

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	III, 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, 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.

Category

Table 201 – A

		1 st Trimester	2 nd Trimester	3 rd 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				
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 st Trimester	2 nd Trimester	3 rd 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 <
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

		1 st Trimester	2 nd Trimester	3 rd 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	Hgb <	Hgb <	Hgb <	Hgb <	Hgb <	Hgb <	Hgb <	Hgb <	Hgb <	Hgb <
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				
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 st Trimester	2 nd Trimester	3 rd 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	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				



Category

Table 201 – C

		1 st Trimester	2 nd Trimester	3 rd 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	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				
3000- 3999 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				
4000- 4999 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				
5000-5999 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				
6000-6999 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				

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		1 st Trimester	2 nd Trimester	3 rd 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 <
7000-7999 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				
8000- 8999 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				
9000- 8999 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				
10000 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				

