

# 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 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 as long as the cut-off values used are those indicated on the CDC tables. 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 | II, IV, V, or VI |
| Infants                   | I                |
| Children                  | III              |

## 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 an 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

- Centers for Disease Control and Prevention. Criteria for anemia in children and childbearing-aged women. MMWR 1998;47: RR-3.
- Centers for Disease Control and Prevention. Prenatal Nutrition Surveillance System User's Manual. Atlanta: CDC, 1994.

3. Institute of Medicine. Iron deficiency anemia: recommended guidelines for the prevention, detection, and management among U.S. children and women of childbearing age. National Academy Press, Washington, D.C.; 1993.
4. Institute of Medicine. Nutrition during pregnancy. 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.

### 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, a pregnant woman would be certified, 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.

## Category

Table 201 – A

| Altitude                  | Smoking            | Category                     |                              |                              |                          |                          |                     |                       |                        |                      |                      |
|---------------------------|--------------------|------------------------------|------------------------------|------------------------------|--------------------------|--------------------------|---------------------|-----------------------|------------------------|----------------------|----------------------|
|                           |                    | 1 <sup>st</sup><br>Trimester | 2 <sup>nd</sup><br>Trimester | 3 <sup>rd</sup><br>Trimester | Nonpreg<br>12 - < 15 yrs | Nonpreg<br>15 - < 18 yrs | Nonpreg<br>≥ 18 yrs | Infants<br>0 - < 6 mo | Infants<br>6 - < 12 mo | Child<br>1 - < 2 yrs | Child<br>2 - < 5 yrs |
|                           |                    | Hct <                        | Hct <                        | Hct <                        | Hct <                    | Hct <                    | Hct <               | Hct <                 | Hct <                  | Hct <                | Hct <                |
| No altitude<br>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                |                       |                        |                      |                      |
| 3000-3999 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                |                       |                        |                      |                      |
| 4000- 4999 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                |                       |                        |                      |                      |
| 5000- 5999 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                |                       |                        |                      |                      |
| 6000-6999 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                |                       |                        |                      |                      |

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|                  |                    | Category                     |                              |                              |                          |                          |                     |                       |                        |                      |                      |
|------------------|--------------------|------------------------------|------------------------------|------------------------------|--------------------------|--------------------------|---------------------|-----------------------|------------------------|----------------------|----------------------|
|                  |                    | 1 <sup>st</sup><br>Trimester | 2 <sup>nd</sup><br>Trimester | 3 <sup>rd</sup><br>Trimester | Nonpreg<br>12 - < 15 yrs | Nonpreg<br>15 - < 18 yrs | Nonpreg<br>≥ 18 yrs | Infants<br>0 - < 6 mo | Infants<br>6 - < 12 mo | Child<br>1 - < 2 yrs | Child<br>2 - < 5 yrs |
| Altitude         | Smoking            | Hct <                        | Hct <                        | Hct <                        | Hct <                    | Hct <                    | Hct <               | Hct <                 | Hct <                  | Hct <                | Hct <                |
| 7000-7999 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                |                       |                        |                      |                      |
| 8000- 8999 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                |                       |                        |                      |                      |
| 9000- 8999 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                |                       |                        |                      |                      |
| 10000 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            | 1 <sup>st</sup><br>Trimester | 2 <sup>nd</sup><br>Trimester | 3 <sup>rd</sup><br>Trimester | Nonpreg<br>12 - < 15 yrs | Nonpreg<br>15 - < 18 yrs | Nonpreg<br>≥ 18 yrs | Infants<br>0 - < 6 mo | Infants<br>6 - < 12 mo | Child<br>1 - < 2 yrs | Child<br>2 - < 5 yrs |
|---------------------------|--------------------|------------------------------|------------------------------|------------------------------|--------------------------|--------------------------|---------------------|-----------------------|------------------------|----------------------|----------------------|
|                           |                    | Hgb <                        | Hgb <                        | Hgb <                        | Hgb <                    | Hgb <                    | Hgb <               | Hgb <                 | Hgb <                  | Hgb <                | Hgb <                |
| No altitude<br>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                |                       |                        |                      |                      |
| 3000- 3999 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                |                       |                        |                      |                      |
| 4000- 4999 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                |                       |                        |                      |                      |
| 5000-5999 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                |                       |                        |                      |                      |
| 6000-6999 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                |                       |                        |                      |                      |

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|                  |                    | Category                     |                              |                              |                          |                          |                     |                       |                        |                      |                      |
|------------------|--------------------|------------------------------|------------------------------|------------------------------|--------------------------|--------------------------|---------------------|-----------------------|------------------------|----------------------|----------------------|
|                  |                    | 1 <sup>st</sup><br>Trimester | 2 <sup>nd</sup><br>Trimester | 3 <sup>rd</sup><br>Trimester | Nonpreg<br>12 - < 15 yrs | Nonpreg<br>15 - < 18 yrs | Nonpreg<br>≥ 18 yrs | Infants<br>0 - < 6 mo | Infants<br>6 - < 12 mo | Child<br>1 - < 2 yrs | Child<br>2 - < 5 yrs |
| Altitude         | Smoking            | Hgb <                        | Hgb <                        | Hgb <                        | Hgb <                    | Hgb <                    | Hgb <               | Hgb <                 | Hgb <                  | Hgb <                | Hgb <                |
| 7000-7999 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                |                       |                        |                      |                      |
| 8000- 8999 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                |                       |                        |                      |                      |
| 9000- 8999 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                |                       |                        |                      |                      |
| 10000 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                |                       |                        |                      |                      |

