

# 201 Low Hematocrit/Low Hemoglobin

## Definition/Cut-off Value

Low Hemoglobin (Hb) or hematocrit (Hct) is defined as less than the 5<sup>th</sup> 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.

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Category

Table 201 - A

		1 <sup>st</sup> Trimester	2 <sup>nd</sup> Trimester	3 <sup>rd</sup> 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

		1 <sup>st</sup> Trimester	2 <sup>nd</sup> Trimester	3 <sup>rd</sup> 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 <
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

		1 <sup>st</sup> Trimester	2 <sup>nd</sup> Trimester	3 <sup>rd</sup> 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				
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

		1 <sup>st</sup> Trimester	2 <sup>nd</sup> Trimester	3 <sup>rd</sup> 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 <
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

		1 <sup>st</sup> Trimester	2 <sup>nd</sup> Trimester	3 <sup>rd</sup> 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				
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

		1 <sup>st</sup> Trimester	2 <sup>nd</sup> Trimester	3 <sup>rd</sup> 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 <
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				