201 Low Hematocrit/Low Hemoglobin

Definition/Cut-off Value

Hemoglobin or hematocrit concentration below the 95 percent confidence interval (i.e., below the .025 percentile) for healthy, well-nourished individuals of the same age, sex, and stage of pregnancy.

Cut-off values are provided on the next page, based on the levels established by the Centers for Disease Control and Prevention (CDC).

Participant Category and Priority Level

<table>
<thead>
<tr>
<th>Category</th>
<th>Priority</th>
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</thead>
<tbody>
<tr>
<td>Pregnant Women</td>
<td>1</td>
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<tr>
<td>Breastfeeding Women</td>
<td>1</td>
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<tr>
<td>Non – Breastfeeding Women</td>
<td>6</td>
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<tr>
<td>Infants</td>
<td>1</td>
</tr>
<tr>
<td>Children</td>
<td>3</td>
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</table>

Justification

Hemoglobin (Hb) and hematocrit (Hct) are the most commonly used tests to screen for iron deficiency anemia. Measurements of Hb and Hct reflect the amount of functional iron in the body. Changes in Hb concentration and Hct occur at the late stages of iron deficiency. While neither Hb nor Hct test are direct measures of iron status and do not distinguish among different types of anemia, these tests are useful indicators of iron deficiency anemia.

Iron deficiency is by far the most common cause of anemia in children and women of childbearing age. It may be caused by a diet low in iron, insufficient assimilation of iron from the diet, increased iron requirements due to growth or pregnancy, or blood loss. Anemia can impair energy metabolism, temperature regulation, immune function, and work performance. Anemia during pregnancy may increase the risk of prematurity, poor maternal weight gain, low birth weight, and infant mortality. In infants and children, even mild anemia may delay mental and motor development. The risk increases with the duration and severity of anemia, and early damages are unlikely to be reversed through later therapy.

References

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 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.

Values by Status

<table>
<thead>
<tr>
<th>Status</th>
<th>Non-smoking</th>
<th>Any smoking up to 20 cigarettes/day</th>
<th>Smoking 21 to 40 cigarettes/day</th>
<th>Smoking &gt; 40 cigarettes/day</th>
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<tbody>
<tr>
<td>PG 1st trimester</td>
<td>11.0 &amp; 33.0</td>
<td>11.3 &amp; 34.0</td>
<td>11.5 &amp; 34.5</td>
<td>11.7 &amp; 35.0</td>
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<tr>
<td>PG 2nd trimester</td>
<td>10.5 &amp; 32.0</td>
<td>10.8 &amp; 33.0</td>
<td>11.0 &amp; 33.5</td>
<td>11.2 &amp; 34.0</td>
</tr>
<tr>
<td>PG 3rd trimester</td>
<td>11.0 &amp; 33.0</td>
<td>11.3 &amp; 34.0</td>
<td>11.5 &amp; 34.5</td>
<td>11.7 &amp; 35.0</td>
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<tr>
<td>PP,BF: 12-14 years</td>
<td>11.8 &amp; 35.7</td>
<td>12.1 &amp; 36.7</td>
<td>12.3 &amp; 37.2</td>
<td>12.5 &amp; 37.7</td>
</tr>
<tr>
<td>PP, BF: 15-17 years</td>
<td>12.0 &amp; 35.9</td>
<td>12.3 &amp; 36.9</td>
<td>12.5 &amp; 37.4</td>
<td>12.7 &amp; 37.9</td>
</tr>
<tr>
<td>PP, BF: 18 years &amp; older</td>
<td>12.0 &amp; 35.7</td>
<td>12.3 &amp; 36.7</td>
<td>12.5 &amp; 37.2</td>
<td>12.7 &amp; 37.7</td>
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<table>
<thead>
<tr>
<th>Status</th>
<th>Age</th>
<th>Hct. %</th>
<th>Hgb., Grams</th>
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<tbody>
<tr>
<td>Infant</td>
<td>5 – 12 months</td>
<td>33.0</td>
<td>11.0</td>
</tr>
<tr>
<td>Child</td>
<td>12 – 24 months</td>
<td>32.9</td>
<td>11.0</td>
</tr>
<tr>
<td>Child</td>
<td>24 – 60 months</td>
<td>33.0</td>
<td>11.1</td>
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Implications for Minnesota WIC Services

- The objectives and intervention strategies are: To improve blood iron levels
- To achieve and maintain normal dietary intake patterns
- Assure regular care and follow-up with health care provider

The assessment should identify possible causes and/or contributing factors to low hemoglobin levels. Consider possible causes and/or contributing factors for low hemoglobin and tailor your assessment to these factors.

<table>
<thead>
<tr>
<th>Participant Category</th>
<th>Possible causes and/or contributing factors for low hemoglobin values</th>
<th>Areas for Assessment</th>
</tr>
</thead>
</table>
| Pregnant Women       | • A woman’s blood volume doubles during pregnancy so there is an increased need for iron  
 • Nausea and vomiting can affect appetite and overall dietary intake  
 • Some women have difficulty accessing and/or tolerating prenatal vitamins. Plus, some prenatal vitamins do not contain iron, especially “gummy” vitamins  
 • Lead exposure  
 • Smoking  
 • Limited access to food  
 • Low dietary intake of foods rich in iron  
 • Medical conditions which cause blood loss or affect the woman’s ability to absorb iron | • Is the woman experiencing nausea or vomiting? Skipping meals? Avoiding certain foods? Nausea and vomiting impairing desire or ability to cook?  
 • Is the woman consuming regular meals and snacks? Does her daily schedule with work/school interfere with eating regularly?  
 • Is the woman a vegetarian/vegan?  
 • Does the woman drink large amounts of sweetened beverages? Impacting overall diet quality?  
 • Does the family have food insecurity?  
 • Has a prenatal vitamin with iron been recommended by the health care provider? Does she have them? Does she take them, and if so, how often?  
 • Other medications or health concerns?  
 • Smoking, alcohol or drug use? Smoking increases the body’s iron requirement. Substance use can affect appetite and ability to prepare meals. |
| Breastfeeding and Non-Breastfeeding Postpartum Women | • Limited access to food  
 • Low dietary intake of foods rich in iron  
 • Lead Exposure  
 • Medical conditions which cause blood loss or affect the woman’s ability to absorb iron | • Is the woman consuming regular meals and snacks? Finding time to eat while caring for a newborn?  
 • Is the woman a vegetarian/vegan?  
 • Does the woman drink large amounts of sweetened beverages? Impacting overall diet quality?  
 • Does the woman consume excess milk?  
 • PICA?  
 • Does the family have food insecurity?  
 • Has a prenatal vitamin or another vitamin with iron been recommended by the health care provider? |

Lead Exposure? Elevated lead levels increase the chances of iron deficiency by competing with iron absorption and by inhibiting production of red blood cells.
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<td></td>
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<td>care provider? Does she have them? Does she take them, and if so, how often?</td>
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<td></td>
<td></td>
<td>• Other medications or health concerns?</td>
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<td></td>
<td></td>
<td>• Smoking, alcohol or drug use? Smoking increases the body’s iron requirement. Substance use can affect appetite and ability to prepare meals.</td>
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<tr>
<td></td>
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<td>• Large blood loss during pregnancy?</td>
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<td>• Is the woman receiving appropriate postpartum medical care and/or is the care scheduled?</td>
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<tr>
<td></td>
<td></td>
<td>• Lead Exposure? Elevated lead levels increase the chances of iron deficiency by competing with iron absorption and by inhibiting production of red blood cells.</td>
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<tr>
<td>Infants</td>
<td>• Rapid growth</td>
<td>Is the premature and/or low birth weight infant receiving regular medical care? Has the health care provider discussed the infant’s iron needs with the parents?</td>
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<td></td>
<td>• Premature and/or low birth weight infants</td>
<td>Is the infant born to anemic mother evaluated for need for iron supplementation? Even infants born at term with normal weight may not have optimal iron stores if mother was iron deficient.</td>
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<td></td>
<td>• Born to mother who was anemic during pregnancy</td>
<td>Is the exclusively breastfed infant receiving an iron supplement? AAP recommends supplemental iron beginning at 4 months until adequate dietary iron is consumed for exclusively BF infants, may be especially important for breastfed infants born early or at low birth weight.</td>
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<tr>
<td></td>
<td>• Exclusively breastfed infants not provided an iron supplement by 4 months of age</td>
<td>Is the exclusively breastfed infant receiving a dietary source of iron by 4-6 months of age? Is parent familiar with age-appropriate dietary sources of iron?</td>
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<td>• Failure to introduce iron rich foods to the exclusively breastfed infant by 4-6 months of age</td>
<td>Is the older infant eating a varied diet with includes sources of iron rich foods? The American Academy of Pediatrics recommends introducing iron rich foods, such as meat and iron fortified cereal by 6 months of age. Is parent familiar with how to advance developmentally appropriate textures, including iron rich foods?</td>
</tr>
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<td></td>
<td>• Introduction of cow’s milk in infancy</td>
<td>Has cow’s milk been introduced? Early introduction of cow’s milk increases the likelihood of iron deficiency, both by displacing breastmilk or infant formula and through intestinal blood loss.</td>
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<td></td>
<td>• Failure to progress to more solids in later infancy.</td>
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<tr>
<td></td>
<td>• Lead exposure</td>
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### Participant Category

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</table>
| • Rapid growth  
• Consumption of >24 ounces of cow’s milk daily after age 1 year  
• Low dietary intake of foods rich in iron  
• Limited access to food  
• Lead exposure  
• Feeding disorders or issues related to preterm birth or low birth weight | • **Lead Exposure?** Elevated lead levels increase the chances of iron deficiency by competing with iron absorption and by inhibiting production of red blood cells.  
• **Is the toddler or child “picky”?** Eats lots of “junk food”? Avoids eating meat or only eats processed meats like hotdogs? Limited variety of foods?  
• **How much milk is being consumed?** Is milk consumption > 24 oz? Is the child weaned from the bottle? Is milk replacing other foods? Does mom know how much milk is appropriate?  
• **Is the parent a vegetarian/vegan?** Do they feed the toddler meat? What non-meat sources of iron do they eat?  
• **Does the family have food insecurity?** This can contribute to Iron Deficiency Anemia. Is a referral needed?  
• **Does the child drink sweetened beverages?**  
• **Has a vitamin with iron been recommended by the health care provider?** Do they have them? Does the supplement have the recommended amount of iron? Many vitamins marketed to children do not iron, especially “gummy” vitamins. Do they take the supplement, and if so, how often?  
• **Have lead levels been tested?** Normal?  
• **Other medications or health concerns?** Children born premature or at low birthweight may have overt or subtle feeding difficulties such as oral aversions. Feeding difficulties may lead to anemia by decreasing the child’s ability and willingness to eat foods, especially iron rich foods such as meat and legumes.  
• **Growth pattern?**  
• **Behavioral concerns?**  
• **PICA** |
The **Nutrition Counseling** should incorporate the results of the assessment.

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<thead>
<tr>
<th>Participant Category</th>
<th>Nutrition Counseling</th>
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</table>
| Pregnant Women       | • **Manage nausea and vomiting.** Eat small amounts frequently throughout the day. Eat food that are tolerated, avoid foods that increase nausea. Drink liquids between meals instead of with meals. For additional counseling recommendations, see risk code 301.  
  • **Foods high in iron.** Point out WIC foods that are high in iron, and discuss other foods that are good iron sources. Heme iron -- the type found in animal products such as red meat, fish and chicken -- is much better absorbed by the body, compared to non-heme iron (the type in plants). Eating a heme iron source with a non-heme iron source will enhance the non-heme iron absorption. Small quantities of meat in the diet can make a large contribution to important nutrients including iron, if accepted by the participant. **Explore:** What high iron foods the participant typically eats, and those they might consider trying, or eating more often. **Food sources of Iron**  
  • **Minimizing foods that interfere with iron absorption.** If the assessment identified large intake of foods that may adversely affect iron absorption such as coffee, tea and milk, **explore** whether the participant might be open to decreasing the quantity consumed and/or consuming these between meals.  
  • **Tips for increasing iron absorption:** Iron containing food + Vitamin C food combos. Offer simple doable tips such as eating WIC cereal as a snack with a small glass of WIC juice or a citrus fruit. Or eating a bean burrito with tomatoes for lunch. **Food sources of vitamin C**  
  • **Overcoming barriers to taking iron supplements.** Often Prenatal vitamins are recommended by health care providers. WIC can serve an important role in helping participants work through the barriers that may exist to taking the supplements consistently. **Explore:**  
    - **Hesitations to taking the supplement**  
      - Perceived side effects, such as constipation or increased appetite.  
      - Avoiding ingredients that may be in a tablet, such as gelatin, gluten or dyes.  
      - Preference for an over the counter multi-vitamin with iron (*most gummies do not contain iron*)  
      - Cost (may be covered by insurance, with a prescription)  
    - **Ideas for remembering to take their supplement**  
      - Place it in a visible place, but *inaccessible to toddlers* (can be poisonous)  
      - Set a recurring alarm on their phone |
| Breastfeeding and Non-Breastfeeding Postpartum Women | • **Eat regular meals and snacks.** Assist mom with quick meal and snack ideas to fit into her busy schedule of infant care.  
  • **Foods high in iron.** Point out WIC foods that are high in iron, and discuss other foods that are good iron sources. Heme iron -- the type found in animal products such as red meat, fish and chicken -- is much better absorbed by the body, compared to non-heme iron (the type in plants). Eating a heme iron source with a non-heme iron source will enhance the non-heme iron absorption. Small quantities of meat in the diet can make a large contribution to important nutrients including iron, if accepted by the participant. **Explore:** What high iron foods the participant typically eats, and those they might consider trying, or eating more often. **Food sources of Iron**  
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<td><strong>Tips for increasing iron absorption:</strong> Iron containing food + Vitamin C food combos. Offer simple doable tips such as eating WIC cereal as a snack with a small glass of WIC juice or a citrus fruit. Or eating a bean burrito with tomatoes for lunch. <strong>Food sources of vitamin C</strong></td>
</tr>
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</table>
|                      | **Overcoming barriers to taking iron supplements.** Often Prenatal vitamins or another supplement are recommended by health care providers for the postpartum period. WIC can serve an important role in helping participants work through the barriers that may exist to taking the supplements consistently. **Explore:**  
  - **Hesitations to taking the supplement**  
    - Perceived side effects, such as constipation or increased appetite.  
    - Avoiding ingredients that may be in a tablet, such as gelatin, gluten or dyes.  
    - Preference for an over the counter multi-vitamin with iron (*most gummies do not contain iron*)  
    - Cost (may be covered by insurance, with a prescription)  
  - **Ideas for remembering to take their supplement**  
    - Place it in a visible place, *but inaccessible to toddlers* (can be poisonous)  
    - Set a recurring alarm on their phone |
| Infants              | **Assure regular medical care for premature and/or low birth weight infants.** Reinforce health care provider feeding recommendations.  
**Breastmilk or infant formula until 1 year of age.** Cow’s milk and plant based milks (e.g., soy, rice, almond milks) will not meet the nutritional needs of an infant.  
**Foods high in iron.** Exclusively breastfed infants need a dietary source of iron by 4-6 months of age. Iron-zinc fortified baby cereals or pureed/mashed meats are recommended as first solid foods for exclusively breastfed infants. In general, about 2 servings per day of cereal (2 tablespoons/serving or 1 to 2 ounces of meat per day is recommended to meet the need for iron and zinc.  
**Assure iron supplements are used, if prescribed.** AAP recommends supplemental iron beginning at 4 months until adequate dietary iron is consumed for exclusively BF infants. Supplementation may begin at 1 month for breastfed infants born early, depending on physician’s evaluation of need.  
**Introduction of complementary foods.** Assist parent in making nutrient-rich choices for baby’s first foods.  
**Encourage cup use and weaning from the bottle by 12-14 months of age** to prevent over consumption of fluids, promote healthy appetite and encourage advancement of feeding skills. |
| Children             | **Foods high in iron.** Point out WIC foods that are high in iron, and discuss other foods that are good iron sources. Heme iron -- the type found in animal products such as red meat, fish and chicken -- is much better absorbed by the body, compared to non-heme iron (the type in plants). Eating a heme iron source with a non-heme iron source will enhance the non-heme iron absorption. Small quantities of meat in the diet can make a large contribution to important nutrients including iron, if accepted by the participant. **Explore:** What high iron foods the participant typically eats, and those they might consider trying, or eating more often. **Food sources of iron**  
**Minimizing foods that interfere with iron absorption.** If the assessment identified large intake of foods that may adversely affect iron absorption such as coffee, tea and... |
milk, explore whether the participant might be open to decreasing the quantity consumed and/or consuming these between meals.

- **Tips for increasing iron absorption**: Iron containing food + Vitamin C food combos. Offer simple doable tips such as eating WIC cereal as a snack with a small glass of WIC juice or a citrus fruit. Or eating a bean burrito with tomatoes for lunch. [Food sources of vitamin C](#)

- **Overcoming barriers to taking iron supplements**: Often multivitamins or iron supplements are recommended by health care providers. WIC can serve an important role in helping participants work through the barriers that may exist to taking the supplements consistently. **Explore**:
  - Hesitations to giving child a supplement
    - Perceived side effects, such as constipation or increased appetite.
    - Avoiding ingredients that may be in a tablet, such as gelatin, gluten or dyes.
    - “Baby doesn’t like it” challenge, such as with iron drops.
    - Confusion in choosing an over the counter multi-vitamin with iron (*most gummies do not contain iron*)
    - Cost (may be covered by insurance, with a prescription)
  - Ideas for remembering to give the child their iron supplement
    - Place it in a visible place, *but inaccessible to toddlers* (can be poisonous)
    - Set a recurring alarm on their phone

- **Weaning from the bottle by 12-14 months of age** to prevent over consumption of cow’s milk, promote healthy appetite and encourage advancement of feeding skills.

Provide referrals as necessary.

- All participants with a hemoglobin level that meets the high-risk criteria (<10) should be referred to the health care provider for therapy and follow-up.
- If the family has inadequate resources for purchasing food, refer to food assistance programs for which they may be eligible (e.g., SNAP, community food shelves, free/reduced school lunch program, soup kitchens, Fare Share)
- Offer other referrals as deemed necessary, such as, drug and alcohol abuse counseling, smoking cessation programs, mental health services or counseling for eating disorders.

Best practice for WIC documentation for this risk code:

- Document possible causes and/or contributing factors to low hemoglobin levels. Indicate plan for resolving low hemoglobin.
- Document any referrals made to the health care provider or other resources.

Additional Resources include:

- [Minnesota WIC Nutrition Modules](#) – select the module *Iron Deficiency Anemia in Women and Children*
- [MN WIC Health Indicators Summaries by County, CHB and City](#)
- [Iron – NIH Fact Sheet](#)
- [AAP Clinical Report Diagnosis and Prevention of Iron Deficiency Anemia](#)
- [CDC Recommendations to Prevent and Control Iron Deficiency Anemia](#)
- [Iron Absorption Mechanisms--Harvard](#)