%208%20-%20English%20revised%202010.pdf.

56. Duke, CS. Common concerns when storing human milk. New Beginnings; July-August 1998; 15 (4), p. 109.

57. Neifert, M. Dr. Mom's guide to breastfeeding. 1998; New York, NY: Plume, pp. 305-306.

58. Jones F, Tully, MR. Best practice for expressing, storing, and handling human milk in hospitals, homes and child care settings. Raleigh, NC: Human Milk Banking Association of North America Inc.; 2006.

59. US Food and Drug Administration. Use of donor human milk [Internet]. Washington DC: [updated 2015 Aug 7; cited 2016 Aug 17]. Available from: http://www.fda.gov/ScienceResearch/SpecialTopics/PediatricTherapeuticsResearch/ucm235203.htm.

60. Lee JW, Davis JM. Future applications of antioxidants in premature infants. Vurr Opin Pediatr. 2011 Apr; 23(2):161-6. Available from: http://www.ncbi.nlm.nih.gov/pubmed/21150443.

61. Centers for Disease Control and Prevention. Breastfeeding Report Card 2014 [Internet]. Georgia: 2014 [cited 2016 Aug 17]. Available from: http://www.cdc.gov/breastfeeding/pdf/2014breastfeedingreportcard.pdf.

62. American Academy of Pediatrics. Microbial contamination of human milk purchased via the internet. Pediatrics. Originally published online October 21, 2013; DOI: 10.1542/peds. 2013-1687.

63. Cohen RS, Xiong SC, Sakamoto P. Retrospective review of serological testing of potential human donors. ,. Arch Dis Child Fetal Neonatal Ed 2010 95: F118-F120. doi: 10.1136/adc.2008.1564711997; 100: 1035-1038.

64. American Academy of Pediatrics. Breastfeeding and the use of human milk. Pediatrics. Feb 2005; American Academy of Pediatrics. Volume 115/Issue2, Revised 100(6):1035. Available from: http://pediatrics.aappublications.org/content/115/2/496.

65. Anderson JV, Van Nierop MR. Basic nutrition facts a nutrition reference. Lansing, MI: Michigan Department of Public Health; 1989.

66. Lawrence RA. Breastfeeding: a guide for the medical profession. 5th edition. St. Louis, MO: Mosby, 1999, pp. 371-377.

67. Siegel RK. Herbal intoxication: psychoactive effects from herbal cigarettes, tea and capsules. JAMA 236:473, 1976.

68. Ridker PM. Toxic effects of herbal teas. Arch Environ Health 42(3):133-6, 1987.

69. Office of Dietary Supplements, National Institutes of Health (NIH). Botanical dietary supplements: background Information. NIH web page, last updated 7/7/2004. Available from: http://ods.od.nih.gov/factsheets/BotanicalBackground.asp.

70. American Academy of Pediatric Dentistry. Fluoride. Pediatric Dent. 1999; 21:40.

71. American Academy of Pediatrics, Section on Breastfeeding and Committee on Nutrition. Prevention of rickets and vitamin D deficiency in infants, children, and adolescents. Pediatrics 2008. Available from: http://pediatrics.aappublications.org/content/122/5/1142.full.

425 Inappropriate Nutrition Practices for Children

Definition/Cut-off Value

Routine use of feeding practices that may result in impaired nutrient status, disease, or health problems. These practices, with examples, are outlined below. Refer to "Attachment to 425-Justification and References" for this criterion.

Participant Category and Priority Level

Category	Priority
Children	V

Inappropriate Nutrition Practices for Children	Examples of Inappropriate Nutrition Practices (including but not limited to)
425.1 Routinely feeding inappropriate beverages as the primary milk source.	Examples of inappropriate beverages as primary milk source: • Non-fat or reduced-fat milks (between 12 and 24 months of age, unless allowed by State agency policy for a child for whom overweight or obesity is a concern) or sweetened condensed milk; and • Goat's milk, sheep's milk, imitation or substitute milks (that are unfortified or inadequately fortified), or other "homemade concoctions."
425.2 Routinely feeding a child any sugar-containing fluids.	Examples of sugar-containing fluids: 1. Soda/soft drinks; 2. Gelatin water; 3. Corn syrup solutions; and 4. Sweetened tea.
425.3 Routinely using nursing bottles, cups, or pacifiers improperly.	• Using a bottle to feed: o Fruit juice, or o Diluted cereal or other solid foods. • Allowing the child to fall asleep or be put to bed with a bottle at naps or bedtime. • Allowing the child to use the bottle without restriction (e.g., walking around with a bottle) or as a pacifier. • Using a bottle for feeding/drinking beyond 14 months.

Inappropriate Nutrition Practices for Children	Examples of Inappropriate Nutrition Practices (including but not limited to)
425.3 (continued) Routinely using nursing bottles, cups, or pacifiers improperly.	• Using a pacifier dipped in sweet agents such as sugar, honey, or syrups. • Allowing a child to carry around and drink throughout the day from a covered or training cup.
425.4 Routinely using feeding practices that disregard the developmental needs or stages of the child.	• Inability to recognize, insensitivity to, or disregarding the child's cues for hunger and satiety (e.g., forcing a child to eat a certain type and/or amount of food or beverage or ignoring a hungry child's requests for appropriate foods). • Feeding foods of inappropriate consistency, size, or shape that put children at risk of choking. • Not supporting a child's need for growing independence with self-feeding (e.g., solely spoon-feeding a child who is able and ready to finger-feed and/or try self-feeding with appropriate utensils). • Feeding a child food with an inappropriate texture based on his/her developmental stage (e.g., feeding primarily pureed or liquid food when the child is ready and capable of eating mashed, chopped or appropriate finger foods).
425.5 Feeding foods to a child that could be contaminated with harmful microorganisms.	Examples of potentially harmful foods for a child: • Unpasteurized fruit or vegetable juice; • Unpasteurized dairy products or soft cheeses such as feta, Brie, Camembert, blue-veined, and Mexican-style cheese; • Raw or undercooked meat, fish, poultry, or eggs; • Raw vegetable sprouts (alfalfa, clover, bean, and radish); • Deli meats, hot dogs, and processed meats (avoid unless heated until steaming hot).
425.6 Routinely feeding a diet very low in calories and/or essential nutrients.	Examples: • Vegan diet; • Macrobiotic diet; and • Other diets very low in calories and/or essential nutrients.

Inappropriate Nutrition Practices for Children	Examples of Inappropriate Nutrition Practices (including but not limited to)
425.7 Feeding dietary supplements with potentially harmful consequences.	Examples of dietary supplements which when fed in excess of recommended dosage may be toxic or have harmful consequences: • Single or multi-vitamins; • Mineral supplements; and • Herbal or botanical supplements/remedies/teas.
425.8 Routinely not providing dietary supplements recognized as essential by national public health policy when a child's diet alone cannot meet nutrient requirements.	• Providing children under 36 months of age less than 0.25 mg of fluoride daily when the water supply contains less than 0.3 ppm fluoride. • Providing children 36-60 months of age less than 0.50 mg of fluoride daily when the water supply contains less than 0.3 ppm fluoride. • Not providing 400 IU of vitamin D if a child consumes less than 1 liter (or 1 quart) of vitamin D fortified milk or formula.
425.9 Routine ingestion of non-food items (pica).	Examples of inappropriate nonfood items: • Ashes; • Carpet fibers; • Cigarettes or cigarette butts; • Clay; • Dust; • Foam rubber; • Paint chips; • Soil; and • Starch (laundry and cornstarch).

Attachment to 425: Justification and References

Inappropriate Nutrition Practices for Children

Justification

425.1 Routinely feeding inappropriate beverages as the primary milk source.

Goat's milk, sheep's milk, imitation and substitute milks (that are unfortified or inadequately fortified) do not contain nutrients in amounts appropriate as a primary milk source for children (1-4).

Non-fat and reduced-fat milks are not recommended for use with children from 1 to 2 years of age because of the lower calorie density compared with whole-fat products (1, 5). The low-calorie, low-fat content of these milks requires an increase in caloric intake to meet energy needs. Infants and children under two using reduced fat milks gain at a slower growth rate, lose body fat as evidenced by skinfold thickness, lose energy reserves, and are at risk of inadequate intake of essential fatty acids. Additionally, essential fatty acids are a critical component of infant and child brain development with deficits early in life leading to significantly altered brain structure and function (6-8). Similar malnourishment has been associated with negative health outcomes including, but not limited to, slower language development, poorer motor function, lower IQ, poorer school performance, and eyesight problems (9).

WIC Regulations [7 CFR 246.10(e)], however, include the option for WIC State agencies to issue reduced-fat milk and/or reduced-fat yogurt to children (1 to 2 years of age) for whom overweight or obesity is a concern, as determined by the Competent Professional Authority (CPA) (Food Package Guidance, May 2014). This option is consistent with the American Academy of Pediatrics (AAP) recommendation in the clinical report: *Lipid Screening and Cardiovascular Health in Childhood* (10). The AAP identifies parental history of obesity, lipidemia, and cardiovascular disease as determinants for a child for whom overweight or obesity is a concern. WIC State agencies that choose to authorize reduced-fat milk and/or reduced-fat yogurt for the 1 year old child must develop policy that defines the assessment criteria the CPA will use to determine if the child should be given reduced-fat dairy products. For example, a State agency may choose to use existing nutrition risk criteria: #114 *Overweight or At Risk of Overweight (Infants and Children)* and/or # 115 *High Weight-for-Length (Infants and Children <24 Months of Age)* to identify children to receive reduced-fat milk. For more information about the required State agency policy for issuing reduced-fat milk to children 12 months to 2 years of age, please see the Food and Nutrition Service, Food Package Guidance issued May 2014.

425.2 Routinely feeding a child any sugar-containing fluids.

Abundant epidemiologic evidence from groups who have consumed low quantities of sugar as well as from those who have consumed high quantities shows that sugar – especially sucrose – is the major dietary factor affecting the prevalence and progression of dental caries (11). Consumption of foods and beverages high in fermentable carbohydrates, such as sucrose, increases the risk of early childhood caries and tooth decay (11, 12).

425.3 Routinely using nursing bottles, cups, or pacifiers improperly.

Dental caries are a major health problem in U.S. preschool children, especially in low-income populations (13). Most implicated in this rampant disease process is prolonged use of baby bottles, during the day or

night, containing fermentable sugars, (e.g., fruit juice, soda, and other sweetened drinks); pacifiers dipped in sweet agents such as sugar, honey or syrups; or other high frequency sugar exposures (11). Solid foods such as cereal should not be put into a bottle for feeding; this is a form of force feeding (14) and does not encourage the child to eat the cereal in a more developmentally-appropriate way.

Additional justifications for the examples include:

- The American Academy of Pediatrics (AAP) and the American Academy of Pedodontics recommend that children not be put to bed with a bottle in their mouth (15, 16). While sleeping with a bottle in his or her mouth, a child's swallowing and salivary flow decrease, resulting in a pooling of liquid around the teeth (17). Propping the bottle can cause: ear infections because of fluid entering the middle ear and not draining properly; choking from liquid flowing into the lungs; and tooth decay from prolonged exposure to carbohydrate-containing liquids (18).
- Pediatric dentists recommend that parents be encouraged to have infants drink from a cup as they approach their first birthday, and that infants are weaned from the bottle by 12-14 months of age (19).
- The practice of allowing children to carry or drink from a bottle or cup of juice for periods throughout the day leads to excessive exposure of the teeth to carbohydrates, which promotes the development of dental caries (15). Allowing toddlers to use a bottle or cup containing fermentable carbohydrates unsupervised during waking hours provides an almost constant supply of carbohydrates and sugars (1). This leads to rapid demineralization of tooth enamel and an increase in the risk of dental caries due to prolonged contact between cariogenic bacteria on the susceptible tooth surface and the sugars in the consumed liquid (1, 19). The sugars in the liquid pool around the child's teeth and gums feed the bacteria there and result in decay (20). The process may start before the teeth are even fully erupted. Upper incisors (upper front teeth) are particularly vulnerable; the lower incisors are generally protected by the tongue (20). The damage begins as white lesions and progresses to brown or black discoloration typical of caries (20). When early childhood caries are severe, the decayed crowns may break off and the permanent teeth developing below may be damaged (20). Undiagnosed dental caries and other oral pain may contribute to feeding problems and failure to thrive in young children (20). Use of a bottle or cup, containing fermentable carbohydrates, without restriction is a risk because the more times a child consumes solid or liquid food, the higher the caries risk (1). Cariogenic snacks eaten between meals place the toddler most at risk for caries development; this includes the habit of continually sipping from cups (or bottles) containing cariogenic liquids (juice, milk, soda, or sweetened liquid) (20). If inappropriate use of the bottle persists the child is at risk of toothaches, costly dental treatment, loss of primary teeth, and developmental lags on eating and chewing. If this continues beyond the usual weaning period there is a risk of decay to permanent teeth.

425.4 Routinely using feeding practices that disregard the developmental needs or stage of the child.

The interactions and communication between a caregiver and child during feeding and eating influence a child's ability to progress in eating skills and consume a nutritionally adequate diet. These interactions comprise the "feeding relationship" (14). A dysfunctional feeding relationship, which could be characterized by a caregiver misinterpreting, ignoring, or overruling a young child's innate capability to regulate food intake based on hunger, appetite, and satiety can result in poor dietary intake and impaired growth (21, 22). Parents who consistently attempt to control their children's food intake may give children few opportunities to learn to control their own food intake (23). This could result in inadequate or

excessive food intake, future problems with food regulation, and problems with growth and nutritional status. Instead of using approaches such as bribery, rigid control, struggles, or short-order cooking to manage eating, a healthier approach is for parents to provide nutritious, safe foods at regular meals and snacks, allowing children to decide how much, if any, they eat (1, 22). Young children should be able to eat in a matter-of-fact way sufficient quantities of the foods that are given to them, just as they take care of other daily needs (3). Research indicates that restricting access to foods (i.e., high fat foods) may enhance the interest of 3- to 5-year old children in those foods and increase their desire to obtain and consume those foods. Stringent parental controls on child eating have been found to potentiate children's preference for high-fat energy dense foods, limit children's acceptance of a variety of foods, and disrupt children's regulation of energy intake (24, 25). Forcing a child to clean his or her plate may lead to overeating or development of an aversion to certain foods (12). The toddler and preschooler are striving to be independent (12). Self-feeding is important even though physically they may not be able to handle feeding utensils or have good eye-hand coordination (12). Children should be able to manage the feeding process independently and with dispatch, without either unnecessary dawdling or hurried eating (3, 17). Self-feeding milestones include (1): During infancy, older infants progress from semisolid foods to thicker and lumpier foods to soft pieces to finger-feeding table food (14). By 15 months, children can manage a cup, although not without some spilling. At 16 to 17 months of age, well-defined wrist rotation develops, permitting the transfer of food from the bowl to the child's mouth with less spilling. The ability to lift the elbow as the spoon is raised and to flex the wrist as the spoon reaches the mouth follows. At 18 to 24 months, they learn to tilt a cup by manipulation with the fingers. Despite these new skills, 2-year-old children often prefer using their fingers to using the spoon. Preschool children learn to eat a wider variety of textures and kinds of food (3, 12). However, the foods offered should be modified so that the child can chew and swallow the food without difficulty (3).

425.5 Feeding foods to a child that could be contaminated with harmful microorganisms.

According to the AAP, to prevent food-borne illness, the foods listed below should not be fed to young children or infants (1). All of the foods have been implicated in selected outbreaks of food-borne illness, including in children. Background information regarding foods that could be contaminated with harmful microorganisms is also included below:

- Unpasteurized fruit or vegetable juice – Only pasteurized juice is safe for infants, children, and adolescents (15). Pasteurized fruit juices are free of microorganisms (15). Unpasteurized juice may contain pathogens, such as Escherichia coli, Salmonella, and Cryptosporidium organisms (15, 26). These organisms can cause serious disease, such as hemolytic-uremic syndrome, and should never be fed to infants and children (15). Unpasteurized juice must contain a warning on the label that the product may contain harmful bacteria (15, 27).
- Unpasteurized dairy products or soft cheeses – Young children or infants should not eat raw or unpasteurized milk or cheeses (1). Unpasteurized dairy products could contain harmful bacteria, such as Brucella species, that could cause young children to contract a dangerous food borne illness. The AAP also recommends that young children should not eat soft cheeses such as feta, Brie, Camembert, blue-veined, and Mexican-style cheese. These foods could contain Listeria bacteria (hard cheeses, processed cheeses, cream cheese, cottage cheese, and yogurt need not be avoided) (1).
- Raw or undercooked meat, fish, poultry, or eggs – Young children or infants should not eat raw or undercooked meat or poultry, raw fish or shellfish , including oysters, clams, mussels, and scallops

(1). These foods may contain harmful bacteria or parasites that could cause children to contract a dangerous food borne illness.

- Raw vegetable sprouts (alfalfa, clover, bean, and radish) – Sprouts can cause potentially dangerous Salmonella and E. coli O157 infection. Sprouts grown under clean conditions in the home also present a risk because bacteria may be present in the seed. Cook sprouts to significantly reduce the risk of illness (28).
- Deli meats, hot dogs, and processed meats (avoid unless heated until steaming hot) – These foods have been found to be contaminated with *Listeria monocytogenes*; if adequately cooked, this bacteria is destroyed.

425.6 Routinely feeding a diet very low in calories and/or essential nutrients.

Highly restrictive diets prevent adequate intake of nutrients, interfere with growth and development, and may lead to other adverse physiological effects (29). Well-balanced vegetarian diets with dairy products and eggs are generally associated with good health. However, strict vegan diets may be inadequate in calories, vitamin B12, vitamin D, calcium, iron, protein, and essential amino acids needed for growth and development (30). The more limited the diet, the greater the health risk. Given the health and nutrition risks associated with highly restrictive diets, WIC can help the parent to assure that the child consumes an adequate diet to optimize health during critical periods of growth as well as for the long term.

425.7 Feeding dietary supplements with potentially harmful consequences.

A child consuming inappropriate or excessive amounts of single or multivitamin or mineral or herbal remedy not prescribed by a physician is at risk for a variety of adverse effects including harmful nutrient interactions, toxicity, and teratogenicity (1, 31). Like drugs, herbal or botanical preparations have chemical and biological activity, may have side effects, and may interact with certain medications – these interactions can cause problems and can even be dangerous (32). Botanical supplements are not necessarily safe because the safety of a botanical depends on many things, such as its chemical makeup, how it works in the body, how it is prepared, and the dose used (32). While some herbal teas may be safe, some have undesirable effects, particularly on young children who are fed herbal teas or who receive breast milk from mothers who have ingested herbal teas (33). Examples of teas with potentially harmful effects to children include: licorice, comfrey leaves, sassafras, senna, buckhorn bark, cinnamon, wormwood, woodruff, valerian, foxglove, pokeroot or pokeweed, periwinkle, nutmeg, catnip, hydrangea, juniper, Mormon tea, thorn apple, yohimbe bark, lobelia, oleander, yerba mate, kola nut or gotu cola, and chamomile (33-35).

425.8 Routinely not providing dietary supplements recognized as essential by national public health policy when a child's diet alone cannot meet nutrient requirements.

Depending on a child's specific needs and environmental circumstances, certain dietary supplements may be recommended by the child's health care provider to ensure health. For example, fluoride supplements may be of benefit in reducing dental decay for children living in fluoride-deficient areas (1, 36). In addition, the AAP recommends that children who are ingesting less than 1 liter (1 quart) per day of vitamin D-fortified formula or milk should receive a vitamin D supplement of 400 IU/day (37). Since 1 quart of milk is in excess of the recommended 2 cups of milk per day for pre-school children (38), most children will require a vitamin D supplement.

425.9 Routine ingestion by child of nonfood items (Pica).

Pica is the compulsive eating of nonnutritive substances and can have serious medical implications (38). Pica is observed most commonly in areas of low socioeconomic status and is more common in women (especially pregnant women) and in children (35). Pica has also been seen in children with obsessive-compulsive disorders, mental retardation, and sickle cell disease (39-41). Complications of this disorder include: iron-deficiency anemia, lead poisoning, intestinal obstruction, acute toxicity from soil contaminants, and helminthic infestations (39, 42, 43).

References

1. Committee on Nutrition, American Academy of Pediatrics. Pediatric nutrition handbook. 6th Ed. Elk Grove Village, Ill: American Academy of Pediatrics, 2014.
2. American Academy of Pediatrics, Committee on Nutrition. Iron fortification of infant formula. Pediatrics. 1999; 104:119-123.
3. Trahms CM, Pipes PL, editors. Nutrition in Infancy and Childhood. WCB/McGraw-Hill; 1997.
4. Bellioni-Businco B, Paganelli R, Lucenti P, Giampietro PG, Perborn H, Businco L. Allergenicity of goat's milk in children with cow's milk allergy. J. Allergy Clin. Immunol. 1999; 103:1191-1194.
5. Tamborlane, WV, editor. The Yale guide to children's nutrition. Connecticut: Yale University; 1997.
6. Hansen AE, Wiese HF, Boelsche AN, Haggard ME, Adam DJ, Davis H. Role of Linoleic Acid in Infant Nutrition: Clinical and Chemical Study of 428 Infants Fed on Milk Mixtures Varying in Kind and Amount of Fat. Pediatrics. 1963; 31(1), 171-19
7. Uauy R, Castillo C. Lipid requirements of infants: implications for nutrient composition of fortified complementary foods. The Journal of nutrition. 2003; 133(9), 2962S-2972S.
8. Innis SM. Dietary (n-3) fatty acids and brain development. The Journal of nutrition. 2007; 137(4), 855-859.
9. Birch EE, Garfield S, Castañeda Y, Hughbanks-Wheaton D, Uauy R, Hoffman D. Visual acuity and cognitive outcomes at 4 years of age in a double-blind, randomized trial of long-chain polyunsaturated fatty acid-supplemented infant formula. Early human development. 2007; 83(5), 279-284.
10. Daniels, SR, Greer, FR. Lipid screening and cardiovascular health in childhood. Pediatrics. 2008; 122(1), 198-208.
11. Tinanoff N and Palmer CA. Dietary determinants of dental caries and dietary recommendations for preschool children. J Public Health Dent. 2000; 60(3):197-206.
12. Williams, CP, editor. Pediatric manual of clinical dietetics. Chicago: American Dietetic Association; 1998.
13. Tang J, Altman DS, Robertson D, O'Sullivan DM, Douglass JM, Tinanoff N. Dental caries prevalence and treatment levels in Arizona preschool children. Public Health Rep. 1997; 112:319-29.
14. Satter E. Child of mine: feeding with love and good sense. Palo Alto (CA): Bull Publishing Company; 2000.

15. American Academy of Pediatrics, Committee on Nutrition. The use and misuse of fruit juice in pediatrics. Pediatrics. 2001; 107:1210-1213.

16. American Academy of Pediatrics and American Academy of Pedodontics. Juice in ready-to-use bottles and nursing bottle carries. AAP News. 1978; 29(1):11.

17. Samour PQ, Helm KK, Lang CE. Handbook of pediatric nutrition. 2nd Ed. Gaithersburg, MD: Aspen Publishers, Inc.; 1999.

18. Shelov SD. Caring for your baby and young child: birth to age 5. Elk Grove Village, IL: American Academy of Pediatrics; 1998.

19. American Academy of Pediatric Dentistry. Baby Bottle Tooth Decay/Early Childhood Caries. Pediatr. Dent 2000-2001 (revised May 1996); 2001 Mar-Apr; 23(2):18.

20. Fitzsimons D, Dwyer JT, Palmer C, Boyd LD. Nutrition and oral health guidelines for pregnant women, infants, and children. J. Am. Diet. Assoc. Feb 1998; 98(2):182-6.

21. Satter, E. Childhood feeding problems. Feelings and their medical significance; Vol. 32, no. 2; Columbus, OH; Ross Laboratories; 1990.

22. Satter EM. The feeding relationship. J. Am. Diet. Assoc. 1986; 86:352-6.

23. Johnson SL, Birch LL. Parents' and children's adiposity and eating style. Pediatrics. 1994; 94:653-61.

24. Olson RE. Is it wise to restrict fat in the diets of children? J. Am. Diet. Assoc. 2000 Jan; 100(1):28-32.

25. Birch LL, Fisher JO. Development of eating behaviors among children and adolescents. Pediatrics. 1998; 101:539-549.

26. Parish ME. Public health and non-pasteurized fruit juices. Crit. Rev. Microbiol. 1997; 23:109-119.

27. Food Labeling. Warning and Notice Statement: Labeling of Juice Products; Final Rule. 63 Federal Register. 37029-37056 (1998) (codified at 21 CFR §101, 120).

28. Food and Drug Administration. Updates: Avoid raw sprouts to reduce food poisoning risk, agency advises. FDA Consumer magazine, September-October 1999.

29. Institute of Medicine. WIC nutrition risk criteria: a scientific assessment. National Academy Press, Washington, D.C.; 1996.

30. Duyff RL. American Dietetic Association. The American Dietetic Association's complete food and nutrition guide. Minneapolis, MN: Chronimed Pub; 1996.

31. Anderson JV, Van Nierop MR. Basic nutrition facts a nutrition reference. Lansing, MI: Michigan Department of Public Health; 1989.

32. Office of Dietary Supplements, National Institutes of Health (NIH). Botanical dietary supplements: Background Information. [cited 2015 Feb 27]. Available from: http://ods.od.nih.gov/factsheets/BotanicalBackground.asp.

33. Lawrence, RA. Breastfeeding: a guide for the medical profession. 5th edition. St. Louis, MO: Mosby, 1999, pp. 371-377.

34. Siegel RK. Herbal intoxication: psychoactive effects from herbal cigarettes, tea and capsules. JAMA 236:473, 1976.

35. Ridker PM. Toxic effects of herbal teas. Arch Environ Health. 42(3):133-6, 1987.

36. American Academy of Pediatric Dentistry. Fluoride. Pediatr. Dent. 1999; 21:40.

37. American Academy of Pediatrics Section on Breastfeeding and Committee on Nutrition. Prevention of rickets and vitamin D deficiency in infants, children, and adolescents. Pediatrics. 2008. [cited 2015 Feb 27]. Available from: www.pediatrics.org/cgi/doi/10.1542/peds.2008-1862.

38. U.S. Department of Agriculture, Center for Nutrition Policy and Promotion. Health and Nutrition Information for Preschoolers. [cited 2015 Feb 27]. Available from: http://www.choosemyplate.gov/preschoolers.html.

39. Rose EA, Porcerelli JH, Neale AV. Pica: common but commonly missed. J. Am. Board Fam. Pract. 2000; 13(5):353-8.

40. LeBlanc LA, Piazza CC, Krug MA. Comparing methods for maintaining the safety of a child with pica. Res Dev Disabil. 1997; 18(3):215-20.

41. Ivascu NS, et al. Characterization of pica prevalence among patients with sickle cell disease. Arch Pediatr. Adoles Med. 2001; 155(11):1243-7.

42. Calabrese EJ, et al. Soil ingestion: a concern for acute toxicity in children. Environ Health Perspect. 1997; 105(12):1354-8.

43. Wang PY, Skarsgard ED, Baker RJ. Carpet bezoar obstruction of the small intestine. J. Pediatr. Surg. 1996; 31(12):1691-3.

427 Inappropriate Nutrition Practices for Women

Definition/Cut-off Value

Routine nutrition practices that may result in impaired nutrient status, disease, or health problems. These practices, with examples, are outlined below. Refer to "Attachment to 427-Justification and References" for this criterion.

Participant Category and Priority Level

Category	Priority
Pregnant Women	IV
Breastfeeding Women	IV
Non-Breastfeeding Women	VI

Inappropriate Nutrition Practices for Women	Examples of Inappropriate Nutrition Practices (including but not limited to)
427.1 Consuming dietary supplements with potentially harmful consequences.	Examples of dietary supplements which when ingested in excess of recommended dosages, may be toxic or have harmful consequences: • Single or multiple vitamins; • Mineral supplements; and • Herbal or botanical supplements/remedies/teas.
427.2 Consuming a diet very low in calories and/or essential nutrients; or impaired caloric intake or absorption of essential nutrients following bariatric surgery.	• Strict vegan diet; • Low-carbohydrate, high-protein diet; • Macrobiotic diet; and • Any other diet restricting calories and/or essential nutrients.
427.3 Compulsively ingesting non-food items (pica).	• Non-food items: • Ashes; • Baking soda; • Burnt matches; • Carpet fibers; • Chalk;

Inappropriate Nutrition Practices for Women	Examples of Inappropriate Nutrition Practices (including but not limited to)
	• Cigarettes; • Clay; • Dust; • Large quantities of ice and/or freezer frost; • Paint chips; • Soil; and • Starch (laundry and cornstarch).
427.4 Inadequate vitamin/mineral supplementation recognized as essential by national public health policy.	• Consumption of less than 27 mg of iron as a supplement daily by pregnant woman. • Consumption of less than 150 µg of supplemental iodine per day by pregnant and breastfeeding women. • Consumption of less than 400 mcg of folic acid from fortified foods and/or supplements daily by non-pregnant woman.
427.5 Pregnant woman ingesting foods that could be contaminated with pathogenic microorganisms.	Potentially harmful foods: • Raw fish or shellfish, including oysters, clams, mussels, and scallops; • Refrigerated smoked seafood, unless it is an ingredient in a cooked dish, such as a casserole; • Raw or undercooked meat or poultry; • Hot dogs, luncheon meats (cold cuts), fermented and dry sausage and other deli-style meat or poultry products unless reheated until steaming hot; • Refrigerated pâté or meat spreads; • Unpasteurized milk or foods containing unpasteurized milk; • Soft cheeses such as feta, Brie, Camembert, blue-veined cheeses and Mexican style cheese such as queso blanco, queso fresco, or Panela unless labeled as made with pasteurized milk; • Raw or undercooked eggs or foods containing raw or lightly cooked eggs including certain salad dressings, cookie and cake batters, sauces, and beverages such as unpasteurized eggnog; • Raw sprouts (alfalfa, clover, and radish); or • Unpasteurized fruit or vegetable juices.

Attachment to 427: Justification and References

Inappropriate Nutrition Practices for Women

Justification

427.1 Consuming dietary supplements with potentially harmful consequences.

Women taking inappropriate or excessive amounts of dietary supplements, such as single or multivitamins or minerals, or botanical (including herbal) remedies or teas, are at risk for adverse effects such as harmful nutrient interactions, toxicity and teratogenicity (1, 2). Pregnant and lactating women are at higher risk secondary to the potential transference of harmful substances to their infant.

Most nutrient toxicities occur through excessive supplementation of particular nutrients, such as, vitamins A, B-6 and niacin, iron and selenium (3). Large doses of vitamin A may be teratogenic (4). Because of this risk, the Institute of Medicine recommends avoiding preformed vitamin A supplementation during the first trimester of pregnancy (4). Besides nutrient toxicities, nutrient-nutrient and drug-nutrient interactions may adversely affect health.

Many herbal and botanical remedies have cultural implications and are related to beliefs about pregnancy and breastfeeding. The incidence of herbal use in pregnancy ranges from 7-55 % with echinacea and ginger being the most common (1). Some botanical (including herbal) teas may be safe; however, others have undesirable effects during pregnancy and breastfeeding. Herbal supplements such as, blue cohash and pennyroyal stimulate uterine contractions, which may increase the risk of miscarriage or premature labor (1, 5). The March of Dimes and the American Academy of Pediatrics recommend cautious use of tea mixtures because of the lack of safety testing in pregnant women (6).

427.2 Consuming a diet very low in calories and/or essential nutrients; or impaired caloric intake or absorption of essential nutrients following bariatric surgery.

Women consuming highly restrictive diets are at risk for primary nutrient deficiencies, especially during critical developmental periods such as pregnancy. Pregnant women who restrict their diets may increase the risk of birth defects, suboptimal fetal development and chronic health problems in their children. Examples of nutrients associated with negative health outcomes are:

- Low iron intake and maternal anemia and increased risk of preterm birth or low birth weight (7, 8).
- Low maternal vitamin D status and depressed infant vitamin D status (9).
- Low folic acid and NTD (10, 11, 12).

Low calorie intake during pregnancy may lead to inadequate prenatal weight gain, which is associated with infant intrauterine growth restriction (IUGR) (13) and birth defects (10, 11, 14). The pregnant adolescent who restricts her diet is of particular concern since her additional growth needs compete with the developing fetus and the physiological changes of pregnancy (14).

Strict vegan diets may be highly restrictive and result in nutrient deficiencies. Nutrients of potential concern that may require supplementation are:

- Riboflavin (15, 16)
- Iron (15)

- Zinc (15, 17)
- Vitamin B12 (15, 16, 18)
- Vitamin D (15, 16, 18)
- Calcium (15, 16, 18, 19,)
- Selenium (16)

The pregnant adolescent who consumes a vegan diet is at even greater risk due to her higher nutritional needs (16, 18). The breastfeeding woman who chooses a vegan or macrobiotic diet increases her risk and her baby's risk for vitamin B12 deficiency (18). Severe vitamin B12 deficiency resulting in neurological damage has been reported in infants of vegetarian mothers (18).

With the epidemic of obesity, treatment by gastric bypass surgery has increased more than 600% in the last ten years and has created nutritional deficiencies not typically seen in obstetric or pediatric medical practices (20). Gastrointestinal surgery promotes weight loss by restricting food intake and, in some operations, interrupting the digestive process. Operations that only reduce stomach size are known as "restrictive operations" because they restrict the amount of food the stomach can hold. Examples of restrictive operations are adjustable gastric banding and vertical banded gastroplasty. These types of operations do not interfere with the normal digestive process (21).

Some operations combine stomach restriction with a partial bypass of the small intestine; these are known as malabsorptive operations. Examples of malabsorptive operations are Roux-en-y gastric bypass (RGB) and Biliopancreatic diversion (BPD). Malabsorptive operations carry a greater risk for nutritional deficiencies because the procedure causes food to bypass the duodenum and jejunum, where most of the iron and calcium are absorbed. Menstruating women may develop anemia because not enough iron and vitamin B12 are absorbed. Decreased absorption of calcium may also contribute to osteoporosis and metabolic bone disease (21). A breastfeeding woman who has had gastric bypass surgery is at risk of vitamin B12 deficiency for herself and her infant (22).

427.3 Compulsively ingesting non-food items (pica).

Pica, the compulsive ingestion of non-food substances over a sustained period of time, is linked to lead poisoning and exposure to other toxicants, anemia, excess calories or displacement of nutrients, gastric and small bowel obstruction, as well as, parasitic infection (23). It may also contribute to nutrient deficiencies by either inhibiting absorption or displacing nutrient dense foods in the diet.

Poor pregnancy outcomes associated with pica-induced lead poisoning, include lower maternal hemoglobin level at delivery (24) and a smaller head circumference in the infant (25). Maternal transfer of lead via breastfeeding has been documented in infants and can result in a neuro-developmental insult depending on the blood lead level and the compounded exposure for the infant during pregnancy and breastfeeding (26, 27, 28).

427.4 Inadequate vitamin/mineral supplementation recognized as essential by national public health policy.

The Recommended Dietary Allowance (RDA) for pregnant women is 27mg of iron per day (29). The Centers for Disease Control and Prevention recommends iron supplementation for all pregnant women to prevent iron deficiency (30); however, pregnant women should seek guidance from a qualified health care provider before taking dietary supplements (31).

During pregnancy and lactation the iodine requirement is sharply elevated. The RDA for iodine during pregnancy is 220 μg and 290 μg during lactation (29). Severe iodine deficiency during pregnancy can cause cretinism and adversely affect cognitive development in children (32). Even mild iodine deficiency may have adverse affects on the cognitive function of children (33). Since the 1970s, according to the 2001-2002 National Health and Nutrition Examination Surveys (NHANES), there has been a decrease of approximately 50% in adult urinary iodine values. For women of child bearing age, the median urinary iodine value decreased from 294 to 128 μg per liter (34). The American Thyroid Association recommends that women receive prenatal vitamins containing 150 μg of iodine daily during pregnancy and lactation (35). The iodine content of prenatal vitamins in the Unites States is not mandated, thus not all prenatal vitamins contain iodine (36). Pregnant and breastfeeding women should be advised to review the iodine content of their vitamins and discuss the adequacy of the iodine with their health care provider.

Non-pregnant women of childbearing age who do not consume adequate amounts of folic acid are at greater risk for functional folate deficiency, which has been proven to cause neural tube defects (NTDs), such as spina bifida and anencephaly (37-40).

Folic acid consumed from fortified foods and/or a vitamin supplement in addition to folate found naturally in food reduces this risk (12). The terms “folic acid” and “folate” are used interchangeably, yet they have different meanings. Folic acid is the synthetic form used in vitamin supplements and fortified foods (12, 38, 39). Folate occurs naturally and is found in foods, such as dark green leafy vegetables, strawberries, and orange juice (12).

Studies show that consuming 400 mcg of folic acid daily interconceptionally can prevent 50 percent of neural tube defects (12). Because NTDs develop early in pregnancy (between the 17th and 30th day) and many pregnancies are not planned, it is important to have adequate intakes before pregnancy and throughout the childbearing years (14). NTDs often occur before women know they are pregnant. It is recommended that all women capable of becoming pregnant consume a multivitamin containing 400 mcg of folic acid daily (39-41). It is important that breastfeeding and non-breastfeeding women participating in the WIC Program know about folic acid and foods that contain folate to encourage preconceptional preventive practices (38).

427.5 Pregnant woman ingesting foods that could be contaminated with pathogenic microorganisms.

Food-borne illness is a serious public health problem (42). The causes include pathogenic microorganisms (bacteria, viruses, and parasites) and their toxins and chemical contamination. The symptoms are usually gastrointestinal in nature (vomiting, diarrhea, and abdominal pain), but neurological and “non-specific” symptoms may occur as well. Over the last 20 years, certain foods have been linked to outbreaks of food-borne illness. These foods include: milk (Campylobacter); shellfish (Norwalk-like viruses); unpasteurized apple cider (Escherichia coli O 157:H7); eggs (Salmonella); fish (ciguatera poisoning); raspberries (Cyclospora); strawberries (Hepatitis A virus); and ready-to-eat meats (Listeria monocytogenes).

Listeria monocytogenes can cause an illness called listeriosis. Listeriosis during pregnancy can result in premature delivery, miscarriage, fetal death, and severe illness or death of a newborn from the infection (43). Listeriosis can be transmitted to the fetus through the placenta even if the mother is not showing signs of illness.

Pregnant women are especially at risk for food-borne illness. For this reason, government agencies such as the Centers for Disease Control and Prevention, the USDA Food Safety and Inspection Service, and the Food and Drug Administration advise pregnant women and other high risk individuals not to eat foods as identified in the definition for this criterion (42, 43).

The CDC encourages health care professionals to provide anticipatory guidance, including the "four simple steps to food safety" of the Fight BAC campaign, to help reduce the incidence of food-borne illnesses.

References

1. Tiran D. The use of herbs by pregnant and childbearing women: a risk-benefit assessment. Complementary Therapies in Nursing and Midwifery. November 2003. 9(4):176-181.
2. Position of the American Dietetic Association: Nutrition and lifestyle for a healthy pregnancy outcome. J Am Diet Assoc. 2002 October; 102(10):1479-1490.
3. Position of the American Dietetic Association: Food fortification and dietary supplements. J Am Diet Assoc. January 2001.
4. Langkamp-Henken B, Lukowski MJ, Turner RE, Voyles LM. High levels of retinol intake during the first trimester of pregnancy result from use of over-the-counter vitamin/mineral supplements. J Am Diet Assoc. September 2000.
5. March of Dimes (homepage on the Internet). New York: Herbal Supplements: their safety, a concern for health care providers. [cited May 26, 2004] Available from: http://www.marchofdimes.com.
6. American Academy of Pediatrics, Committee on Nutrition. Pediatric Nutrition Handbook. 5th Ed. Kleinman, Ronald, editor. Washington DC: American Academy of Pediatrics; 2004.
7. Recommendations to prevent and control iron deficiency in the United States. MMWR [serial on the Internet]. 1998 April [cited 2004 March 12]. Available from: http://www.cdc.gov/mmwr/preview/mmwrhtml/00051880.htm.
8. Rasmussen, K. M. Is there a causal relationship between iron deficiency or iron-deficiency anemia and weight at birth, length of gestation and perinatal mortality? American Society for Nutritional Sciences. 2001; 590S-603S.
9. Scanlon KS, editor. Vitamin D expert panel meeting; October 11-12, 2001; Atlanta, Georgia. Available from: http://www.cdc.gov/nccdphp/dnpa/nutrition/pdf/Vitamin D Expert Panel Meeting.pdf.
10. Carmichael SL, Shaw GM, Schaffer DM, Selvin S. Diet quality and risk of neural tube defects. Medical Hypotheses. 2003; 60(3):351-355.
11. Shaw GM, Todoroff K, Carmichael SL, Schaffer DM, Selvin S. Lowered weight gain during pregnancy and risk of neural tube defects among offspring. Int. J. Epidemiology 2001; 30:60-65.
12. American Academy of Pediatrics, Committee on Genetics. Folic acid for the prevention of neural tube defects. Pediatrics.1999; 104(2):325-327.
13. Strauss RS, Dietz WH. Low maternal weight gain in the second and third trimester increases the risk for intrauterine growth retardation. American Society for Nutritional Sciences. 1999; 988-993.
14. Scholl TO, Hediger ML, Ances IG. Maternal growth during pregnancy and decreased infant birth weight. Am. J. Clin. Nutr. 1990; 51:790-793.
15. Position of the American Dietetic Association and Dietitians of Canada: Vegetarian diets. J Am Diet Assoc. 2003; 103(6):748-765.

16. Larsson CL, Johansson GK. Dietary intake and nutritional status of young vegans and omnivores in Sweden. Am. J. Clin. Nutr. 2002; 76:100-106.

17. Bakan R, Birmingham CL, Aeberhardt L, Goldner EM. Dietary zinc intake of vegetarian and nonvegetarian patients with anorexia nervosa. International Journal of Eating Disorders. 1993; 13(2):229-233.

18. Specker, Bonny L., Nutritional concerns of lactating women consuming vegetarian diets. Am. J. Clin. Nutr. 1994:59(suppl):1182-1186.

19. Heaney RP, Dowell MS, Rafferty K, Bierman J. Bioavailability of the calcium in fortified soy imitation milk, with some observation on method. Am. J. Clin. Nutr. 2000; 71:1166-1169.

20. Steinbrook, R. Surgery for severe obesity. New Engl. J. Med. 2004; 350(11):1075-9.

21. National Institute of Diabetes and Digestive and Kidney Diseases. Gastrointestinal surgery for severe obesity. [cited August 18, 2004] Available from: http://www.niddk.nih.gov/health/nutrit/pubs/gastric/gastricsurgery.htm.

22. Grange DK, Finlay JL. Nutritional vitamin B12 deficiency in a breastfed infant following maternal gastric bypass. Pediatr. Hematol Oncol. 1994; 11(3):311-8.

23. Corbett RW, Ryan C, Weinrich SP. Pica in pregnancy: does it affect pregnancy outcomes? American Journal of Maternal and Child Nursing. 2003; 28(3):183-189.

24. Rainville AJ. Pica practices of pregnant women are associated with lower maternal hemoglobin level at delivery. J Am Diet Assoc. 1998; 98(3): 293-6.

25. Institute of Medicine. WIC nutrition risk criteria: a scientific assessment. 1996; 270-272.

26. Gulson, Brian L., et al., Relationships of lead in breast milk to lead in blood, urine, and diet of infant and mother. Environmental Health Perspectives. 1998:106(10): 667-674.

27. Ping-Jian L, Ye-Zhou S, Qian-Ying W, Li-Ya G, Yi-Land W. Transfer of lead via placenta and breast milk in human. Biomedical and Environmental Sciences. 2000; 13:85-89.

28. Canfield, RL, Henderson, C, Cory-Slecha, D, Cox, C, Jusko, T, Lanphear, B. Intellectual impairment in children with blood lead concentrations below 10 mcg per deciliter. New Engl. J. Med. 2003; 348(16):1517-1526.

29. Institute of Medicine. Dietary reference intakes for vitamin A, vitamin K, arsenic, Boron, chromium, cooper, iodine, iron, manganese, molybdenum, nickel, silicon, vanadium and zinc. Food and Nutrition Board. Washington, DC: National Academy Press; 2001.

30. Centers for Disease Control and Prevention. Recommendations to prevent and control iron deficiency in the United States. MMWR 1998:47: RR-3.

31. U.S. National Library of Medicine and National Institutes of Health. Drugs and supplements: iron. Medline Plus. http://www.nlm.nih.gov/medlineplus/druginfo/natural/patient-iron.html#Safety. Accessed May 2009.

32. Zimmerman MB. Iodine deficiency in pregnancy and effects of maternal iodine supplementation on the offspring: a review. Am. J. Clin. Nutr. 2009:8(suppl): 668S-72S.

33. de Escobar DM, Obregón MJ, del Rey FF. Maternal thyroid hormones early in pregnancy and fetal brain development. Best Pract. Res. Clin. Endoriconl. Metab. 2004; 18:225-48.

34. Caldwell KL, Miller GA, Wang RY, Jain RB, Jones, RL. Iodine status of the U.S. population, National Health and Nutrition Examination Survey 2003-2004. Thyroid 2008; 18:1207-14.

35. Becker DV, Braverman LE, Delange F, et al. Iodine supplementation for pregnancy and lactation – United States and Canada: recommendations of the American Thyroid Association. Thyroid 2006; 16:949-51.

36. Leung AM, Pearce EN, Braverman, LE. Iodine content of prenatal vitamins in the United States. New Engl. J. Med. 2009; 360:9.

37. Centers for Disease Control and Prevention, Division of Birth Defects and Developmental Disabilities. Folic acid and the prevention of spina bifida and anencephaly: 10 years after the U.S. Public Health Service recommendation. MMWR 2002; 51: (RR-13)1-3.

38. Centers for Disease Control and Prevention. National Center for Environmental Health, Division of Birth Defects and Developmental Disabilities. Preventing neural tube birth defects: a prevention model and resource guide. Atlanta: CDC, 1998.

39. Centers for Disease Control and Prevention. Recommendations for the use of folic acid to reduce the number of cases of spina bifida and other neural tube defects. MMWR 1992; 41: RR-14.

40. Evans MI, Llurba E, Landsberger EJ, O'Brien JE, Harrison HH. Impact of folic acid fortification the United States: markedly diminish high maternal serum alpha-fetoprotein values. Am. Col. Obstetr. Gynecol. 2004; 103(3):447.

41. Chacko MR, Anding R, Kozinetz CA, Grover JL. Neural tube defects: knowledge and preconceptional prevention practices in minority young women. Pediatrics. 2003; 112(3):536-542.

42. Centers for Disease Control and Prevention. Diagnosis and management of foodborne illness: a primer for physicians. MMWR 2001; 50: RR-2.

43. Food Safety and Inspection Service, USDA. Listeriosis and pregnancy: what is your risk? [cited August 11, 2004] Available from: http://www.fsis.usda.gov.

Websites for Additional Information

427.1 References - Supplements/Herbs

http://www.marchofdimes.com
http://www.dietary-supplements.info.nih.gov/
http://www.vm.cfsan.fda.gov/
http://www.herbalgram.org

427.2 References - Highly Restrictive Eating/Nutrient Malabsorption

http://www.eatright.org
http://www.nimh.nih.gov
http://www.eatright.org/
http://www.llu.edu/llu/vegetarian/
http://www.nal.usda.gov/fnic/pubs/bibs/gen/vegetarian.htm
http://www.gastric-bypass-treatment.com/long-term-weight-loss-surgery-compications.aspx

427.3 References - Non-Food Ingestion

http://www.nieh.nih.gov/
http://www.epa.gov/ 427.4 References - Folic Acid
http://www.cdc.gov/
http://www.aap.org/
http://www.iom.edu/

427.5 References - Listeriosis

http://www.cdc.gov/foodsafety
http://www.cdc.gov/ncidod/dbmd/diseaseinfo/listeriosis_g.htm
http://www.cfsan.fda.gov
http://www.foodsafety.gov
http://www.fightbac.org
http://www.ific.org

428 Dietary Risk Associated with Complementary Feeding Practices

Definition/Cut-off Value

An infant or child who has begun to or is expected to begin to 1) consume complementary foods and beverages, 2) eat independently, 3) be weaned from breast milk or infant formula, or 4) transition from a diet based on infant/toddler foods to one based on the *Dietary Guidelines for Americans*, is at risk of inappropriate complementary feeding.

A complete nutrition assessment, including for risk #411, Inappropriate Nutrition Practices for Infants, or #425, Inappropriate Nutrition Practices for Children, must be completed prior to assigning this risk.

Participant Category and Priority Level

Category	Priority
Infants 4 to 12 months	IV
Children 12 through 23 months	V

Justification

Overview

Complementary feeding is the gradual addition of foods and beverages to the diet of the infant and young child (1, 2). The process of adding complementary foods should reflect the physical, intellectual, and behavioral stages as well as the nutrient needs of the infant or child. Inappropriate complementary feeding practices are common and well documented in the literature. Caregivers often do not recognize signs of developmental readiness and, therefore, offer foods and beverages that may be inappropriate in type, amount, consistency, or texture. Furthermore, a lack of nationally accepted feeding guidelines for children under the age of two might lead caregivers to assume that all foods are suitable for this age range.

The 2000 WIC Participant and Program Characteristics study (PC 2000) shows greater percentages of anthropometric and biochemical risk factors in children ages 6 to 24 months than in children 24 to 60 months of age (3). These differences could reflect physical manifestations of inappropriate complementary feeding practices. Although PC 2000 shows a lower dietary risk in the 6 to 24 month age group, this risk is probably under-reported due to the high incidence of other higher priority nutrition risks.

Age	Anthropometric Risk (%)	Biochemical Risk (%)	Dietary Risk (%)
6-11 mos	40	16	55
1 yr	41	14	76
2 yrs	37	12	80
3 yrs	32	9	80
4 yrs	35	7	79

The Institute of Medicine (IOM), in their report, Summary of Proposed Criteria for Selecting the WIC Food Packages identified specific nutrients with potential for inadequacy or excess for WIC participants. For breast-fed infants 6 through 11 months, the nutrients of concern for potential inadequacy are iron and zinc while those for children 12 through 23 months are iron, vitamin E, fiber and potassium. The nutrients of concern for excessive intake in children 12 through 23 months are zinc, preformed vitamin A, sodium and energy (4).

To manage complementary feeding successfully, caregivers must make decisions about what, when, where, and how to offer foods according to the infant's or child's:

- Requirement for energy and nutrients;
- Fine, gross, and oral motor skills;
- Emerging independence and desire to learn to self-feed; and
- Need to learn healthy eating habits through exposure to a variety of nutritious foods (1, 2, 5, 6, 7).

How WIC Can Help

The WIC Program plays a key role not only in the prevention of nutrition-related health problems, but also in the promotion of lifelong healthy eating behaviors. The process of introducing complementary foods provides a unique opportunity for WIC staff to assist caregivers in making appropriate feeding decisions for young children that may have lifelong implications.

Prevention of Nutrition-Related Health Problems:

Zinc deficiency

Zinc is critical for growth and immunity, as well as brain development and function. The concentration of zinc in breast milk declines to a level considered inadequate to meet the needs of infants 7 to 12 months of age (8, 9). Complementary food sources of zinc, such as meats or zinc-fortified infant cereals, should be introduced to exclusively breastfed infants by 7 months.

Iron deficiency

Hallberg states, "The weaning period in infants is especially critical because of the especially high iron requirements and the importance of adequate iron nutrition during this crucial period of development" (10). According to the Centers for Disease Control and Prevention (CDC), children less than 24 months of age, especially those between 9 and 18 months, have the highest rate of iron deficiency of any age group (11). In the third National Health and Nutrition Examination Survey (NHANES III), children ages 1 to 2, along

with adolescent girls, had the highest rates of overt anemia, while 9 % were iron deficient (12). Meanwhile, the Pediatric Nutrition Surveillance 2003 Report noted anemia rates of 16.2 % in 6 to 11 months of age infants, 15.0 % in 12 to 17 months of age, and 13.5 % in 18-23 months of age children (13).

Picciano et al. reported that the intake of iron decreased from 98% of the recommended amount at 12 months to 76% at 18 months of age (14). In WIC clinics, Kahn et al. found that the incidence of anemia was significantly more common in 6 to 23 months of age children than in 23 to 59 months of age. The 6 to 23 months of age was also more likely than the older child to develop anemia despite a normal hemoglobin test at WIC certification (15).

Feeding practices that may prevent iron deficiency include:

- Breastfeeding infants exclusively until 4 to 6 months of age;
- Feeding only iron-fortified infant formula as a substitute for or supplement to breast milk until age 1;
- Offering a supplemental food source of iron to infants, between 4 to 6 months or when developmentally ready;
- Avoiding cow's milk until age 12 months; and
- Limiting milk consumption to no more than 24 ounces per day for children aged 1 to 5 years (11).

Obesity

Much of the literature on obesity indicates that learned behaviors and attitudes toward food consumption are major contributing factors. Proskitt states, "The main long term effect of weaning on nutritional status could be through attitudes toward food and meals learned by infants through the weaning process. This may be a truly critical area for the impact of feeding on later obesity" (16).

Birch and Fisher state, "An enormous amount of learning about food and eating occurs during the transition from the exclusive milk diet of infancy to the omnivore's diet consumed by early childhood." The authors believe that parents have the greatest influence on assuring eating behaviors that help to prevent future overweight and obesity (17).

The American Academy of Pediatrics (AAP) states, "…prevention of overweight is critical, because long-term outcome data for successful treatment approaches are limited…" and, "Families should be educated and empowered through anticipatory guidance to recognize the impact they have on their children's development through lifelong habits of physical activity and nutritious eating" (1). Parents can be reminded that they are role models and teachers who help their children adopt healthful eating and lifestyle practices.

Tooth decay

Children under the age of 2 are particularly susceptible to Early Childhood Caries (ECC), a serious public health problem (18). In some communities, the incidence of ECC can range from 20% to 50% (19). Children with ECC appear to be more susceptible to caries in permanent teeth at a later age (1, 20). Dental caries can be caused by many factors, including prolonged use of a bottle and extensive use of sweet and sticky foods (21).

The Avon Longitudinal Study of Pregnancy and Childhood examined 1,026 children aged 18 months and found that baby bottles were used exclusively for drinking by 10 % of the children and for at least one

feeding by 64% of the children. Lower income families were found to use the bottle more frequently for carbonated beverages than higher income families (22).

Complementary feeding practices that caregivers can use to prevent oral health problems include:

- Avoiding concentrated sweet foods like lollipops, candy and sweetened cereals.
- Avoiding sweetened beverages. Introducing fruit juice after 6 months of age (1) and only feeding it in a cup; and limiting fruit juice to 4-6 ounces/day.
- Weaning from a bottle to a cup by 12 to 14 months (23).

Promotion of Lifelong Healthy Eating Behaviors:

Timing of introduction of complementary foods

The AAP, Committee on Nutrition (CON) states that, "… complementary foods may be introduced between ages 4 and 6 months…" but cautions that actual timing of introduction of complementary foods for an individual infant may differ from this (population based) recommendation. Furthermore, the AAP-CON acknowledges a difference of opinion with the AAP, Section on Breastfeeding, which recommends exclusive breastfeeding for at least 6 months (1).

Early introduction of complementary foods before the infant is developmentally ready (i.e., before 4-6 months of age) is associated with increased respiratory illness, allergy in high-risk infants, and decreased breast milk production (7).

Infants with a strong family history of food allergy should be breastfed for as long as possible and should not receive complementary foods until 6 months of age. The introduction of the major food allergens such as eggs, milk, wheat, soy, peanuts, tree nuts, fish and shellfish should be delayed until well after the first year of life as guided by the health care provider (7, 24).

Delayed introduction of complementary foods, on the other hand, is also associated with feeding difficulties. Northstone et al found that introduction of textured foods after 10 months of age resulted in more feeding difficulties later on, such as picky eating and/or refusal of many foods. To avoid these and other developmental problems, solid foods should be introduced no later than 7 months, and finger foods between 7 and 9 months of age (25).

Choosing Appropriate Complementary Foods and Beverages

Complementary foods should supply essential nutrients and be developmentally appropriate (7). The WIC Infant Feeding Practices Study (WIC-IFPS) found that by 6 months of age, greater than 80% of mothers introduced inappropriate dairy foods (i.e., yogurt, cheese, ice cream and pudding), 60% introduced sweets/snack foods (defined as chips, pretzels, candy, cookies, jam and honey), and 90% introduced high protein foods (beans, eggs and peanut butter) to their infants. This study also found that, among the infants who received supplemental drinks by 5 months of age, three-quarters had never used a cup, concluding that most infants received supplemental drinks from the bottle. By one year of age, almost 90% of WIC infants received sweetened beverages and over 90% received sweet/snack foods (26).

The Feeding Infants and Toddlers Study (FITS) found that WIC infants and toddlers consumed excess energy but inadequate amounts of fruits and vegetables. In addition, WIC toddlers consumed more sweets, desserts and sweetened beverages than non-WIC toddlers (27).

Sixty-five percent of all food-related choking deaths occur in children under the age of 2. Children in this age group have not fully developed their oral-motor skills for chewing and swallowing. For this reason, they

should be fed foods of an appropriate consistency, size, and shape. Foods commonly implicated in choking include hot dogs, hard, gooey or sticky candy, nuts and seeds, chewing gum, grapes, raisins, popcorn, peanut butter and hard pieces of raw fruits and vegetables and chunks of meat or cheese (1, 28, 29).

Introducing a Cup

Teaching an infant to drink from a cup is part of the process of acquiring independent eating skills. A delay in the initiation of cup drinking prolongs the use of the nursing bottle that can lead to excess milk and juice intake and possible Early Childhood Caries (ECC). Weaning from a bottle to a cup should occur by 12 to14 months of age (23).

Helping The Child Establish Lifelong Healthy Eating Patterns

Lifelong eating practices may have their roots in the early years. Birch and Fisher state that food exposure and accessibility, the modeling behavior of parents and siblings, and the level of parental control over food consumption influence a child's food preferences. Inappropriate feeding practices may result in under- or over-feeding and may promote negative associations with eating that continue into later life.

Normal eating behaviors such as spitting out or gagging on unfamiliar food or food with texture are often misinterpreted as dislikes or intolerances leading to a diminished variety of foods offered. Infants have an innate preference for sweet and salty tastes. Without guidance, an infant may develop a lifelong preference for highly sweetened or salty foods rather than for a varied diet (17).

A young child gradually moves from the limited infant/toddler diet to daily multiple servings from each of the basic food groups as described in the Dietary Guidelines (30). The toddler stage (ages 1-2 years) may frustrate caregivers since many toddlers have constantly changing food preferences and erratic appetites. In addition, toddlers become skeptical about new foods and may need to experience a food 15-20 times before accepting it (31).

Caregivers can be guided and supported in managing common toddler feeding problems. Feeding practices that caregivers can use to facilitate a successful transition to a food group-based diet include:

- Offering a variety of developmentally appropriate nutritious foods;
- Reducing exposure to foods and beverages containing high levels of salt and sugar;
- Preparing meals that are pleasing to the eye and include a variety of colors and textures; setting a good example by eating a variety of foods;
- Offering only whole milk from age 1-2; (Lower fat milk can be introduced after that age.)
- Providing structure by scheduling regular meal and snack times;
- Allowing the child to decide how much or whether to eat;
- Allowing the child to develop eating/self-feeding skills; and
- Eating with the child in a pleasant mealtime environment without coercion.

References

1. American Academy of Pediatrics. Committee on Nutrition. Kleinman RE, editor. Pediatric Nutrition Handbook. 5th ed. 2004.
2. Pelto GH, Levitt E, and Thairu L. Improving feeding practices: Current patterns, common constraints, and the design of interventions. Food and Nutrition Bulletin, 2003; 24(1): 45-82.

3. United States Department of Agriculture. Study of WIC participant and program characteristics. 2000.
4. Institute of Medicine. Food and Nutrition Board. Proposed criteria for selecting the WIC food packages. The National Academies Press, Washington DC, 2004.
5. Hervada AR, Hervada-Page M. Infant Nutrition: The first two years. In: Childhood Nutrition. Lifshitz F, editor. CRC Press; 1995.
6. Pipes PL, Trahms CM. Nutrient needs of infants and children. In: PipesPL, Trahms CM editors. Nutrition in infancy and childhood 5th ed. Mosby Publishing Co. 1993.
7. Hendricks KM, Weaning: Pathophysiology, practice and policy. In: Nutrition in Pediatrics, 3rd edition. B.C. Decker Inc, 2003.
8. Institute of Medicine. Food and Nutrition Board. Dietary reference intakes for vitamin A, vitamin K, arsenic, boron, chromium, copper, iodine, iron, manganese, molybdenum, nickel, silicon, vanadium and zinc. National Academies Press, Washington DC, 2001.
9. Clinical Nutrition Services; Warren Grant Magnuson Clinical Center, Office of Dietary Supplements. Facts about dietary supplements: zinc. National Institutes of Health. Bethesda Maryland; 2002.
10. Hallberg L. Perspectives on nutritional iron deficiency. Annu. Rev. Nutr. 2001; 21:1-21.
11. Centers for Disease Control and Prevention. Recommendations to prevent and control iron deficiency in the United States. MMWR. April 1998:18-21.
12. Looker AC, Dallman PR, Carroll MD, Gunter EW, Johnson CL. Prevalence of iron deficiency in the United States. JAMA. 1997; 277:973-6.
13. Centers for Disease Control and Prevention. Pediatric surveillance system 2003 annual report, Atlanta: U.S. Department of Health and Human Services, Center for Disease Control and Prevention, 2004. Available at http://www.cdc.gov/pednss (accessed 11/04).
14. Picciano MF, Smiciklas-Wright H, Birch LL, Mitchel DC, Murray-Kolb L, McConchy KL. Nutritional guidance is needed during dietary transition in early childhood. Ped. 2000; 106: 109-114.
15. Kahn JL, Binns HJ, Chen T, Tanz RR, Listernick R. Persistence and emergence of anemia in children during participation in the Special Supplemental Nutrition Program for Women, Infants, and Children. Arch Pediatr. Adolesc. Med. 2002; 156:1028-32.
16. Proskitt EM. Early feeding and obesity. In: Boulton J, Laron Z and Rey J, editors. Long-term consequences of early feeding. Nestle Nutrition Workshops Series; 1996, Nestle Ltd., Vevey/Lippincott-Raven Publishers, Philadelphia; Vol. 36.
17. Birch LL, Fisher JO. Development of eating behaviors among children and adolescents. Ped. 1998; 101:539-549.
18. Bertness J, Holt K, editors. Promoting awareness, preventing pain: Facts on early childhood caries (ECC) 2nd. Ed. [Fact Sheet on the Internet]. Washington (DC); National Maternal & Child Oral Health Resource Center; 2004. Available from: http://www.mchoralhealth.org.
19. American Academy of Pediatric Dentistry. Baby bottle tooth decay/early childhood caries. Pediatr. Dent. 2001 Mar-Apr; 23 (2): 18.

20. al-Shalan TA, Erickson PR, Hardie NA. Primary incisor decay before age 4 as a risk factor for future dental caries. J. Pediatr. Dent. 1997 Jan-Feb; 9 (1): 37-41.

21. Casamassimo P ed. 1996. Bright futures in practice: oral health. Arlington, VA: National Center for Education in Maternal and Child Health.

22. Northstone K, Rogers I, Emmett P. Drinks consumed by 18-month-old children: Are current recommendations being followed? Eur. J. Clin. Nutr. 2002; 56:236-44.

23. American Academy of Pediatric Dentistry. Policy on early childhood caries (EEC): Classifications, consequences, and prevention strategies. Pediatr. Dent; Reference manual 2003-2004: 2004; 25(7):25.

24. Butte N, Cobb K, Dwyer J, Graney L, Heird W, Rickard K. The start healthy feeding guidelines for infants and toddlers. J. Am. Diet. Assoc, 2004; 104 (3) 442-454.

25. Northstone, K, Emmett P, Nethersole F. The effect of age of introduction to lumpy solids on foods eaten and reported difficulties at 6 and 15 months. J. Hum. Nutr. Dietet. 2001; 14: 43-54.

26. Baydar N, McCann M, Williams R, Vesper E, McKinney P. WIC infant feeding practices study. USDA Office of Analysis and Evaluation. November 1997.

27. Ponza M, Devaney B, Ziegler P, Reidy K, and Squatrito C. Nutrient intake and food choices of infants and toddlers participating in WIC. J. Am. Diet. Assoc. 2004; 104: s71-s79.

28. Harris CS, Baker SP, Smith GA, Harris RM. Childhood asphyxiation by food: A national analysis and overview. JAMA. 1984; 251:2231-5.

29. Lucas B. Normal nutrition from infancy through adolescence. In: Handbook of pediatric nutrition. 2nd ed. Gaithersburg, Maryland: Aspen Publishers, Inc. 1999.

30. United States Department of Agriculture and the United States Department of Health and Human Services. Dietary guidelines for Americans, 5th ed. 2000. Available from: http://www.usda.gov.cnpp.

31. Story M, Holt K, Sofka D, editors. Bright futures in practice: nutrition. 2nd ed. Arlington, VA: National Center for Education in Maternal and Child Health; 2002.

502 Transfer of Certification

Definition/Cut-off Value

Person with current valid Verification of Certification (VOC) document from another State or local agency. The VOC is valid through the end of the current certification period, even if the participant does not meet the receiving agency's nutritional risk, priority or income criteria, or the certification period extends beyond the receiving agency's certification period for that category, and shall be accepted as proof of eligibility for Program benefits. If the receiving agency is at maximum caseload, the transferring participant must be placed at the top of any waiting list and enrolled as soon as possible. (1, 2)

This criterion would be used primarily when the VOC card/document does not reflect another (more specific) nutrition risk condition or if the participant was certified based on a nutrition risk condition not in use by the receiving State agency (1).

Participant Category and Priority Level

Category	Priority
Pregnant Women	N/A
Breastfeeding Women	N/A
Non-Breastfeeding Women	N/A
Infants	N/A
Children	N/A

Justification

Local agencies must accept Verification of Certification (VOC) documents from participants. A person with a valid VOC document shall not be denied participation in the receiving State because the person does not meet that State's particular eligibility criteria. Once a WIC participant has been certified by a local agency, the service delivery area into which s/he moves is obligated to honor that commitment. (1, 2)

Implications for WIC Nutrition Services

Transferring participants should receive the food package offered in the receiving State agency according to their category and nutritional needs. The receiving agency should explain any differences in the authorized supplemental foods. Participants who are eligible to receive WIC formula (infant formula, exempt infant formula, or WIC-eligible nutritionals) in Food Package III must have one or more qualifying conditions, as determined by a health care professional licensed to write medical prescriptions under State law (1, 2).

References

1. U.S. Department of Agriculture, Food and Nutrition Service. Policy Memorandum 2016-4: Verification of Certification. August, 11, 2016. Available from: https://www.fns.usda.gov/wic/verification-certification.
2. WIC Program Regulations; 7 CFR 246.7(k).

601 Breastfeeding Mother of Infant at Nutritional Risk

Definition/Cut-off Value

A breastfeeding woman whose breastfed infant has been determined to be at nutritional risk.

Participant Category and Priority Level

Category	Priority
Pregnant Women	I, II, or IV*
Breastfeeding Women	I, II, or IV*
**Must be the same priority as at-risk infant.*	

Justification

A breastfed infant is dependent on the mother's milk as the primary source of nutrition. Special attention should therefore be given to the health and nutritional status of the mother (5). Lactation requires approximately 500 additional Kcal per day as well as increased protein, calcium, and other vitamins and minerals (3, 1). Inadequate maternal nutrition may result in decreased nutrient content of the milk (1).

References

1. Institute of Medicine. Nutrition During Lactation. National Academy Press, Washington, D.C.; 1991.
2. Lawrence RA. Breastfeeding a guide for the medical profession. St. Louis: Mosby, 1994.
3. National Research Council (U.S.), Subcommittee on the Tenth Edition of the RDAs, National Institutes of Health, Committee on Dietary Allowances. Recommended dietary allowances. Washington, D.C.: National Academy Press, 1989.
4. WIC Program Regulations, Sect. 246.7(e)(1)(iii).
5. Worthington-Roberts BS, Williams SR. Nutrition in Pregnancy and Lactation. St. Louis: Mosby, 1993.

602 Breastfeeding Complications or Potential Complications (Women)

Definition/Cut-off Value

A breastfeeding woman with any of the following complications or potential complications for breastfeeding:

Complications (or Potential Complications)	
Severe breast engorgement	Cracked, bleeding or severely sore nipples
Recurrent plugged ducts	Age ≥ 40 years
Mastitis (fever or flu-like symptoms with localized breast tenderness)	Failure of milk to come in by 4 days postpartum
Flat or inverted nipples	Tandem nursing (breastfeeding two siblings who are not twins)

Participant Category and Priority Level

Category	Priority
Pregnant Women	I
Breastfeeding Women	I

Justification

Severe breast engorgement

Severe breast engorgement is often caused by infrequent nursing and/or ineffective removal of milk. This severe breast congestion causes the nipple-areola area to become flattened and tense, making it difficult for the baby to latch-on correctly. The result can be sore, damaged nipples and poor milk transfer during feeding attempts. This ultimately results in diminished milk supply. When the infant is unable to latch-on or nurse effectively, alternative methods of milk expression are necessary, such as using an electric breast pump.

Recurrent plugged ducts

A clogged duct is a temporary back-up of milk that occurs when one or more of the lobes of the breast do not drain well. This usually results from incomplete emptying of milk. Counseling on feeding frequency or method or advising against wearing an overly tight bra or clothing can assist.

Mastitis

Mastitis is a breast infection that causes a flu-like illness accompanied by an inflamed, painful area of the breast - putting both the health of the mother and successful breastfeeding at risk. The woman should be referred to her health care provider for antibiotic therapy.

Flat or inverted nipples

Infants may have difficulty latching-on correctly to nurse when nipples are flat or inverted. Appropriate interventions can improve nipple protractility and skilled help guiding a baby in proper breastfeeding technique can facilitate proper attachment.

Cracked, bleeding or severely sore nipples

Severe nipple pain, discomfort lasting throughout feedings, or pain persisting beyond one week postpartum is atypical and suggests the baby is not positioned correctly at the breast. Improper infant latch-on not only causes sore nipples, but impairs milk flow and leads to diminished milk supply and inadequate infant intake. There are several other causes of severe or persistent nipple pain, including Candida or staph infection. Referrals for lactation counseling and/or examination by the woman's health care provider are indicated.

Age ≥ 40 years

Older women (over 40) are more likely to experience fertility problems and perinatal risk factors that could impact the initiation of breastfeeding. Because involutional breast changes can begin in the late 30's, older mothers may have fewer functioning milk glands resulting in greater difficulty producing an abundant milk supply.

Failure of milk to come in by 4 days postpartum

Failure of milk to come in by 4 days postpartum may be a result of maternal illness or perinatal complications. This may place the infant at nutritional and/or medical risk, making temporary supplementation necessary until a normal breast milk supply is established.

Tandem nursing (breastfeeding two siblings who are not twins)

With tandem nursing the older baby may compete for nursing privileges, and care must be taken to assure that the younger baby has first access to the milk supply. The mother who chooses to tandem nurse will have increased nutritional requirements to assure her adequate milk production.

References

1. Alexander JM, Grant AM, Campbell MJ. Randomised controlled trial of breast shells and Hoffman's exercises for inverted and non-protractile nipples. BMJ 1992; 304:1030-2.
2. Akre J. Infant Feeding. The physiological basis. Bull.World Health Organ 1989; 67 Suppl:1-108.
3. Amier, L, Garland, SM, Dennerstein, L, et al.: Candida albicans: Is it associated with nipple pain in lactating women? Gynecol Obstetr Invest; 1996; 41:30-34.
4. De Coopman J. Breastfeeding after pituitary resection: support for a theory of autocrine control of milk supply? J. Hum. Lact. 1993; 9:35-40.
5. Lawrence RA. Breastfeeding a guide for the medical profession. St. Louis: Mosby, 1994.
6. Livingstone VH, Willis CE, Berkowitz J. Staphylococcus aureus and sore nipples. Can. Fam. Physician 1996; 42:654-9.
7. Mohrbacher N, Stock J, La LL, I. The breastfeeding answer book. Schaumburg, Ill: La Leche League International, 1997.
8. Neifert M. Early assessment of the breastfeeding infant. Contemporary Pediatr. 1996 Oct; 13:142.

9. Neifert MR. The optimization of breast-feeding in the perinatal period. Clin. Perinatol. 1998; 25:303-26.

10. Neifert MR, Seacat JM, Jobe WE. Lactation failure due to insufficient glandular development of the breast. Pediatrics 1985; 76:823-8.

11. Riodan J, Auerbach KG. Breastfeeding and human lactation. Boston: Jones and Bartlett Publishers, 1993.

12. The Main Trial Collaborative Group: Preparing for breastfeeding: treatment of inverted and non-protractile nipples in pregnancy; Midwifery; 1994; 10:200.

13. Woolridge MW. Aetiology of sore nipples. Midwifery 1986; 2:172-6.

603 Breastfeeding Complications or Potential Complications (Infants)

Definition/Cut-off Value

A breastfed infant with any of the following complications or potential complications for breastfeeding.

BF Complications (or Potential Complications)	
Jaundice	Weak or ineffective suck
Difficulty latching onto mother's breast	Inadequate stooling (for age, as determined by a physician or other health care professional), and/or less than 6 wet diapers per day

Participant Category and Priority Level

Category	Priority
Infants	I

Justification

Jaundice

Jaundice occurs when bilirubin accumulates in the blood because red blood cells break down too quickly, the liver does not process bilirubin as efficiently as it should, or intestinal excretion of bilirubin is impaired. The slight degree of jaundice observed in many healthy newborns is considered physiologic. Jaundice is considered pathologic if it appears before 24 hours, lasts longer than a week or two, reaches an abnormally high level, or results from a medical problem such as rapid destruction of red blood cells, excessive bruising, liver disease, or other illness. When jaundice occurs in an otherwise healthy breastfed infant, it is important to distinguish "breastmilk jaundice" from "breastfeeding jaundice" and determine the appropriate treatment.

- In the condition known as "breastmilk jaundice," the onset of jaundice usually begins well after the infant has left the hospital, 5 to 10 days after birth, and can persist for weeks and even months. Early visits to the WIC clinic can help identify and refer these infants to their primary health care provider. Breastmilk jaundice is a normal physiologic phenomenon in the thriving breastfed baby and is due to a human milk factor that increases intestinal absorption of bilirubin. The stooling and voiding pattern is normal. If the bilirubin level approaches 18-20 mg%, the health care provider may choose to briefly interrupt breastfeeding for 24-36 hours which results in a dramatic decline in bilirubin level.
- Resumption of breastfeeding usually results in cessation of the rapid fall in serum bilirubin concentration, and in many cases a small increase may be observed, followed by the usual gradual decline to normal.

- "Breastfeeding jaundice", is an exaggeration of physiologic jaundice, which usually peaks between 3 and 5 days of life, though it can persist longer. This type of jaundice is a common marker for inadequate breastfeeding. An infant with breastfeeding jaundice is underfed and displays the following symptoms: infrequent or ineffective breastfeeding; failure to gain appropriate weight; infrequent stooling with delayed appearance of yellow stools (i.e., prolonged passage of meconium); and scant dark urine with urate crystals. Improved nutrition usually results in a rapid decline in serum bilirubin concentration.

Weak or ineffective suck

A weak or ineffective suck may cause a baby to obtain inadequate milk with breastfeeding and result in a diminished milk supply and an underweight baby. Weak or ineffective suckling can be due to prematurity, low birth weight, a sleepy baby, or physical/medical problems such as heart disease, respiratory illness, or infection. Newborns who receive bottle feedings before beginning breastfeeding or who frequently use a pacifier may have trouble learning the proper tongue and jaw motions required for effective breastfeeding.

Difficulty latching onto the mother's breast

Difficulty latching onto the mother's breast may be due to flat or inverted nipples, breast engorgement, or incorrect positioning and breastfeeding technique. Early exposure to bottle feedings can predispose infants to "nipple confusion" or difficulties learning to attach to the breast correctly and effectively extract milk. A referral for lactation counseling should be made.

Inadequate stooling and/or less than 6 wet diapers per day

Inadequate stooling or less than 6 wet diapers are probable indicators that the breastfed infant is not receiving adequate milk. Not only is the baby at risk for failure to thrive, but the mother's milk is at risk for rapidly diminishing due to ineffective removal of milk. The breastfed infant with inadequate caloric intake must be identified early and the situation remedied promptly to avoid long-term consequences of dehydration or nutritional deprivation. Although failure to thrive can have many etiologies, the most common cause in the breastfed infant is insufficient milk intake as a result of infrequent or ineffective nursing. Inadequate breastfeeding can be due to infant difficulties with latching on or sustaining suckling, use of a nipple shield over the mother's nipple, impaired let down of milk, a non-demanding infant, excessive use of a pacifier, or numerous other breastfeeding problems.

The literature regarding inadequate stooling varies widely in terms of quantification; this condition is best diagnosed by the pediatrician or other health care practitioner.

References

1. Auerbach KG, Gartner LM. Breastfeeding and human milk: their association with jaundice in the neonate. Clin. Perinatol. 1987; 14:89-107.
2. Barros FC, Victora CG, Semer TC, Tonioli FS, Tomasi E, Weiderpass E. Use of pacifiers is associated with decreased breast-feeding duration. Pediatrics 1995; 95:497-9.
3. Bocar DL. The lactation consultant: part of the health care team. NAACOGS. Clin. Issu. Perinat. Womens Health Nurs. 1992; 3:731-7.
4. Cooper WO, Atherton HD, Kahana M, Kotagal UR. Increased incidence of severe breastfeeding malnutrition and hypernatremia in a metropolitan area. Pediatrics 1995; 96:957-60.Neifert MR. The optimization of breast-feeding in the perinatal period. Clin. Perinatol. 1998; 25:303-26.

5. De Carvalho M, Robertson S, Friedman A, Klaus M. Effect of frequent breast-feeding on early milk production and infant weight gain. Pediatrics 1983; 72:307-11.

6. Kurinij N, Shiono PH. Early formula supplementation of breast-feeding. Pediatrics 1991; 88:745-50.

7. Lawrence RA. Breastfeeding a guide for the medical profession. St. Louis: Mosby, 1994.

8. Maisels MJ, Newman TB. Kernicterus in otherwise healthy, breast-fed term newborns. Pediatrics 1995; 96:730-3.

9. Meier PP, Engstrom JL, Fleming BA, Streeter PL, Lawrence PB. Estimating milk intake of hospitalized preterm infants who breastfeed. J. Hum. Lact. 1996; 12:21-6.

10. Neifert M. Early assessment of the breastfeeding infant. Contemporary Pediatr. 1996 Oct; 13:142.

11. Neifert M, Lawrence R, Seacat J. Nipple confusion: toward a formal definition. J. Pediatr. 1995; 126:S125-S129.

12. Seidman DS, Stevenson DK, Ergaz Z, Gale R. Hospital readmission due to neonatal hyperbilirubinemia. Pediatrics 1995; 96:727-9.

13. Thullen JD. Management of hypernatremic dehydration due to insufficient lactation. Clin. Pediatr. (Phila) 1988; 27:370-2.

14. Tudehope D, Bayley G, Munro D, Townsend S. Breastfeeding practices and severe hyperbilirubunemia. J. Pediatr. Child Health 1991; 27:240-4.

15. Victora CG, Behague DP, Barros FC, Olinto MT, Weiderpass E. Pacifier use and short breastfeeding duration: cause, consequence, or coincidence? Pediatrics 1997; 99:445-53.

16. Weaver LT, Ewing G, Taylor LC. The bowel habit of milk-fed infants. J. Pediatr. Gastroenterol. Nutr. 1988; 7:568-71.

17. Wilson-Clay B. Clinical use of silicone nipple shields. J. Hum. Lact. 1996; 12:279-85.

701 Infant Up to 6 Months Old of WIC Mother or of a Woman Who Would Have Been Eligible During Pregnancy

Definition/Cut-off Value

An infant < six months of age whose mother was a WIC Program participant during pregnancy or whose mother's medical records document that the woman was at nutritional risk during pregnancy because of detrimental or abnormal nutritional conditions detectable by biochemical or anthropometric measurements or other documented nutritionally related medical conditions.

Participant Category and Priority Level

Category	Priority
Infants	II

Justification

Federal Regulations designate these conditions for WIC eligibility (3).

WIC participation during pregnancy is associated with improved pregnancy outcomes. An infant whose nutritional status has been adequately maintained through WIC services during gestation and early infancy may decline in nutritional status if without these services and return to a state of elevated risk for nutrition related health problems. Infants whose mother was at medical/nutritional risk during pregnancy, but did not receive those services, may also be thought of as a group at elevated risk for morbidity and mortality in the infant period (1, 2).

WIC participation in infancy is associated with lower infant mortality, decreased anemia for infants and improvements in growth (head circumference, height and weight). Infants on WIC are more likely to consume iron-fortified formula and cereal and less likely to consume cow's milk before one year, thus lowering the risk of developing iron deficiency anemia (1, 2).

References

1. Disbrow DD. The costs and benefits of nutrition services: a literature review. J. Am. Diet. Assoc. 1989; 89:S3-66.
2. Ryan AS, Martinez GA, Malec DJ. The effect of the WIC program on nutrient intakes of infants, 1984. Med. Anthropol. 1985; 9153-72.
3. WIC Program Regulations; Section 246.7(e)(1)(ii).

702 Breastfeeding Infant of Woman at Nutritional Risk

Definition/Cut-off Value

Breastfeeding infant of woman at nutritional risk.

Participant Category and Priority Level

Category	Priority
Infants	I,II, or IV*
*Must be the same priority as at-risk mother.	

Justification

A breastfed infant is dependent on the mother's milk as the primary source of nutrition. Lactation requires the mother to consume an additional 500 Kcal per day (approximately) as well as increased protein, calcium, and other vitamins and minerals (2, 1). Inadequate maternal nutrition may result in decreased nutrient content of the milk (1). Special attention should therefore be given to the health and nutritional status of breastfed infants whose mothers are at nutritional risk (4).

References

1. Institute of Medicine. Nutrition During Lactation. National Academy Press, Washington, D.C.; 1991.
2. National Research Council (U.S.), Subcommittee on the Tenth Edition of the RDAs, National Institutes of Health, Committee on Dietary Allowances. Recommended dietary allowances. Washington, D.C.: National Academy Press, 1989.
3. WIC Program Regulations; Section 246.7(e)(1)(i).
4. Worthington-Roberts BS, Williams SR. Nutrition During Pregnancy and Lactation. St. Louis: Mosby, 1989.

801 Homelessness

Definition/Cut-off Value

A woman, infant or child who lacks a fixed and regular nighttime residence; or whose primary nighttime residence is:

- A supervised publicly or privately operated shelter (including a welfare hotel, a congregate shelter, or a shelter for victims of domestic violence) designed to provide temporary living accommodations;
- An institution that provides a temporary residence for individuals intended to be institutionalized;
- A temporary accommodation of not more than 365 days in the residence of another individual; or
- A public or private place not designed for, or ordinarily used as, a regular sleeping accommodation for human beings.

Participant Category and Priority Level

Category	Priority
Pregnant Women	IV or VII
Breastfeeding Women	IV or VII
Non-Breastfeeding Women	VI or VII
Infants	IV or VII
Children	V or VII

Justification

Homeless individuals comprise a very vulnerable population with many special needs. WIC Program regulations specify homelessness as a predisposing nutrition risk condition. Today's homeless population contains a sizeable number of women and children – over one-third of the total homeless population in the U.S. Studies show forty-three percent of today's homeless are families, and an increasing number of the "new homeless" include economically-displaced individuals who have lost their jobs, exhausted their resources, and recently entered into the ranks of the homeless and consider their condition to be temporary.

References

1. WIC Program Regulations; Sect. 246.7(e)(2)(iv).

802 Migrancy

Definition/Cut-off Value

Categorically eligible women, infants and children who are members of families which contain at least one individual whose principal employment is in agriculture on a seasonal basis, who has been so employed within the last 24 months, and who establishes, for the purposes of such employment, a temporary abode.

Participant Category and Priority Level

Category	Priority
Pregnant Women	IV or VII
Breastfeeding Women	IV or VII
Non-Breastfeeding Women	VI or VII
Infants	IV or VII
Children	V or VII

Justification

Data on the health and/or nutritional status of migrants indicate significantly higher rates or incidence of infant mortality, malnutrition, and parasitic disease (among migrant children) than among the general U.S. population. Therefore, migrancy has long been stipulated as a condition that predisposes persons to inadequate nutritional patterns or nutritionally related medical conditions.

References

1. WIC Program Regulations; Sect. 246.7(e)(2)(iv).

901 Recipient of Abuse

Definition/Cut-off Value

Recipient of abuse is defined as an individual who has experienced physical, sexual, emotional, economic, or psychological maltreatment that may frighten, intimidate, terrorize, manipulate, hurt, humiliate, blame, injure, and/or wound the individual (1).

The experience of abuse may be self-reported by the individual, an individual's family member, or reported by a social worker, healthcare provider, or other appropriate personnel. Types of abuse relevant to the WIC population include, but are not limited to, the following:

- **Domestic violence**: abuse committed by a current or former family or household member or intimate partner (2, 3, 4).
- **Intimate partner violence** (IPV): a form of domestic violence committed by a current or former intimate partner (i.e., spouse, boyfriend/girlfriend, dating partner, or ongoing sexual partner) that may include physical violence, sexual violence, stalking, and/or psychological aggression (including coercive tactics) (5).
- **Child abuse and/or neglect**: any act or failure to act that results in harm to a child or puts a child at risk of harm. Child abuse may be physical (including shaken baby syndrome), sexual, or emotional abuse or neglect of an infant or child under the age of 18 by a parent, caretaker, or other person in a custodial role (such as a religious leader, coach, or teacher) (6, 7, 8).

Participant Category and Priority Level

Category	Priority
Pregnant Women	IV or VII
Breastfeeding Women	IV or VII
Non-Breastfeeding Women	VI or VII
Infants	IV or VII
Children	V or VII

Justification

Abuse is a serious public health problem with numerous individual and societal consequences. Women and children who experience abuse often suffer from immediate and long-term physical and emotional health consequences. It has been estimated that the per-victim lifetime cost (including medical costs, lost work productivity, criminal justice, and other costs) is $103,767 for women who experience IPV and $830,938 for children who experience maltreatment (4, 9). Although abuse is prevalent, it is often under-reported for a multitude of reasons. Many statistics related to IPV are reliant on self-report by the recipient. Women may be hesitant to report IPV or seek help from health care providers due to reasons such as financial dependence on the abusive partner, fear of further abuse, fear of stigmatization, and shame (10, 11).

Additionally, screening and evaluation for abuse, particularly IPV, is often inconsistent in the medical community (11, 12).

Impact on Maternal Health

Data from the 2015 National Intimate Partner and Sexual Violence Survey (NISVS) indicate that about 1 in 3 women in the U.S. experienced contact sexual violence, physical violence, and/or stalking by an intimate partner in their lifetime (13). According to the National Center for Injury Prevention and Control, women in the U.S. experience about 4.8 million intimate partner-related physical assaults and rape each year (14). Between 2016 and 2018, the number of IPV incidents in the U.S. increased by 42% (15). The highest rates of IPV are generally experienced by women between the ages of 18 to 34 and nearly three quarters of all women recipients of IPV first experienced IPV before the age of 25 (13, 16). An estimated 11.6 million females between the ages of 11 and 17 years reported having experienced IPV (13). According to the NISVS, some ethnic minorities are disproportionately affected by IPV. The table below summarizes lifetime prevalence of IPV among women of various ethnicities (17):

Race/Ethnicity	Lifetime Prevalence of IPV
Multi-Racial, Non-Hispanic	57%
American Indian/Alaska Native, Non-Hispanic	48%
Black, Non-Hispanic	45%
White, Non-Hispanic	37%
Hispanic	34%
Asian or Pacific Islander	18%

Research suggests that the disclosure of IPV and seeking of services by certain racial/ethnic groups may be deterred due to a mistrust of the medical community, lack of cultural sensitivity, fear of stigmatization and inability to access services (10). Higher rates of IPV are experienced by immigrant women, especially among Latina and Asian women (18). Immigrant women are particularly susceptible to IPV due to poverty, social isolation, disparities in economic and social resources (between the woman and her partner), and immigration status (18). Other populations disproportionately affected by IPV include women with disabilities, LGBTQ women, women veterans, and women with substance use disorders (11). Research shows that:

- Women with disabilities have nearly double the lifetime risk of IPV (17).
- Women with physical health impairments and mental health impairments were 22% and 67% more likely to experience IPV than women without impairments, respectively (11).
- A greater proportion of gay/lesbian women (40%) and bisexual women (60%) report experiencing IPV compared to heterosexual women (35%) (11).
- The lifetime prevalence of IPV among transgender people ranges from 31-50% showing similar, if not higher rates of occurrence than other sexual minorities (11).

- The lifetime IPV prevalence for women veterans is 35% (11).
- Nearly 90% percent of women entering substance use treatment had experienced IPV in their lifetime (11).

While IPV during the perinatal period is more common than other maternal health conditions such as pre-eclampsia and placenta previa, it receives considerably less attention during perinatal care (19). Most studies have found that between 3- 9% of women experience abuse during pregnancy, with the rate increasing to as high as 12% after delivery (10). However, some studies conducted more specifically on low-income single women have estimated abuse rates up to 50% during pregnancy (12). Women living in low-socioeconomic conditions experience higher rates of IPV before and during pregnancy (10). Many of these women, who are at higher risk for adverse health outcomes, utilize WIC services (10). One study found that women who participate in WIC have higher odds of IPV during preconception and pregnancy compared to women who do not (10).

Women who experience abuse are at greater risk of a host of adverse physical health conditions including chronic pain (e.g., fibromyalgia, joint disorders, facial and back pain); cardiovascular problems (e.g., hypertension); gastrointestinal disorders (e.g., stomach ulcers, appetite loss, abdominal pain, digestive problems); and neurological problems (e.g., severe headaches, vision and hearing problems, memory loss, traumatic brain injury) (18). Moreover, women, who experience psychosocial stressors such as IPV, are more likely to partake in risky health behaviors (e.g., smoking, alcohol, and substance use) (16). Engaging in such behaviors puts women at an increased risk for unintended pregnancies and sexually transmitted infections (12).

Pregnant women who experience IPV are less likely to obtain adequate prenatal care and are twice as likely to miss prenatal appointments and not initiate care until the third trimester (12). One study found that women who experience abuse during pregnancy are less likely to gain the amount of weight recommended by the Institute of Medicine (IOM); specifically, excessive weight gain was associated with women aged 20 to 34, and inadequate weight gain was associated with women aged 35 years and older (20). Another study found that the pre-pregnancy BMI of women who experienced IPV before and/or during pregnancy was also more likely to be underweight or overweight compared to participants who were not abused (21). For more information about gestational weight gain, see risk #131 Low Maternal Weight Gain and risk #133 High Maternal Weight Gain.

Women who experience abuse during pregnancy may also suffer mental health consequences. Research has shown that IPV during pregnancy is associated with depression during the perinatal period. In fact, almost 40% of abused women report depressive symptoms, making it the most common mental health consequence of IPV. Women experiencing abuse while pregnant are 2.5 times more likely to report symptoms of depression than their non-abused counterparts. Post-traumatic stress disorder (PTSD) is also common among abused women, with rates ranging from 19-84%. (12) For more information about maternal mental health, see risk #361 Mental Illnesses.

Despite the detrimental effects of IPV, it is often under-reported and not commonly evaluated during pregnancy (21). In fact, research suggests that women are not routinely evaluated, and most clinicians only conduct screening when obvious warning signs are observed (10). According to a national survey, only 17% of providers routinely screen for IPV during the first visit and only 5% during follow-up visits (10). Researchers and caregivers agree that the ideal time to address IPV is during perinatal care because it is often the only time women have regular contact with health care providers; however, the consensus on how to approach IPV and which interventions should be adopted is unclear (19). The U.S. Department of

Health and Human Services and American College of Obstetrics and Gynecologists recommend that physicians screen all women for IPV during obstetric care, beginning at the first prenatal visit, at least once per trimester, and at the postpartum checkup (10).

Impact on Infant Health

IPV experienced by the mother can have severe impacts on neonatal health, putting the infant at higher risk of low birth weight (LBW), preterm birth (PTB), or being born small for gestational age (SGA). IPV has also been shown to contribute to increased likelihood of spontaneous abortion, fetal loss, and neonatal death. These complications may be caused by several mechanisms, including blunt physical trauma to the mother, negative maternal coping behaviors (e.g., smoking, drug use, or alcohol use), inadequate maternal nutrition, isolation, limited access to prenatal care, and elevated physical or psychological stress levels. (12)

Analysis of data from the Pregnancy Risk Assessment Monitoring System (PRAMS) shows a small but significant relationship between IPV either before or during pregnancy and LBW infants (22). One study found that women seen in the hospital for assault while pregnant and who delivered their infants during that hospitalization were more than three times as likely to have a LBW infant (22). The cessation of domestic violence also appears to have a positive impact on infant weight gain. One study indicated that newborns of women who reported an end to domestic violence had greater increases in weight from 6-12 months of age compared to infants of mothers who reported continued violence (23). For more information about LBW, refer to risk #141 Low Birth Weight and Very Low Birth Weight.

While the research on the association between IPV during pregnancy and delivery of a SGA baby is limited, one meta-analysis found that SGA outcomes were significantly increased among women who experience IPV during pregnancy compared to women who did not (24). Another study conducted in a low-income, urban, and predominantly African American sample found that infants born to mothers experiencing IPV were five times more likely to suffer an adverse neonatal outcome (e.g., SGA, LBW or PTB) (12). Research shows that babies who are SGA are at an increased risk of early childhood developmental and behavioral problems and of developing coronary heart disease, stroke, non-insulin-dependent diabetes mellitus, adiposity, and metabolic syndrome in adulthood (12). For more information about SGA, refer to risk #151 Small for Gestational Age.

Shaken Baby Syndrome (SBS) or Abusive Head Trauma (AHT) is the leading cause of physical child abuse death in the United States (25). According to the Center for Disease Control and Prevention (CDC), SBS is a preventable, severe form of physical child abuse resulting from violently shaking an infant by the shoulders, arms, or legs (26). Approximately 1,300 reported cases of SBS/AHT occur in the U.S. each year and most involve babies less than 6 months old (25). Babies from birth to 1 year, especially babies ages 2 to 4 months, are at greatest risk of injury from shaking because they cry more frequently and are easier to shake than older children (26). Factors that increase the likelihood of SBS are having unrealistic expectations about child development and child-rearing, having been abused or neglected as a child, being a victim or witness to domestic violence, and being a single parent (26).

<u>Breastfeeding</u>

When it comes to infant feeding decisions, the research on the relationship between breastfeeding and IPV against the mother before, during and after pregnancy is limited and findings are mixed. A review of 16 studies concluded that IPV exposure appears to associate negatively with breastfeeding outcomes, including decreased breastfeeding initiation, early cessation of exclusive breastfeeding, and shortened duration of exclusive breastfeeding (27). However, high-quality research remains limited. Because exposure

to IPV is not a strong predictor of breastfeeding outcomes based on existing literature, WIC staff should provide breastfeeding support to help participants meet their individual breastfeeding goals.

Impact on Child Health

There are many forms of abuse and neglect. Per the CDC, the most common forms of child abuse and neglect are (28):

- **Physical abuse** – the intentional use of physical force that can result in physical injury. Examples include hitting, kicking, shaking, burning, or other shows of force against a child.
- **Sexual abuse** – involves pressuring or forcing a child to engage in sexual acts. It includes behaviors such as fondling, penetration, and exposing a child to other sexual activities.
- **Emotional abuse** – refers to behaviors that harm a child's self-worth or emotional well-being. Examples include name calling, shaming, rejection, withholding love, and threatening.
- **Neglect** – the failure to meet a child's basic physical and emotional needs. These needs include housing, food, clothing, education, and access to medical care.

According to data from National Survey of Children's Exposure to Violence, approximately 1 in 7 children (0 – 17 years old) in the U.S. experienced child abuse and/or neglect in the reported year (29). Children in families with low socioeconomic status experience child abuse and neglect at a rate that is five times higher than children in families with high socioeconomic status (28). The CDC estimated the total U.S. population economic burden associated with child maltreatment was approximately $428 billion in 2015, rivaling the burden of other public health concerns such as stroke and type 2 diabetes (28). According to the National Child Abuse and Neglect Data System, 75% of the 3.4 million child and abuse neglect referrals in 2011 were classified as neglect, with the majority of children being under 3 years old (30). Neglect can affect children throughout their lifetime depending on the timing, how often it occurs and the severity (30). Children who are abused often have moderate to severe malnutrition due to having food withheld, which may lead to a compromised nutrition state and failure to thrive (FTT) (31). While neglect is often associated with children being underweight, the research is mixed (30). There is a small body of evidence regarding neglect and obesity, with some studies showing neglect being associated with a higher risk of obesity (30). Research has also shown that even when they are not the recipient of abuse, children who witness acts of aggression or IPV in the home can suffer symptoms of post-traumatic stress disorder, such as bed-wetting or nightmares, and were at greater risk than their peers of having allergies, asthma, gastrointestinal problems, headaches, and the flu (14).

Serious neglect and physical, emotional, or sexual abuse have short- and long-term physical, emotional, and functional consequences for children. Children who are abused and/or neglected may suffer physical injuries such as cuts, bruises, or broken bones, as well as emotional and psychological problems, such as impaired social-emotional skills or anxiety. (28)

Child abuse and neglect are considered adverse childhood experiences (ACEs), which are potentially traumatic events that occur in childhood (0-17 years) such as experiencing violence, abuse, or neglect; witnessing violence in the home; and having a family member attempt or die by suicide. ACEs can have negative, lifelong effects on health, including disruption to healthy brain development, affecting social development, and compromising the immune system. Research shows that exposures to ACEs increases the risks of injury, sexually transmitted infections, including HIV, mental health problems, maternal and child health problems, teen pregnancy, involvement in sex trafficking, and a wide range of chronic diseases such

as cancer, type 2 diabetes, heart disease, and suicide. Child abuse and neglect are just a portion of potential ACEs that can occur in childhood. (32)

Implications for WIC Nutrition Services

WIC staff can provide the following nutrition services to participants who experience abuse:

- Provide a safe and supportive environment for participants who may be experiencing or have experienced abuse.
- Encourage pregnant women to attend all prenatal appointments with their health care provider and explain the importance of early and adequate prenatal care.
- Offer tailored breastfeeding support catered to the participant's specific needs and concerns.
- Encourage parents to attend local parenting classes or parent training programs (33).
- Refer the participant to their family case manager, if available, and/or to services and resources in their community that provide support to victims of abuse.
- Refer participants to national resources such as:
    - National Domestic Violence Hotline: 1-800-799-SAFE (7233). This hotline is staffed with trained counselors 24 hours a day and provides callers with crisis counselors, safety planning and assistance in finding resources, such as shelter. A secure, confidential online chat option is also available.
    - Directory of Crime Victim Services. This website provides a directory of programs and organizations that can help victims of crime.
    - Rape, Abuse and Incest National Network (RAINN): 1-800-656-HOPE (4673). This national hotline provides counseling and assistance to victims of sexual violence and their families and friends from trained counselors who are available 24 hours a day.
    - National Clearinghouse for the Defense of Battered Women (NCDBW): 1-800-903-0111 ext. 3. This national organization provides technical assistance to abused women facing charges related to their abuse.
    - Childhelp National Child Abuse Hotline: 1-800-4-A-CHILD (1-800-422-4453). This hotline offers information to parents seeking help for child abuse, individuals who suspect child abuse is occurring and those needing prevention tips. Professional counselors are available to provide support and referrals to emergency and social services. Their website also lists Child Protective Services in each state.

If State law requires the reporting of known or suspected child abuse or neglect, WIC staff must release such information to appropriate State officials. WIC regulations pertaining to confidentiality do not take precedence over such State law.

References

1. United Nations [Internet]. What is domestic abuse?; [cited 2022 Jan 13]; [about 5 screens]. Available from: https://www.un.org/en/coronavirus/what-is-domestic-abuse.
2. National Conference of State Legislatures [Internet]. Domestic violence/domestic abuse and relationships; 2019 June 13 [cited 2022 Jan 13]; [about 25 screens]. Available from:

https://www.ncsl.org/research/human-services/domestic-violence-domestic-abuse-definitions-and-relationships.aspx.

3. The United States Department of Justice [Internet]. Washington (DC). Office of Violence Against Women (OVW): domestic violence; [cited 2022 Jan 13]; [about 2 screens]. Available from: https://www.justice.gov/ovw/domestic-violence.

4. Centers for Disease Control and Prevention [Internet]. Atlanta (GA): Centers for Disease Control and Prevention, c2020. Preventing Intimate Partner Violence. 2020 October 9 [cited 2021 Feb 12]. Available from: https://www.cdc.gov/violencepreventi on/intimatepartnerviolence/fastfact.html.

5. Breiding MJ, Basile KC, Smith SG, Black MC, Mahendra RR. Atlanta (GA). Intimate Partner Violence Surveillance: Uniform Definitions and Recommended Data Elements, Version 2.0. National Center for Injury Prevention and Control, Centers for Disease Control and Prevention; 2015. Available from: https://www.cdc.gov/violenceprevention/pdf/ipv/intimatepartnerviolence.pdf.

6. Centers for Disease Control and Prevention [Internet]. Atlanta (GA). Preventing Child Abuse and Neglect; 2021 Mar 15 [cited 2022 Jan 13]; [about 2 screens]. Available from: https://www.cdc.gov/violenceprevention/childabuseandneglect/fastfact.html.

7. National Library of Medicine [Internet]. Bethesda (MD). Child abuse; 2021 Dec 20 [cited 2022 Jan 13]. Available from: https://medlineplus.gov/childabuse.html.

8. The Child Abuse Prevention and Treatment Act, Pub. L. No. 115-271 (Oct. 24, 2018). Available from: https://www.acf.hhs.gov/sites/default/files/documents/cb/capta.pdf.

9. Peterson C, Florence C, Klevens J. The economic burden of child maltreatment in the United States, 2015. Child Abuse Negl. 2018 October 8 [cited 2021 July 15];8:178-183. Available from: https://stacks.cdc.gov/view/cdc/61245, doi:10.1016/j.chiabu.2018.09.018.

10. Masho SW, Rozario SS, Ferrance JL. Intimate Partner Violence Around the Time of Pregnancy and Utilization of WIC Services. Matern Child Health J. 2019 Sept 18 [cited 2021 Apr 13];23:1648-1657.

11. Ramaswamy A, Ranji U, Salganicoff A. Intimate Partner Violence (IPV) Screening and Counseling Services in Clinical Settings: Issue Brief. Kaiser Family Foundation. 2019 November [cited 28 May 2021]. Available from: https://files.kff.org/attachment/Issue-Brief-Intimate-Partner-Violence-IPV-Screening-and-Counseling-Services-in-Clinical-Settings.

12. Alhusen JL, Ray E, Sharps P, et al. Intimate partner violence during pregnancy: maternal and neonatal outcomes. J Womens Health (Larchmt). 2015 Jan [cited 2021 February 17];24(1):100-106. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4361157/ doi: 10.1089/jwh.2014.4872.

13. Centers for Disease Control and Prevention [Internet]. Atlanta (GA): Centers for Disease Control and Prevention, c2018. The National Intimate Partner and Sexual Violence Survey (NISVS): 2015 Data Brief – Updated Release. 2018 [cited 2021 July 9]. Available from: https://www.cdc.gov/violenceprevention/pdf/2015data-brief508.pdf.

14. National Organization for Women [Internet]. Washington DC: National Organization for Women, c2021. Violence Against Women in the United States: Statistics. National Organization for Women. 2021 [cited 2021 February 12. Available from: https://now.org/resource/violence-against-women-in-the-united-states-statistic/.

15. National Coalition Against Domestic Violence [Internet]. Denver (CO): National Coalition Against Domestic Violence, c2020. Domestic Violence. 2020 [cited 2021 February 12]. Available from https://assets.speakcdn.com/assets/2497/domestic_violence-2020080709350855.pdf?1596811079991.

16. Centers for Disease Control and Prevention [Internet]. Atlanta (GA): Centers for Disease Control and Prevention, c2011. The National Intimate Partner and Sexual Violence Survey (NISVS): 2010 Summary Report. 2011 [cited 2021 February 12]. Available from: https://www.cdc.gov/ViolencePrevention/pdf/NISVS_Report2010-a.pdf.

17. Centers for Disease Control and Prevention [Internet]. Atlanta (GA): Centers for Disease Control and Prevention, c2017. The National Intimate Partner and Sexual Violence Survey (NISVS): 2010-2012 State Report. 2017 [cited 2021 May 24]. Available from: https://www.cdc.gov/violenceprevention/pdf/NISVS-StateReportBook.pdf.

18. Stockman JK, Hayashi H, Campbell JC. Intimate Partner Violence and Its Health Impact on Disproportionately Affected Populations, Including Minorities and Impoverished Groups. J Womens Health (Larchmt). 2015 Jan. [cited 2021 February 17];24(1):62–79. Available from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4302952/, doi: 10.1089/jwh.2014.4879.

19. Van Parys A-S, Verhamme A, Temmerman M, et al. Intimate Partner Violence and Pregnancy: A Systematic Review of Interventions. PLoS ONE. 2014 Jan [cited 2021 Mar 31];9(1). Available from: http://icrh.org/sites/default/files/Van%20Parys%202014%20-%20IPV%20and%20pregnancy%20a%20systematic%20review%20of%20interventions.pdf.

20. Beydoun HA, Tamim H, Lincoln AM, et al. Association of physical violence by an intimate partner around the time of pregnancy with inadequate gestational weight gain in Oklahoma. Soc Sci Med. 2011 Mar [cited 2021 March 31];72(6):867-873. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3443557/, doi: 10.1016/j.socscimed.2011.01.006.

21. Alhusen JL, Geller R, Dreisbach C, et al. Intimate Partner Violence and Gestational Weight Gain in a Population-Based Sample of Perinatal Women. J Obstet Gynecol Neonatal Nurs. 2017 Mar [cited 2021 March 31];46(3):390-402. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5423819/, doi: 10.1016/j.jogn.2016.12.003.

22. Sharps PW, Laughon K, Giangrande SK. Intimate partner violence and the childbearing year: maternal and infant health consequences. Trauma Violence Abuse. 2007 Apr [cited April 20, 2021];8(2):105-16. doi: 10.1177/1524838007302594.

23. Yount KM, DiGirolamo AM, Ramakrishnan U. Impacts of domestic violence on child growth and nutrition: a conceptual review of the pathways of influence. Soc Sci Med. 2011 May [cited April 20, 2021];72(9):1534-54. doi: 10.1016/j.socscimed.2011.02.042.

24. Donovan BM, Spracklen CN, Schweizer ML, et al. Intimate partner violence during pregnancy and the risk for adverse infant outcomes: a systematic review and meta-analysis. BJOG. 2016 March 9 [cited April 20, 2021];123:1289-1299. Available from: https://obgyn.onlinelibrary.wiley.com/doi/pdf/10.1111/1471-0528.13928, doi: 10.1111/1471-0528.13928

25. National Center on Shaken Baby Syndrome [Internet]. Farmington (UT): National Center on Shaken Baby Syndrome. Learn More; [cited 2021 April 1]; [about 12 screens]. Available from: https://dontshake.org/learn-more.

26. Centers for Disease Control and Prevention [Internet]. Atlanta (GA): Centers for Disease Control and Prevention, c2010. A Journalist's Guide to Shaken Baby Syndrome: A Preventable Tragedy. 2010 [cited 2021 July 15]. Available from: https://www.cdc.gov/violenceprevention/pdf/SBSMediaGuide.pdf.

27. Normann AK, Bakiewicz A, Kjerulff Madsen F, et al. Intimate partner violence and breastfeeding: a systematic review. BMJ Open. 2020 October 31 [cited 2021 April 16];10(10):1-9 Available from: https://bmjopen.bmj.com/content/10/10/e034153, doi: 10.1136/bmjopen-2019-034153.

28. Centers for Disease Control and Prevention [Internet]. Atlanta (GA): Centers for Disease Control and Prevention, c2021. Preventing Child Abuse & Neglect. 2021 March 15 [cited 2021 February 17]. Available from: https://www.cdc.gov/violenceprevention/childabuseandneglect/fastfact.html.

29. Finkelhor, D., Turner, H. A., Shattuck, A., & Hamby, S. L. (2015). Prevalence of childhood exposure to violence, crime, and abuse: Results from the National Survey of Children's Exposure to Violence. JAMA Pediatrics, 169(8), 746-754. Available from: https://jamanetwork.com/journals/jamapediatrics/fullarticle/2344705.

30. Black, MM, Drennen, CR. Nutritional and growth issues related to child neglect. Pediatr Ann. 2014 Nov [cited 2021 March 3];43(11):266–270. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5829297/, d oi: 10.3928/00904481-20141022-10.

31. Harper E, Ekvall S, Ekvall V, et al. Pharmacology and Nutritional Intervention in the Treatment of Disease. [Place unknown]: IntechOpen; c2014. Chapter 16, The Nutritional Status of Children with Suspected Abuse; p 1245. Available from: https://www.intechopen.com/books/pharmacology-and-nutritional-intervention-in-the-treatment-of-disease/the-nutritional-status-of-children-with-suspected-abuse.

32. Centers for Disease Control and Prevention [Internet]. Atlanta (GA): Centers for Disease Control and Prevention, c2019. Preventing Adverse Childhood Experiences (ACEs): Leveraging the Best Available Evidence. 2019 [cited 2021 November 1]. Available from: https://www.cdc.gov/violenceprevention/pdf/preventingACES.pdf.

33. Centers for Disease Control and Prevention [Internet]. Atlanta (GA): Centers for Disease Control and Prevention, c2016. Preventing Child Abuse and Neglect: A Technical Package for Policy, Norm, and Programmatic Activities. 2016 [cited 2021 July 15]. Available from: https://www.cdc.gov/violenceprevention/pdf/can-prevention-technical-package.pdf.

902 Woman or Infant/Child of Primary Caregiver with Limited Ability to Make Appropriate Feeding Decisions and/or Prepare Food

Definition/Cut-off Value

A woman or an infant/child whose primary caregiver is assessed to have a limited ability to make appropriate feeding decisions and/or prepare food. Examples include, but are not limited to, a woman or an infant/child of caregiver with the following:

- Documentation or self-report of misuse of alcohol, use of illegal substances, use of marijuana, or misuse of prescription medications.
- Mental illness, including clinical depression diagnosed, documented, or reported by a physician or psychologist or someone working under a physician's orders, or as self-reported by applicant/participant/caregiver.
- Intellectual disability diagnosed, documented, or reported by a physician or psychologist or someone working under a physician's orders, or as self-reported by applicant/participant/caregiver.
- Physical disability to a degree which impairs ability to feed infant/child or limits food preparation abilities.
- ≤ 17 years of age.

See Clarification (page 5) for more information about self-reporting a diagnosis.

Participant Category and Priority Level

Category	Priority
Pregnant Women	IV or VII
Breastfeeding Women	IV or VII
Non-Breastfeeding Women	IV or VII
Infants	IV or VII
Children	V or VII

Justification

A primary caregiver's ability to make appropriate feeding decisions and prepare suitable food is crucial for the health and nutrition of infants and young children. Infants and children depend entirely on caregivers for food, as well as to learn what, when, and how to eat. A responsive feeding relationship, in which

caregivers recognize infant/child cues and respond appropriately in a warm and nurturing environment, is critical for supporting healthy dietary habits, food preferences, and weight outcomes in children (1). Several situations that might impair the feeding abilities of a caregiver have been identified below as potential nutritional risks for infants and children.

A pregnant or postpartum woman's ability to choose and prepare suitable foods for herself is vital for her own nutritional status and wellbeing. A variety of circumstances can impair a woman's ability to make diet-related decisions or prepare food and thus have been identified as possible nutritional risks for pregnant and postpartum women.

Substance Use

About 1 in 5 children in the US live with at least one caregiver who has a substance use disorder (2). While little research has been conducted on the impact of parental substance misuse on infant/child feeding, much has been learned about the influence of substance misuse on overall parenting and caregiving abilities. Parental substance misuse is *sometimes* associated with the following, which can all potentially have a negative impact on infant/child feeding:

- Impaired parental behaviors – "lower levels of parental involvement, limited or absent parental monitoring, ineffective control of children's behavior, and poor discipline skills" (2).
- Compromised caregiving relationship – Less sensitive and responsive to infant/child's cues and needs (3, 4); and less warm, positive, nurturing, and emotionally available (5).
- Reduced capacity to prioritize infant/child's needs (including feeding needs) over need for substances (2, 4).
- Parental difficulty in controlling emotions and anger (4).
- Reduced likelihood for infants/children to receive adequate medical and dental care (2).
- Chaotic, unpredictable home environment – higher rates of household financial instability, food and housing insecurity, inconsistent employment, domestic violence, and stress (2).
- Parental incarceration (2).
- Increased likelihood of infant/child entering foster care – about 60% of infants and 40% of children in out-of-home care are from families with substance use disorders (2, 4).
- Increased risk of neglect and abuse – children of parents who misuse substances are 3 times as likely to be physically, emotionally, or sexually abused and 4 times as likely to be emotionally or physically neglected (2).

In addition to impacting infants/children, substance use can also impair a woman's ability to choose and prepare suitable foods for herself. People with substance use disorders tend to have impaired decision-making (6, 7), which can extend to diet-related choices. Also, as stated above, substance use can result in difficulty in controlling emotions and anger; a chaotic, unpredictable home environment; and incarceration – all of which can negatively impact ability to choose and prepare foods.

For additional information, please refer to Risk 372 – *Alcohol and Substance Use*.

Mental Illness

Mental illness refers to a wide range of mental health conditions-disorders that affect your mood, thinking and behavior. Examples of mental illness include depression, anxiety disorders, schizophrenia, eating disorders and addictive behaviors (8). Some caregivers with a mental illness can struggle with parenting, including the feeding of infants and young children (1, 9). Depression in particular has been studied for its impact on the caregiver-child feeding relationship. For mothers with depression, they may be less able to

detect and respond to an infant's needs, including feeding needs. Depressed mothers are also more likely to be withdrawn, disengaged, and non-interacting, all of which can negatively impact infant/child feeding. Maternal depression may also have a significant impact on breastfeeding dyads, as depression is linked to worrying more about breastfeeding and reporting breastfeeding difficulties (10). In addition, mothers who are depressed tend to have decreased rates of breastfeeding initiation, duration, and exclusivity, compared to mothers who are not depressed (10). There is a scarcity of research on the impact of other forms of mental illness (other than depression) on the caregiver-infant/child feeding relationship. For additional information on depression, please refer to Risk 361 – *Depression.*

Mental illness can be debilitating to pregnant and postpartum women in a variety of ways, which include impairing the ability to choose and prepare suitable foods. Some studies indicate that poor eating habits may be common among those with a mental illness (11, 12). For example, people with bipolar disorder or schizophrenia are more likely to report only eating once a day, eating alone, and having difficulty with preparing food (11). Individuals with a mental illness also may experience cognitive challenges, which can limit learning and retention of information about nutrition and food preparation. In addition, those with a mental illness may also have limited resources (due to not being able to work) for purchasing foods.

Intellectual Disability

Intellectual disability is a disability characterized by significant limitations in both intellectual functioning and in adaptive behavior, which covers many everyday social and practical skills (13). A limited amount of research has been conducted on the impact of caregiver intellectual disability and infant/child feeding. Some research indicates caregivers with an intellectual disability may be less sensitive to an infant/child's cues (14). Other research indicates some caregivers with an intellectual disability also struggle with interacting positively and demonstrating affection with their infant/child (15). Based on each individual's situation, these concerns could possibly impair a caregiver's ability to provide appropriate infant/child feeding.

Having an intellectual disability, such as Down syndrome, may make it difficult or even impossible for women to choose, prepare, or serve themselves foods and beverages (16). As a result, some women with intellectual disabilities are at risk for developing diseases associated with obesity, inactivity, and poor nutrition and may have very little choice in deciding their dietary intake since it may be determined by a caregiver (17).

Physical Disability

Some physical disabilities have the potential to reduce a caregiver's ability to feed an infant/child appropriately or prepare suitable foods. Likewise, some physical disabilities may limit a woman's ability to feed herself or prepare suitable foods for herself. This risk should be assigned if a caregiver's physical disability restricts or limits food preparation ability or ability to feed an infant/child. It should also be assigned if a woman's physical disability restricts or limits her ability to prepare foods for herself or to feed herself.

17 Years of Age and Younger

In 2015, about 230,000 infants were born to teenage mothers; this is a birthrate of about 22 per 1,000 teenage women (18). Teenage mothers may face several challenges as they raise infants and children, including their ability to interact in a responsive manner. Being a teenage mother is *sometimes* associated with the following, which can all potentially have a negative impact on infant/child feeding:

- Increased likelihood of a compromised caregiving relationship – Reduced verbal and emotional responsiveness to infant/child (19), reduced sensitivity to needs of infant (19), and impaired ability to provide cognitive stimulation to infant/child (20).
- Increased likelihood of infant/child entering foster care (20).
- Greater likelihood to misuse substances (21).

For additional information regarding pregnant and postpartum adolescents, please refer to Risk 331 – *Pregnancy at a Young Age*.

Implications for WIC Nutrition Services

WIC provides support to women and to infants/children of caregivers with limited ability to make appropriate feeding decisions/prepare food by offering counseling on nutrition, breastfeeding, and infant/child feeding. WIC also provides nutritious foods for women and caregivers to give their infants/children, as well as referrals to support participants' needs. WIC staff can assist participants by:

- Providing individualized nutrition education in an easy-to-understand format that is appropriate for the learning level of the participant/caregiver. Most education materials should be written for a 5th to 7th grade reading level. Be sensitive to the unique learning needs and style of the participant/caregiver, which may mean using food models, posters, and handouts (12).
- Providing referrals to promote parenting and infant/child feeding skills, including referrals to local home visiting programs, parenting programs, and early intervention services.
- Providing referrals to those with substance misuse for professional treatment, referring to community resources for alcohol and substance use support groups, and providing breastfeeding promotion and support to women enrolled in supervised medication-assisted treatment programs.
- Encouraging participants/caregivers with mental illnesses, intellectual disabilities, and physical disabilities to follow health care provider's plan of care. Coordinate with health care providers as needed.
- Providing individualized food packages, tailored to meet the needs of participants. Some caregivers who have a limited ability to make appropriate feeding decisions/prepare food may be unable to prepare powder or concentrated infant formula. Thus, for the safety of the infant, State WIC Agencies may allow ready-to-feed (RTF) WIC formulas to be issued when it is determined that the caregiver may have difficulty correctly diluting powder or concentrated formulas. Please refer to your State WIC Agency's specific policies regarding the issuance of RTF, as policies vary from state to state.

References

1. Perez-Escamilla R, Segura-Perez S, Lott M, on behalf of the RWJF HER Expert Panel on Best Practices for Promoting Healthy Nutrition, Feeding Patterns, and Weight Status for Infants and Toddlers from Birth to 24 Months. Feeding guidelines for infants and young toddlers: a responsive parenting approach. Durham, NC: Healthy Eating Research, 2017. [cited 2017 Jul 24]. Available from: http://healthyeatingresearch.org/.
2. Smith VC, Wilson CR, Committee on Substance Use and Prevention. Families affected by parental substance use. Pediatrics. 2016;138:e1-e13.

3. Hatzis D, Dawe S, Harnett P, Barlow J. Quality of caregiving in mothers with illicit substance use: a systematic review and meta-analysis. Substance Abuse: Research and Treatment. 2017;11:1-15.

4. Child Welfare Information Gateway. Parental substance use and the child welfare system. Washington, DC: U.S. Department of Health and Human Services, Children's Bureau. 2014 [cited 2017 Jul 7]. Available from: https://www.childwelfare.gov/pubPDFs/parentalsubabuse.pdf.

5. Substance Abuse and Mental Health Services Administration. Supporting infants, toddlers, and families impacted by caregiver mental health problems, substance abuse, and trauma, a community action guide. DHHS Publication No. SMA-12-4726. Rockville, MD: Substance Abuse and Mental Health Services Administration, 2012. [cited 2017 Jul 7]. Available from: https://store.samhsa.gov/shin/content/SMA12-4726/SMA12-4726.pdf.

6. Krmpotich T, Mikulich-Gilbertson S, Sakai J, Laetitia T, Banich MT, Tanabe J. Impaired decision-making, higher impulsivity, and drug severity in substance dependence and pathological gambling. Journal of Addiction Medicine. 2015;9(4):273-280.

7. Verdejo-Garcia A, Perez-Garcia M, Bechara A. Emotion, decision-making and substance dependence: a somatic-marker model of addiction. Current Neuropharmacology. 2006;4(1):17-31.

8. Mayo Clinic [Internet]. Minneapolis: Patient Care and Health Information; [Oct 2015: cited 2018 May 4] Mental Illness. Available from: https://www.mayoclinic.org/diseases-conditions/mental-illness/symptoms-causes/syc-20374968.

9. Tabak I, Zablocka-Zytka L, Ryan P, Poma SZ, Joronen K, Vigano G, Simpson W, Paavilainen E, Scherbaum N, Smith M, Dawson I. Needs, expectations and consequences for children growing up in a family where the parent has a mental illness. International Journal of Mental Health Nursing. 2016;25:319-329.

10. Dennis C, McQueen K. The relationship between infant-feeding outcomes and postpartum depression: a qualitative systematic review. Pediatrics. 2009;123:e736-e751.

11. Kilbourne AM, Rofey DL, McCarthy JF, Post EP, Welsh D, Blow FC. Nutrition and exercise behavior among patients with bipolar disorder. Bipolar Disorders. 2007;9:443-452.

12. Kwan CL, Gelberg HAL, Rosen JA, Chamberlin V, Shah C, Nguyen C, Pierre JM, Erickson ZD, Mena SJ, King M, Arnold I, Baker MR, Meyer HB, Ames D. Nutrition counseling for adults with severe mental illness: key lessons learned. Journal of the Academy of Nutrition and Dietetics. 2013;114(3):369-374.

13. American Association on Intellectual and Developmental Disability. Washington DC: Intellectual Disability; [Jan 2018: cited 2018 May 4]. Available from: http://aaidd.org/intellectual-disability/definition#.WuxfKXkUmPx.

14. Granzvist P, Forslund T, Fransson M, Springer L, Lindberg. Mothers with intellectual disability, their experiences of maltreatment, and their children's attachment representations: a small-group matched comparison study. Attachment and Human Development. 2014;16:417-436.

15. Wilson S, McKenzie K, Quayle E, Murray G. A systematic review of interventions to promote social support and parenting skills in parents with an intellectual disability. Child: Care, Health and Development. 2013;40:7-19.

16. Gameren-Oosterom HBMV, Fekkes M, Reijneveld SA, Oudesluys-Murphy AM, Verkerk PH, Wouwe JPV, Buitendijk SE. Practical and social skills of 16-19-year-olds with Down syndrome: independence still far away. Research in Developmental Disabilities. 2013;34:4599-4607.
17. Koritsas S, Iacono T. Weight, nutrition, food choice, and physical activity in adults with intellectual disability. Journal of Intellectual Disability Research. 2015;60(4):355-364.
18. Centers for Disease Control and Prevention. About teen pregnancy. [cited 2017 Aug 2]. Available from: https://www.cdc.gov/teenpregnancy/about/index.htm.
19. Chico E. Gonzalez A, Ali N, Steiner M, Fleming AS. Executive function and mothering: challenges faced by teenage mothers. Developmental Psychobiology. 2014;56:1027-1035.
20. Youth.gov. Pregnancy Prevention – Adverse Effects. [cited 2017 Aug 2]. Available from: http://youth.gov/youth-topics/teen-pregnancy-prevention/adverse-effects-teen-pregnancy.
21. McPeak KE, Sandrock D, Spector ND, Pattishal AE. Important determinants of newborn health: postpartum depression, teen parenting, and breastfeeding. Current Opinion in Pediatrics. 2015;27:138-144.

Clarification

Self-reporting of a diagnosis by a medical professional should not be confused with self-diagnosis, where a person simply claims to have or to have had a medical condition without any reference to professional diagnosis. A self-reported medical diagnosis ("My doctor says that I have/my son or daughter has…") should prompt the CPA to validate the presence of the condition by asking more pointed questions related to that diagnosis.

903 Foster Care

Definition/Cut-off Value

Entering the foster care system during the previous six months or moving from one foster care home to another foster care home during the previous six months.

Participant Category and Priority Level

Category	Priority
Pregnant Women	IV or VII
Breastfeeding Women	IV or VII
Non-Breastfeeding Women	VI or VII
Infants	IV or VII
Children	V or VII

Justification

"Foster children are among the most vulnerable individuals in the welfare system. As a group, they are sicker than homeless children and children living in the poorest sections of inner cities." This statement from a 1995 Government Accounting Office report on the health status of foster children confirms research findings that foster children have a high frequency of mental and physical problems, often the result of abuse and neglect suffered prior to entry into the foster care system. When compared to other Medicaid-eligible children, foster care children have higher rates of chronic conditions such as asthma, diabetes and seizure disorders. They are also more likely than children in the general population to have birth defects, inadequate nutrition and growth retardation including short stature.

Studies focusing on the health of foster children often point out the inadequacy of the foster care system in evaluating the health status and providing follow-up care for the children for whom the system is responsible. Because foster care children are wards of a system which lacks a comprehensive health component, the social and medical histories of foster children in transition, either entering the system or moving from one foster care home to another, are frequently unknown to the adults applying for WIC benefits for the children. For example, the adult accompanying a foster child to a WIC clinic for a first-time certification may have no knowledge of the child's eating patterns, special dietary needs, chronic illnesses or other factors which would qualify the child for WIC. Without any anthropometric history, failure to grow, often a problem for foster children, may not be diagnosed even by a single low cutoff percentile.

Since a high proportion of foster care children have suffered from neglect, abuse or abandonment and the health problems associated with these, entry into foster care or moving from one foster care home to another during the previous six months is a nutritional risk for certification in the WIC Program. Certifiers using this risk should be diligent in evaluating and documenting the health and nutritional status of the foster child to identify other risks as well as problems that may require follow-up or referral to other health care programs. This nutritional risk cannot be used for consecutive certifications while the child remains in the same foster home. It should be used as the sole risk criterion only if careful assessment of the

applicant's nutritional status indicates that no other risks based on anthropometric, medical or nutritional risk criteria can be identified.

The nutrition education, referrals and service coordination provided by WIC will support the foster parent in developing the skills and knowledge to ensure that the foster child receives appropriate nutrition and health care. Since a foster parent frequently has inadequate information about a new foster child's health needs, the WIC nutritionist can alert the foster parent to the nutritional risks that many foster care children have and suggest ways to improve the child's nutritional status.

References

1. American Medical News: America's Sickest Children; January 10, 1994; 15-19.
2. Chernoff R, Combs-Orme T, Risley-Curtiss C, Heisler A. Assessing the health status of children entering foster care. Pediatrics 1994; 93:594-601.
3. DuRouseau PC, Moquette-Magee E, Disbrow D. Children in foster care: are they at nutritional risk? J. Am. Diet. Assoc. 1991 Jan; 91(1):83-85.
4. Government Accounting Office. Foster care health needs of many young children are unknown and unmet: report to the ranking minority member, Subcommittee on Human Resources, Committee on Ways and Means, House of Representatives. Washington D.C.: The Office; 1995 May. Report No.: A 1.13: HEHS-95-114.
5. Halfon N, Mendonca A, Berkowitz G. Health status of children in foster care. The experience of the Center for the Vulnerable Child. Arch. Pediatr. Adolesc. Med. 1995; 149:386-92.
6. Schor EL. The foster care system and health status of foster children. Pediatrics 1982; 69:521-8.
7. Takayama JI, Wolfe E, Coulter KP. Relationship between reason for placement and medical findings among children in foster care. Pediatrics 1998; 101:201-7.
8. Wyatt DT, Simms MD, Horwitz SM. Widespread growth retardation and variable growth recovery in foster children in the first year after initial placement. Arch. Pediatr. Adolesc. Med. 1997; 151:813-6.

904 Environmental Tobacco Smoke Exposure

Definition/Cut-off Value

Environmental tobacco smoke (ETS) exposure is defined (for WIC eligibility purposes) as exposure to smoke from tobacco products inside enclosed areas, like the home, place of child care, etc. ETS is also known as secondhand, passive, or involuntary smoke (1). The ETS definition also includes the exposure to the aerosol from electronic nicotine delivery systems (2).

Participant Category and Priority Level

Category	Priority
Pregnant Women	I
Breastfeeding Women	I
Non-Breastfeeding Women	III,IV,V, or VI
Infants	I
Children	III

Justification

Most environmental tobacco smoke (ETS) exposure occurs in homes and workplaces (3). It can also happen in public places, such as in restaurants, bars, casinos, and cars and other vehicles (3). There are no safe levels of exposure to ETS (1, 4). It is known to increase the risk of lung cancer, respiratory diseases, and cardiovascular diseases among adults, and to have adverse effects on birth outcomes and the health of infants and children (4). ETS exposure increases oxidative stress and inflammation (5-7). Inflammation is associated with asthma (8), cardiovascular diseases (9, 10), cancer (11), chronic obstructive pulmonary disease (12), and metabolic syndrome (13, 14).

ETS from Tobacco Smoking

ETS from traditional tobacco and nicotine products is a mixture of the sidestream smoke given off by a burning cigarette, pipe, or cigar, and the mainstream smoke exhaled by smokers. ETS is made up of over 7,000 chemicals, and at least 69 of which are known to cause cancer (1).

ETS from Electronic Nicotine Delivery Systems (ENDS)

Vapes, vaporizers, vape pens, hookah pens, electronic cigarettes (e-cigarettes or e-cigs), and e-pipes are some of the many terms used to describe electronic nicotine delivery systems (ENDS). ENDS are noncombustible tobacco products used to smoke or "vape" a solution that often contains nicotine. The solution, or "e-liquid," is heated to create an aerosol that the user inhales. (15)

While ENDS do not produce sidestream vapor, their mainstream vapor has been shown to be hazardous. It contains chemicals, such as nicotine, which can cause cancer, can harm the fetus, and are a source of indoor air pollution (2, 16-19). An individual's level of exposure to secondhand nicotine depends on the amount of nicotine in the ENDS product, as well as on product characteristics, device operation, and the user's inhalation pattern. A few studies have demonstrated that passive exposure to ENDS among healthy

adults causes an increase in nicotine in the bloodstream that is similar to that from passive exposure to cigarette smoke (2). More research is needed to evaluate health consequences of ETS exposure from ENDS, particularly for pregnant women and children (2).

The following table summarizes the conditions associated with increased risk from ETS exposure for the mother, infant, and child:

ETS Source	Effects on Mother	Effects on Birth Outcomes	Effects on Infant	Effects on Child
Tobacco Smoke	• Stroke (4) • Nasal irritation (4) • Asthma (4) • Lung cancer (4) • Cardiovascular disease (4) • Increased levels of inflammation and oxidative stress (5, 6, 7)	• Ectopic pregnancy (4) • Fetal growth restriction (4, 20, 21)*	• Sudden unexpected infant death (SUID) (4, 20) • Lower birth weight (21, 22) † • Smaller head circumference (22) ‡ • Impaired lung growth and function (4) • Lower respiratory illnesses (4)	• Middle ear disease (4, 20) • Lower respiratory illness (4, 20) • Increased severity of asthma/wheezing (20) • Metabolic syndrome (14) May develop in adulthood: • Lung cancer (23, 24) • Cardiovascular diseases (10, 25) • Potential nicotine use (26)
Electronic Nicotine Delivery System (ENDS) Vapor	Limited data, but potential association with (2): • Impaired lung function from long-term exposure • Dermatitis • Allergic sensitization	Nicotine exposure effects (2): • Preterm birth§ • Stillbirth	Nicotine exposure effects (2): • Sudden unexpected infant death (SUID) • Impaired brain development • Deficits in auditory processing • Attention and cognition problems	Limited data, but potential association with (2): • Nut allergy reaction due to e-liquids containing flavorants derived from nuts

*See risk #336 *Fetal Growth Restriction* for more information.

†See risk #141 *Low Birth Weight and Very Low Birth Weight* for more information.

‡See risk #152 *Low Head Circumference (Infants and Children <24 Months of Age)* for more information.

§See risk #142 *Preterm or Early Term Delivery* for more information.

Nutrition

Nonsmokers who are regularly exposed to ETS have been observed to have high vitamin C turnover, thus resulting in a vitamin deficiency (27, 28). Data from the Center of Disease Control and Prevention National Health and Nutrition Examination Survey 2003-2004 found that children exposed to ETS had lower levels of vitamins A, C, and E, as well as beta-carotene and folate when compared to non-exposed children (29). Antioxidants may reduce oxidative stress-induced lung damage among both smokers and non-smokers (5-7, 28, 29). Research on preventing oxidative stress-related diseases by antioxidant supplementation has produced mixed results; therefore, it is recommended to consume fruits and vegetables for appropriate antioxidants intake (28, 29). It is recommended that individuals exposed to ETS meet the Recommended Dietary Allowance for vitamin C (27, 30).

Thirdhand Smoke

Thirdhand smoke (THS) is the unintentional intake of tobacco smoke and other related chemicals that occurs without the presence of active smoking. Residual tobacco smoke pollutants adhere to the clothing and hair of smokers, to pet fur, and to surfaces, furnishings, and dust in indoor environments (31). Contact with the pollutants can cause nicotine exposure. Infants and children are the most at risk of THS exposure because they spend more time indoors and are closer to or on the ground where the nicotine-contaminated dust accumulates (31, 32). Once smoking has occurred indoors, THS cannot be eliminated by airing out rooms, opening windows, using fans or air conditioners, or confining smoking to only certain areas of a home. Replacing items is often the only way to reduce, though not eliminate, residual tobacco smoke pollutants (33). There is limited research on the extent of negative health outcomes from exposure to THS. While THS is not a WIC Nutrition Risk, it should be considered for overall health implications.

Implications for WIC Nutrition Services

WIC staff can provide the following nutrition services to women, infants and children who are exposed to environmental tobacco smoke:

- Administer State or local agency substance use screening methods. For more information, please see: *WIC Substance Use Prevention Resource*, Chapter 5: https://wicworks.fns.usda.gov/resources/wic-substance-use-prevention-guide.
- Provide a safe and supportive environment when discussing ETS exposure. For more information on techniques for delivering effective messages, please see: *WIC Substance Use Prevention Guide*, Chapter 6: https://wicworks.fns.usda.gov/resources/wic-substance-use-prevention-guide.
- Encourage fruit and vegetables that are high in vitamin C.
- Highlight WIC foods, especially 100% juice that are good sources of vitamin C and other important nutrients.
- Offer the following suggestions to minimize secondhand and thirdhand smoke exposure (20, 33, 34):
    - Have smoke-free rules for the car and home.
    - Make sure places that are frequently visited are smoke-free (i.e., school, work, parks, restaurants, places of worship, etc.).
    - Ask anyone who cares for children or pets to follow smoke-free rules.
    - Those who smoke outside should do so away from open doors or windows.

- If smoking has occurred inside a house, consider replacing fabric-covered items and thoroughly washing walls.

Clarification

The following questions were adapted from the validated surveys to be applicable for WIC purposes, and can be used to determine ETS exposure (35, 36):

- In the past seven days, have you and/or child been in an enclosed space while someone used tobacco products?

References

1. National Cancer Institute [Internet]. Bethesda (MD): National Institutes of Health, 2019. Secondhand tobacco smoke (environmental tobacco smoke). 2019 Feb 21 [cited 2019 Oct 16]. Available from: https://www.cancer.gov/about-cancer/causes-prevention/risk/substances/secondhand-smoke.
2. U.S. Department of Health and Human Services [Internet]. Atlanta (GA): U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2016. E-cigarette use among youth and young adults: a report of the Surgeon General. 2016 July [cited 2019 Apr 20]. [24 pages]. Available from: https://www.cdc.gov/tobacco/data_statistics/sgr/e-cigarettes/index.htm.
3. Centers for Disease Control and Prevention [Internet]. Atlanta (GA): Centers for Disease Control and Prevention, 2018. Secondhand smoke (SHS) facts. 2018 Jan 17 [cited 2020 Feb 3] Available from: https://www.cdc.gov/tobacco/data_statistics/fact_sheets/secondhand_smoke/general_facts/index.htm
4. U.S. Department of Health and Human Services [Internet]. Washington (DC): U.S Department of Health and Human Services, 2006. The health consequences of smoking- 50 years of progress: a report of the Surgeon General. 2015 July [cited 2019 July 18]. Available from: https://www.ncbi.nlm.nih.gov/books/NBK179276/pdf/Bookshelf_NBK179276.pdf
5. Block G, Dietrich M, Norkus EP, et al. Factors associated with oxidative stress in human populations. Am. J. Epidemiol. 2002 Aug 1 [cited 2019 Oct 16]; 156(3):274-285. Available from: https://academic.oup.com/aje/article/156/3/274/71423.
6. Panagiotakos DB, Pitsavos C, Chrysohoou C, et al. Effect of exposure to secondhand smoke on markers of inflammation: the ATTICA study. Am. J. Med. 2004 Feb 1 [cited 2020 Mar 5]; 116(3):145-50. Available from: https://www.ncbi.nlm.nih.gov/pubmed/14749157?dopt=Abstract.
7. Kostikas K, Minas M, Nikalaou E, et al. Secondhand smoke exposure induces acutely airway acidification and oxidative stress. Resp Med. 2013 Feb 1 [cited 2020 Mar 5]; 107(2):172-9. Available from: https://doi.org/10.1016/j.rmed.2012.10.017.
8. Dozor A. The role of oxidative stress in the pathogenesis and treatment of asthma. Annals of the New York Academy of Sciences. 2010 Aug 17 [cited 2020 Mar 3];1203(1): 133-7. Available from: https://doi.org/10.1111/j.1749-6632.2010.05562.x.

9. Barnoya J, Glantz SA. Cardiovascular effects of secondhand smoke: nearly as large as smoking. Circulation. 2005 May 24 [cited 2020 Mar 5]; 111(20):2684-98. Available from: https://www.ahajournals.org/doi/full/10.1161/circulationaha.104.492215.

10. Raghuveer G, White DA, Hayman LL, et al. Cardiovascular consequences of childhood tobacco smoke exposure: prevailing evidence, burden, and racial and socioeconomic disparities: a scientific statement from the American Heart Association. Circulation. 2016 Oct 18 [cited 2020 Mar 5]; 134(16): 336-59. Available from: https://www.ncbi.nlm.nih.gov/pubmed/27619923.

11. Sinn DD, Man SF, McWilliams A, et al. Progression of airway dysplasia and C-reactive protein in smokers at high risk of lung cancer. Am. J. Respir. Crit. Care Med. 2006 Mar [cited 2019 Nov 4]; 1:173(5): 535-9. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2662937/.

12. Slowik N, Ma S, He J, et al. The effect of secondhand smoke exposure on markers of elastin degradation. Chest. 2001 Oct [cited 2020 Mar 5]; 140(4): 946-53. Available from: https://doi.org/10.1378/chest.10-2298.

13. Haffner SM. The metabolic syndrome: inflammation, diabetes mellitus, and cardiovascular disease. Am. J. Cardiol. 2006 Jan 16 [cited 2020 Feb 21]; 97(2A):3A-11A. Available from: https://www.ncbi.nlm.nih.gov/pubmed/16442931?dopt=Abstract.

14. Moore BF, Clark ML, Bachand A, et al. Interactions between diet and exposure to secondhand smoke on metabolic syndrome among children: NHANES 2007-2010. Journal of clinical endocrinology & metabolism. 2016 Jan [cited 2020 Feb 21];101(1): 52-8. Available at: https://doi.org/10.1210/jc.2015-2477.

15. U.S. Food & Drug Administration [Internet]. Washington (DC): US FDA, 2019. Vaporizers, e-cigarettes, and other electronic nicotine delivery systems (ENDS). 2019 Feb 05 [cited 2019 Mar 1]. Available from: https://www.fda.gov/TobaccoProducts/Labeling/ProductsIngredientsComponents/ucm456610.htm.

16. Grana R, Benowitz N, Glantz SA. E-cigarettes: a scientific review. Circulation. 2014 [cited 2019 Mar 27];129(19): 1972-86. Available from: https://www.ahajournals.org/doi/full/10.1161/CIRCULATIONAHA.114.007667.

17. Bahl V, Lin S, Xu N, et al. Comparison of electronic cigarette refill fluid cytotoxicity using embryonic and adult models. Reprod Toxicol. 2012 Dec [cited 2019 Mar 27];34(4): 529-37. Available from: https://www.sciencedirect.com/science/article/pii/S0890623812002833.

18. Schober W, Szendrei K, Matzen W, et al. Use of electronic cigarettes (e-cigarettes) impairs indoor air quality and increases FeNO levels of e-cigarette consumers. Int J Hyg Environ Health. 2014 Jul [cited 2019 Mar 27];217(6): 628-37. Available from: https://www.ncbi.nlm.nih.gov/pubmed/24373737.

19. Czogala J, Goniewicz ML, Fidelus B, et al. Secondhand exposure to vapors from electronic cigarettes. Nicotine & Tobacco Research. 2014 June [cited 2019 Oct 18];16(6): 655-62. Available from: https://doi.org/10.1093/ntr/ntt203.

20. U.S. Department of Health and Human Services [Internet]. Atlanta (GA): US Department of Health and Human Services, Centers for Disease Control and Prevention, Coordinating Center for Health Promotion, National Center for Chronic Disease Prevent and Health Promotion,

Office on Smoking and Health, 2006. The health consequences of involuntary exposure to tobacco smoke: a report of the Surgeon General. 2006 July [cited 2019 July 18]. Available from: https://www.ncbi.nlm.nih.gov/books/NBK44324/pdf/Bookshelf_NBK44324.pdf.

21. U.S. Department of Health and Human Services [Internet]. Atlanta (GA): US Department of Health and Human Services, Centers for Disease Control and Prevention, 2001. Women and smoking: a report of the Surgeon General. 2001 [cited 2019 July 18]. Available from: https://www.cdc.gov/tobacco/data_statistics/sgr/2001/complete_report/pdfs/chp3.pdf.
22. Perera FP, Rauh V, Whyatt RM, et al. Molecular evidence of an interaction between prenatal environmental exposures and birth outcomes in a multiethnic population. Environ Health Perspect. 2004 April [cited 2020 Feb 20]; 112:626-630. Available from: https://ehp.niehs.nih.gov/doi/pdf/10.1289/ehp.6617.
23. Asomaning K, Miller DP, Liu G, et al. Second hand smoke, age of exposure and lung cancer risk. Lung cancer. 2008 July [cited 2020 Feb 20];61(1): 13-20. Available from: https://doi.org/10.1016/j.lungcan.2007.11.013.
24. Groner JA, Huang H, Nagaraja H, et al. Secondhand some exposure and endothelial stress in children and adolescents. Academic Pediatrics. 2015 Jan [cited 2020 Feb 20];15(1): 54-60. Available from: https://doi.org/10.1016/j.acap.2014.09.003.
25. Lau EM, Celermajer DS. Protecting our children from environmental tobacco smoke: one of our great healthcare challenges. Eur Heart J. 2014 Mar [cited 2020 Feb 20];35: 2452-3. Available from: doi:10.1093/eurheartj/ehu098
26. Wickstrom, R. Effects of nicotine during pregnancy: human and experimental evidence. Current neuropharmacology. 2007 [cited 2019 Mar 8]; 5: 213-22. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2656811/.
27. Dietary reference intakes: the essential guide to nutrient requirements. Otten, JJ, Hellwig, JP, Meyers, LD, ed., Institute of Medicine of the National Academies. Washington (DC): The National Academies Press, 2006 Sep 29.
28. Jacob, RA. Passive smoking induces oxidant damage preventable by vitamin C. Nutrition Reviews. 2000 Aug [cited 2020 Mar 5];58(8): 239-41. Available from: https://academic.oup.com/nutritionreviews/article/58/8/239/1927014.
29. Wilson KM, Finkelstein JN, Blumkin AK, et al. Micronutrient levels in children exposed to secondhand tobacco smoke. Nicotine & Tobacco Research. 2011 Sept [cited 2019 Oct 19];13(9): 800-8. Available from: https://doi.org/10.1093/ntr/ntr076.
30. Monson ER. Dietary reference intakes for the antioxidant nutrients: vitamin C, vitamin E, selenium and carotenoids. J Am Diet Assoc. 2000 June [cited 2020 Mar 5];100(6): 637-40.
31. Sleiman M, Gundel AL, Pankow JF, et al. Formation of carcinogens indoors by surface-mediated reactions of nicotine with nitrous acid, leading to potential thirdhand smoke hazards. PNAS. 2010 April 13 [cited 2019 Sep 11]; 107(15): 6576-6581. Available from: https://www.pnas.org/content/pnas/107/15/6576.full.pdf.
32. Matt GE, Quintana PJE, Hovell MF, et al. Households contaminated by environmental tobacco smoke: sources of infant exposures. Tobacco Control. 2004 Mar [cited 2019 Sept 10];13(1):29-37. Available from: https://www.ncbi.nlm.nih.gov/pubmed/14985592.

33. U.S. Department of Agriculture [Internet]. Washington (DC): USDA Food and Nutrition Service, 2010. Infant nutrition and feeding: a guide for use in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). 2019 April [cited 2019 Aug 7]. Available from: https://wicworks.fns.usda.gov/sites/default/files/media/document/Infant_Feeding_Guide_Final_508c_0.pdf.

34. American Academy of Pediatrics [Internet]. Itasca (IL): American Academy of Pediatrics, c2017. How parents can prevent exposure to thirdhand smoke. 2017 Apr 24 [cited 2019 Sept 11]. Available from: https://www.healthychildren.org/English/health-issues/conditions/tobacco/Pages/How-Parents-Can-Prevent-Exposure-Thirdhand-Smoke.aspx.

35. National Center for Health Statistics [Internet]. Atlanta (GA): Centers for Disease Control and Prevention, 2018. National health and nutrition examination survey overview 2013-2014. 2018 Oct 30 [cited 2020 Feb 3]. Available from: https://wwwn.cdc.gov/nchs/nhanes/continuousnhanes/overview.aspx?BeginYear=2013.

36. Surveys, Questionnaires, and Assessment Tools. Itasca (IL): American Academy of Pediatrics, Julius B Richmond Center of Excellence, 2020. Secondhand tobacco smoke exposures (SHS) and use items. No date [2020 Feb 3]. Available from: https://www.aap.org/en-us/advocacy-and-policy/aap-health-initiatives/Richmond-Center/Pages/Measurement-Core.aspx.