



Iron-Status Indicators

Iron functions as a component of proteins and enzymes. Almost two-thirds of the iron in the body (approximately 2.5 grams of iron) is found in hemoglobin, the protein in red blood cells that carries oxygen to tissues, and about 15 percent is in the myoglobin of muscle tissue. The average American diet provides 10–15 milligrams (mg) of iron daily in the form of heme and nonheme iron. Heme iron is found in animal foods that originally contained hemoglobin and myoglobin, such as red meat, fish, and poultry. Nonheme iron is found in plant foods, such as lentils and beans, and also is provided in iron-enriched and iron-fortified foods. Although heme iron is absorbed better than nonheme iron, most dietary iron is nonheme iron (Miret 2003). Each day the body absorbs approximately 1–2 mg of iron to compensate for the 1–2 mg of iron that the (nonmenstruating) body loses (Institute of Medicine 2001).

Transporting iron from one organ to another is accomplished by the reversible binding of iron to the transport protein, transferrin, which will then form a complex with a highly specific transferrin receptor (TfR) located on the plasma membrane surfaces of cells. Intracellular iron availability is regulated through the increased expression of cellular TfR concentration by iron-deficient cells. Ferritin is the major iron-storage compound: its production increases in cells as iron supplies increase. Although all cells are capable of storing iron, the liver, spleen, and bone marrow cells are primary iron-storage sites in people (Institute of Medicine 2001).

Iron deficiency and iron overload are the two major disorders of iron metabolism. Iron-deficiency anemia is the most severe form of iron deficiency. It is linked to many adverse consequences of iron deficiency, such as reduced physical capacity (Haas 2001) and poor pregnancy outcomes (Schorr 1994). Iron deficiency without anemia, however, has been linked to negative effects on cognitive development among infants and adolescents (Grantham-McGregor 2001; Beard 1999). Iron overload is the accumulation of excess iron in body tissues, and it usually occurs as a result of a genetic predisposition to absorb iron in excess of normal but can also be caused by excessive ingestion of iron supplements or multiple blood transfusions (Pietrangelo 2004). In advanced stages of iron overload

disease (hemochromatosis), the iron accumulates in the parenchymal cells of several organs, but particularly the liver, followed by the heart and pancreas; this condition can lead to organ dysfunction and even death (Pietrangelo 2004).

The Recommended Dietary Allowance (RDA) for all age groups of men and postmenopausal women is 8 mg per day; the RDA for premenopausal women is 18 mg per day. The Tolerable Upper Uptake Level for adults is 45 mg per day of iron, a level based on gastrointestinal distress as an adverse effect (Institute of Medicine 2001).

Clinical laboratories typically use conventional units for iron-status indicators: iron, total iron-binding capacity (TIBC), and erythrocyte protoporphyrin (EPP) are calculated in micrograms per deciliter ($\mu\text{g}/\text{dL}$), ferritin in nanograms per milliliter (ng/mL). Conversion factors to international system (SI) units are as follows: $1 \mu\text{g}/\text{dL} = 0.179 \text{ micromole per liter } (\mu\text{mol}/\text{L})$ for iron and TIBC, $1 \mu\text{g}/\text{dL} = 0.01777 \mu\text{mol}/\text{L}$ for EPP, and $1 \text{ ng}/\text{mL} = 2.247 \text{ picomole } (\text{pmol})/\text{L}$ for ferritin.



Medical technologist places samples for ferritin measurement into a clinical analyzer.

Several methods are used to measure iron and related analytes. Serum iron concentration measures the amount of ferric iron (Fe^{3+}) bound mainly to serum transferrin but does not include the divalent iron contained in serum as hemoglobin. Serum iron concentration is decreased in many people with iron-deficiency anemia and in people with chronic inflammatory disorders. Elevated concentrations of serum iron occur in iron-loading disorders such as hemochromatosis.

Serum iron is not, however, a good indicator of iron stores and is not a sensitive measure of iron deficiency, partly because of daily fluctuations. For enhanced utility, serum iron measurements are used in conjunction with TIBC measurements. Normally, because only about one third of the iron-binding sites of transferrin are occupied by Fe^{3+} , serum transferrin has considerable reserve iron-binding capacity. TIBC is a measurement of serum transferrin after saturation of all available binding sites with reagent iron. Concentrations of serum TIBC vary with the type of iron-metabolism disorder. For example, in iron deficiency TIBC is often increased, and in chronic inflammatory disorders, malignancies, and hemochromatosis, it is often decreased. The ratio of serum iron to TIBC is called transferrin saturation. Low iron values in conjunction with elevated TIBC values (or specifically measured transferrin concentrations), yielding less than 16 percent transferrin saturation, generally indicate iron-deficiency anemia (World Health Organization 2001). Transferrin saturation values in excess of 60 percent may be indicative of hemochromatosis or iron overload (World Health Organization 2001).

Ferritin is present in the blood in very low concentrations. Plasma ferritin is in equilibrium with body stores, and its concentration declines early in the development of iron deficiency. Low serum ferritin concentrations thus are sensitive indicators of iron deficiency. Ferritin is also an acute-phase protein; acute and chronic diseases can result in increased ferritin concentration, potentially masking an iron-deficiency diagnosis. The generally accepted cut-off level for serum ferritin below which iron stores are considered to be depleted is 15 ng/mL for people aged 5 years and older and 12 ng/mL for people younger than 5 years of age ([World Health Organization 2001](#)).

Finally, when iron delivery to the bone marrow is not sufficient for maintaining the incorporation of iron into newly synthesized globin and porphyrin protein, EPP concentrations increase. Yet EPP is not useful to distinguish iron deficiency from infection and also elevates in response to lead poisoning ([Roels 1975](#)). As a result, the measurement of EPP is most useful in settings where iron deficiency levels are common and where infections, lead poisoning, and other forms of anemia are rare. The generally accepted cut-off level for EPP is 80 µg/dL red blood cells for people aged 5 years and older and 70 µg/dL red blood cells for children younger than 5 years of age ([World Health Organization 2001](#)).

For more information about iron, see the Institute of Medicine's Dietary Reference Intake reports ([Institute of Medicine 2001](#)), fact sheets from the National Institutes of Health, Office of Dietary Supplements (http://ods.od.nih.gov/Health_Information/Information_About_Individual_Dietary_Supplements.aspx), and information from the American Society for Nutrition (<http://jn.nutrition.org/nutinfo/>).

Three national health objectives for Healthy People 2010 relate to iron deficiency reduction: Objective 19–12 (reduce iron deficiency among young children and females of childbearing age), Objective 19–13 (reduce anemia among low-income pregnant females in their third trimester), and Objective 19–14 (reduce iron deficiency among pregnant females) ([U.S. Department of Health and Human Services 2000](#)).

To address the changing epidemiology of iron deficiency in the United States, CDC staff, in consultation with outside experts, developed recommendations in 1998 for use by primary health-care providers to prevent, detect, and treat iron deficiency ([U.S. Centers for Disease Control and Prevention 1998](#)). Since the inception of NHANES in 1971, monitoring the iron status of the U.S. population has been an important component. To provide the best possible assessment of this element, each NHANES has included a battery of hematologic and biochemical indicators of iron status ([Looker 1995](#)). Since NHANES II (1976–1980), models that employ multiple biochemical iron-status indicators have been used to define iron deficiency in the population ([Pilch 1984](#)). The three-indicator model, using serum ferritin, transferrin saturation, and erythrocyte protoporphyrin, was developed in 1980 and applied to NHANES III (1988–1994) as well as to the other most recent surveys that became continuous beginning in 1999.

Reference data for hematologic and iron-related analytes were published for NHANES II (Fulwood 1982) and NHANES III (Hollowell, 2005). Prevalence estimates of iron deficiency using the three-indicator model were similar in NHANES III (Looker 1997) and in NHANES 1999–2000 (Looker 2002). In NHANES 1999–2000, the estimated prevalence of iron deficiency was greatest among toddlers aged 1–2 years (7 percent) and adolescent and adult females aged 12–49 years (9 percent to 16 percent). The prevalence of iron deficiency was approximately two times higher among non-Hispanic black and Mexican-American females (19 percent to 22 percent) than among non-Hispanic white females (10 percent). Across all age and sex groups in the United States, iron-deficiency anemia has an estimated prevalence of less than 5 percent.

Selected Observations and Highlights

The following example observations and figures are taken from the tables of 1999–2002 data (for ferritin) and 1999–2000 data (for all other iron-status indicators) contained in this report. Statements about categorical differences between demographic groups noted below are based on non-overlapping confidence limits from univariate analysis without adjusting for demographic variables (e.g., age, sex, race/ethnicity) or other determinants of these blood concentrations (e.g., dietary intake, supplement usage, smoking, BMI). A multivariate analysis may alter the size and statistical significance of these categorical differences. Furthermore, additional significant differences of smaller magnitude may be present despite their lack of mention here (e.g., if confidence limits slightly overlap or if differences are not statistically significant before covariate adjustment has occurred). For a selection of citations of descriptive NHANES papers related to these biochemical indicators of diet and nutrition, see Appendix E.

General Observations

- Among all age groups, 1–5 year-old children have the lowest ferritin concentrations. Children up to age 11 have lower transferrin saturation levels than do adolescents or adults.
- Women 12 years and older are more likely to be defined as iron deficient than are men. These women have lower concentrations of serum ferritin, lower transferrin saturation, and higher EPP concentrations.
- Mexican Americans have lower serum ferritin and higher EPP concentrations than do either non-Hispanic whites or non-Hispanic blacks.

- Non-Hispanic blacks have lower serum transferrin saturation levels than do non-Hispanic whites.
- Mexican-American and non-Hispanic white children (aged 1–5 years) have lower serum ferritin concentrations than do non-Hispanic black children.
- Mexican-American children (aged 1–5 years) have higher EPP concentrations than do non-Hispanic black or non-Hispanic white children.
- Mexican-American women of childbearing age (aged 20–39 years) have lower serum ferritin concentrations than do non-Hispanic white women. Concentrations for non-Hispanic black women of childbearing age fall between those of Mexican-American and non-Hispanic white women.
- Non-Hispanic black women of childbearing age (aged 20–39 years) have lower serum transferrin saturation levels than do non-Hispanic white women. Serum transferrin saturation levels for Mexican-American women of childbearing age fall between levels for non-Hispanic white and Mexican-American women of childbearing age.

Highlights

Because children and women have lower serum ferritin and transferrin saturation levels than do men and older people (≥ 60 years), children and women are at greater risk for iron deficiency.

Two minority groups, non-Hispanic blacks and Mexican Americans, typically are at greater risk for iron deficiency than are non-Hispanic whites.

At least 5 percent of persons in each age group, except for older people (≥ 60 years), have low serum ferritin concentrations (< 12 ng/mL for children younger than 5 years and < 15 ng/mL for people aged 5 years and older) that are consistent with depleted iron storage.

At least 10 percent of persons in each age group have low transferrin saturation levels (< 16 percent), which are indicative of iron deficiency.

Table 3.1.a. Serum ferritin: Total population

Geometric mean and selected percentiles of serum concentrations (in ng/mL) for the total U.S. population aged 1 year and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		5th	50th	95th	
Males and Females					
Total, 1 year and older	60.2 (58.3-62.1)	9.00 (9.00-10.0)	62.0 (59.0-64.0)	343 (329-359)	16656
1–5 years	21.5 (20.3-22.9)	6.00 (3.00-8.00)	21.0 (20.0-23.0)	62.0 (53.0-77.0)	1523
6–11 years	29.8 (28.1-31.5)	11.0 (11.0-13.0)	30.0 (28.0-31.0)	74.0 (67.0-83.0)	1909
12–19 years	32.8 (31.4-34.3)	8.00 (6.00-9.00)	34.0 (32.0-35.0)	115 (103-125)	4340
20–39 years	62.2 (58.9-65.6)	8.00 (7.00-10.0)	71.0 (66.0-76.0)	301 (272-321)	3186
40–59 years	80.8 (76.7-85.0)	9.00 (7.00-11.0)	93.0 (88.0-96.0)	404 (379-433)	2680
60 years and older	101 (95.5-107)	19.0 (16.0-22.0)	105 (97.0-112)	481 (434-518)	3018
Males					
Total, 1 year and older	93.0 (89.3-96.8)	16.0 (15.0-17.0)	101 (97.0-107)	416 (391-439)	8142
1–5 years	20.2 (18.7-21.7)	3.00 (3.00-6.00)	20.0 (19.0-22.0)	62.0 (50.0-79.0)	805
6–11 years	29.7 (27.3-32.3)	11.0 (9.00-12.0)	31.0 (29.0-32.0)	73.0 (64.0-83.0)	972
12–19 years	44.3 (41.6-47.1)	15.0 (13.0-17.0)	42.0 (40.0-45.0)	142 (125-154)	2172
20–39 years	129 (122-137)	41.0 (34.0-46.0)	134 (125-142)	382 (344-406)	1356
40–59 years	145 (135-157)	32.0 (24.0-42.0)	150 (138-168)	500 (434-574)	1340
60 years and older	127 (118-136)	21.0 (18.0-24.0)	134 (125-147)	552 (493-623)	1497
Females					
Total, 1 year and older	39.7 (38.1-41.4)	6.00 (6.00-8.00)	39.0 (37.0-41.0)	213 (198-228)	8514
1–5 years	23.2 (21.8-24.8)	7.00 (5.00-9.00)	23.0 (22.0-25.0)	69.0 (52.0-88.0)	718
6–11 years	29.9 (28.2-31.7)	12.0 (10.0-14.0)	30.0 (27.0-31.0)	76.0 (67.0-83.0)	937
12–19 years	24.0 (22.7-25.3)	5.00 (3.00-7.00)	26.0 (24.0-27.0)	76.0 (70.0-85.0)	2168
20–39 years	30.4 (28.6-32.4)	< LOD	32.0 (30.0-35.0)	126 (110-146)	1830
40–59 years	45.6 (42.8-48.6)	4.00 (3.00-6.00)	53.0 (46.0-57.0)	228 (201-243)	1340
60 years and older	84.9 (79.7-90.4)	15.0 (14.0-21.0)	86.0 (80.0-93.0)	391 (349-445)	1521

< LOD means less than the limit of detection, which may vary for some compounds by year. See Appendix D for LOD.

Table 3.1.b. Serum ferritin: Mexican Americans

Geometric mean and selected percentiles of serum concentrations (in ng/mL) for Mexican Americans in the U.S. population aged 1 year and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		5th	50th	95th	
Males and Females					
Total, 1 year and older	46.6 (43.4-50.1)	7.00 (6.00-8.00)	44.0 (40.0-47.0)	298 (265-334)	4946
1–5 years	19.0 (18.2-19.9)	5.00 (3.00-7.00)	19.0 (18.0-20.0)	48.0 (45.0-54.0)	515
6–11 years	27.7 (26.1-29.5)	12.0 (10.0-13.0)	27.0 (25.0-28.0)	70.0 (59.0-81.0)	651
12–19 years	29.9 (28.1-31.8)	6.00 (3.00-7.00)	32.0 (29.0-34.0)	114 (101-122)	1639
20–39 years	56.8 (51.9-62.2)	6.00 (3.00-8.00)	67.0 (60.0-74.0)	300 (256-336)	867
40–59 years	76.0 (67.5-85.6)	< LOD	97.0 (81.0-111)	463 (409-589)	634
60 years and older	100 (91.8-110)	18.0 (12.0-24.0)	102 (90.0-120)	433 (342-568)	640
Males					
Total, 1 year and older	77.1 (72.9-81.6)	14.0 (13.0-16.0)	85.0 (77.0-91.0)	373 (317-408)	2422
1–5 years	19.0 (18.0-20.0)	5.00 (3.00-7.00)	19.0 (18.0-21.0)	48.0 (42.0-59.0)	268
6–11 years	28.4 (26.3-30.7)	12.0 (11.0-14.0)	27.0 (25.0-29.0)	70.0 (56.0-88.0)	337
12–19 years	43.2 (40.5-46.2)	14.0 (10.0-16.0)	42.0 (40.0-46.0)	131 (121-143)	812
20–39 years	121 (112-131)	39.0 (31.0-51.0)	122 (111-134)	349 (298-395)	383
40–59 years	160 (142-180)	44.0 (33.0-53.0)	159 (142-177)	646 (457-959)	301
60 years and older	122 (105-143)	19.0 (13.0-28.0)	136 (102-162)	569 (364-831)	321
Females					
Total, 1 year and older	26.9 (24.2-30.0)	< LOD	27.0 (24.0-29.0)	161 (123-201)	2524
1–5 years	19.1 (17.6-20.8)	5.00 (3.00-8.00)	20.0 (17.0-20.0)	47.0 (44.0-56.0)	247
6–11 years	27.0 (24.7-29.6)	12.0 (8.00-14.0)	27.0 (24.0-29.0)	68.0 (59.0-84.0)	314
12–19 years	20.0 (18.3-21.9)	< LOD	22.0 (19.0-24.0)	69.0 (59.0-77.0)	827
20–39 years	23.3 (20.6-26.3)	< LOD	24.0 (22.0-26.0)	98.0 (78.0-144)	484
40–59 years	35.2 (29.2-42.4)	< LOD	38.0 (32.0-44.0)	293 (195-385)	333
60 years and older	84.6 (76.6-93.4)	17.0 (11.0-24.0)	87.0 (76.0-100)	324 (237-375)	319

< LOD means less than the limit of detection, which may vary for some compounds by year. See Appendix D for LOD.

Table 3.1.c. Serum ferritin: Non-Hispanic blacks

Geometric mean and selected percentiles of serum concentrations (in ng/mL) for non-Hispanic blacks in the U.S. population aged 1 year and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		5th	50th	95th	
Males and Females					
Total, 1 year and older	59.2 (55.6-62.9)	8.00 (6.00-10.0)	58.0 (54.0-62.0)	381 (342-423)	3898
1–5 years	25.9 (23.9-28.1)	8.00 (5.00-10.0)	25.0 (24.0-28.0)	73.0 (62.0-98.0)	415
6–11 years	36.8 (34.7-39.0)	15.0 (13.0-17.0)	36.0 (34.0-38.0)	86.0 (78.0-91.0)	604
12–19 years	32.9 (31.3-34.6)	7.00 (6.00-10.0)	33.0 (31.0-36.0)	122 (110-132)	1258
20–39 years	54.4 (48.0-61.6)	< LOD	63.0 (56.0-73.0)	313 (266-368)	592
40–59 years	96.9 (86.7-108)	7.00 (6.00-12.0)	111 (100-129)	482 (425-642)	543
60 years and older	133 (118-150)	22.0 (18.0-31.0)	141 (125-162)	613 (509-724)	486
Males					
Total, 1 year and older	92.8 (87.2-98.8)	17.0 (16.0-19.0)	98.0 (90.0-108)	452 (420-494)	1917
1–5 years	24.6 (21.8-27.7)	7.00† (3.00-10.0)	24.0 (21.0-27.0)	69.0† (57.0-122)	215
6–11 years	36.1 (33.6-38.7)	16.0 (13.0-18.0)	34.0 (31.0-38.0)	79.0 (75.0-90.0)	304
12–19 years	44.1 (42.1-46.1)	14.0 (12.0-16.0)	43.0 (40.0-46.0)	146 (128-171)	642
20–39 years	137 (126-150)	35.0 (24.0-52.0)	150 (137-161)	381 (325-450)	249
40–59 years	176 (156-199)	42.0 (30.0-53.0)	178 (157-206)	642 (494-984)	275
60 years and older	159 (135-186)	26.0 (18.0-34.0)	173 (132-204)	710 (521-851)	232
Females					
Total, 1 year and older	40.1 (36.5-44.2)	6.00 (3.00-7.00)	40.0 (37.0-42.0)	267 (246-297)	1981
1–5 years	27.5 (25.0-30.2)	10.0† (7.00-12.0)	26.0 (24.0-30.0)	73.0† (56.0-96.0)	200
6–11 years	37.6 (34.8-40.6)	16.0 (12.0-17.0)	37.0 (33.0-41.0)	88.0 (73.0-107)	300
12–19 years	24.5 (22.3-26.8)	3.00 (3.00-6.00)	24.0 (22.0-29.0)	91.0 (78.0-104)	616
20–39 years	26.6 (22.0-32.2)	< LOD	31.0 (24.0-34.0)	142 (102-232)	343
40–59 years	57.4 (50.1-65.8)	6.00 (3.00-6.00)	61.0 (52.0-75.0)	343 (255-481)	268
60 years and older	118 (101-138)	21.0 (8.00-30.0)	131 (107-151)	534 (396-613)	254

< LOD means less than the limit of detection, which may vary for some compounds by year. See Appendix D for LOD.
† Estimate is subject to greater uncertainty due to small cell size.

Table 3.1.d. Serum ferritin: Non-Hispanic whites

Geometric mean and selected percentiles of serum concentrations (in ng/mL) for non-Hispanic whites in the U.S. population aged 1 year and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		5th	50th	95th	
Males and Females					
Total, 1 year and older	63.0 (60.4-65.6)	11.0 (10.0-11.0)	65.0 (63.0-69.0)	343 (327-357)	6360
1–5 years	21.3 (19.2-23.6)	5.00 (3.00-8.00)	21.0 (19.0-23.0)	61.0 (46.0-80.0)	420
6–11 years	28.4 (26.0-31.1)	10.0 (9.00-12.0)	30.0 (27.0-32.0)	69.0 (59.0-83.0)	496
12–19 years	32.9 (31.0-34.8)	8.00 (7.00-11.0)	34.0 (31.0-36.0)	107 (95.0-122)	1075
20–39 years	64.3 (59.6-69.5)	9.00 (7.00-12.0)	74.0 (66.0-81.0)	293 (261-328)	1382
40–59 years	79.8 (75.7-84.1)	10.0 (9.00-12.0)	91.0 (85.0-96.0)	386 (349-406)	1280
60 years and older	97.9 (92.2-104)	17.0 (15.0-21.0)	102 (94.0-110)	448 (393-503)	1707
Males					
Total, 1 year and older	96.0 (91.4-101)	16.0 (14.0-18.0)	107 (99.0-115)	414 (391-435)	3127
1–5 years	19.4 (17.3-21.8)	< LOD	19.0 (17.0-21.0)	61.0 (42.0-79.0)	226
6–11 years	28.4 (24.8-32.6)	11.0 (9.00-14.0)	29.0 (27.0-33.0)	68.0 (50.0-97.0)	261
12–19 years	42.9 (39.7-46.4)	14.0 (10.0-17.0)	43.0 (39.0-46.0)	127 (111-143)	536
20–39 years	131 (121-141)	43.0 (32.0-49.0)	135 (124-144)	382 (331-416)	577
40–59 years	139 (127-153)	31.0 (18.0-39.0)	144 (132-168)	453 (409-517)	668
60 years and older	125 (116-135)	20.0 (18.0-25.0)	135 (122-148)	531 (471-601)	859
Females					
Total, 1 year and older	41.7 (39.5-44.0)	8.00 (6.00-9.00)	41.0 (39.0-44.0)	205 (193-227)	3233
1–5 years	23.6 (20.9-26.8)	8.00† (5.00-11.0)	24.0 (20.0-26.0)	59.0† (42.0-98.0)	194
6–11 years	28.4 (25.9-31.2)	10.0 (9.00-14.0)	28.0 (25.0-31.0)	73.0 (56.0-83.0)	235
12–19 years	24.8 (23.0-26.6)	7.00 (3.00-8.00)	26.0 (25.0-28.0)	71.0 (61.0-85.0)	539
20–39 years	32.0 (29.1-35.2)	5.00 (3.00-8.00)	34.0 (29.0-40.0)	127 (108-149)	805
40–59 years	45.2 (41.8-48.8)	6.00 (3.00-8.00)	51.0 (45.0-57.0)	206 (181-235)	612
60 years and older	80.7 (75.7-86.1)	16.0 (13.0-22.0)	83.0 (77.0-89.0)	353 (296-391)	848

< LOD means less than the limit of detection, which may vary for some compounds by year. See Appendix D for LOD.
† Estimate is subject to greater uncertainty due to small cell size.

Table 3.2.a. Serum iron: Total population

Geometric mean and selected percentiles of serum concentrations (in µg/dL) for the total U.S. population aged 1 year and older, National Health and Nutrition Examination Survey, 1999–2000.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
Males and Females					
Total, 1 year and older	81.2 (79.5-83.0)	45.0 (42.0-46.0)	85.0 (84.0-87.0)	137 (134-139)	7877
1–5 years	65.2 (62.0-68.4)	31.0 (27.0-35.0)	70.0 (64.0-79.0)	115 (110-124)	704
6–11 years	71.5 (68.2-75.0)	39.0 (34.0-41.0)	76.0 (69.0-82.0)	126 (117-131)	887
12–19 years	82.1 (79.7-84.7)	45.0 (42.0-47.0)	87.0 (83.0-89.0)	141 (133-145)	2127
20–39 years	84.5 (81.3-87.8)	45.0 (41.0-48.0)	88.0 (86.0-93.0)	146 (139-154)	1470
40–59 years	83.3 (80.3-86.4)	50.0 (46.0-52.0)	87.0 (83.0-92.0)	135 (131-139)	1199
60 years and older	82.0 (78.5-85.8)	49.0 (44.0-54.0)	83.0 (80.0-86.0)	132 (126-139)	1490
Males					
Total, 1 year and older	88.1 (86.1-90.0)	51.0 (49.0-54.0)	92.0 (89.0-94.0)	144 (141-147)	3879
1–5 years	64.9 (61.3-68.7)	33.0 (26.0-38.0)	67.0 (65.0-73.0)	116 (103-125)	388
6–11 years	69.6 (65.9-73.5)	38.0 (31.0-41.0)	75.0 (67.0-81.0)	115 (105-129)	463
12–19 years	92.0 (86.3-98.0)	52.0 (43.0-59.0)	96.0 (91.0-100)	150 (139-161)	1080
20–39 years	93.8 (91.4-96.3)	60.0 (56.0-63.0)	94.0 (92.0-98.0)	154 (141-163)	632
40–59 years	93.7 (89.1-98.6)	56.0 (52.0-63.0)	97.0 (92.0-103)	141 (137-148)	570
60 years and older	86.6 (83.2-90.0)	52.0 (44.0-56.0)	88.0 (85.0-91.0)	145 (137-154)	746
Females					
Total, 1 year and older	75.1 (73.3-76.9)	39.0 (37.0-43.0)	79.0 (77.0-81.0)	130 (124-135)	3998
1–5 years	65.5 (58.8-72.9)	30.0 (24.0-37.0)	76.0 (60.0-85.0)	114 (108-128)	316
6–11 years	73.8 (66.9-81.4)	37.0 (27.0-46.0)	76.0 (67.0-87.0)	133 (111-148)	424
12–19 years	72.9 (69.0-77.0)	40.0 (36.0-42.0)	77.0 (71.0-81.0)	128 (116-135)	1047
20–39 years	76.2 (72.0-80.6)	36.0 (33.0-41.0)	82.0 (74.0-87.0)	137 (128-151)	838
40–59 years	74.7 (71.6-77.9)	44.0 (38.0-48.0)	78.0 (71.0-83.0)	125 (115-134)	629
60 years and older	78.5 (73.9-83.5)	49.0 (40.0-54.0)	80.0 (76.0-85.0)	125 (114-133)	744

Table 3.2.b. Serum iron: Mexican Americans

Geometric mean and selected percentiles of serum concentrations (in µg/dL) for Mexican Americans in the U.S. population aged 1 year and older, National Health and Nutrition Examination Survey, 1999–2000.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
Males and Females					
Total, 1 year and older	80.1 (77.7-82.6)	40.0 (38.0-44.0)	84.0 (81.0-87.0)	139 (136-147)	2710
1–5 years	62.3 (56.6-68.6)	28.0 (21.0-35.0)	70.0 (60.0-79.0)	120 (111-135)	277
6–11 years	71.2 (65.8-77.1)	41.0 (34.0-45.0)	75.0 (68.0-83.0)	117 (110-133)	361
12–19 years	83.3 (79.3-87.4)	44.0 (38.0-48.0)	89.0 (83.0-93.0)	143 (138-148)	938
20–39 years	85.1 (80.1-90.4)	43.0 (37.0-51.0)	88.0 (80.0-97.0)	149 (138-162)	407
40–59 years	85.1 (81.7-88.6)	47.0 (41.0-52.0)	89.0 (83.0-96.0)	147 (131-162)	344
60 years and older	82.1 (76.7-87.7)	48.0 (42.0-52.0)	85.0 (77.0-95.0)	134 (130-139)	383
Males					
Total, 1 year and older	90.0 (86.1-94.1)	49.0 (45.0-55.0)	96.0 (90.0-99.0)	153 (143-162)	1348
1–5 years	61.6 (54.7-69.4)	28.0 (21.0-35.0)	65.0 (57.0-75.0)	120 (97.0-148)	152
6–11 years	71.4 (63.3-80.6)	42.0 (32.0-49.0)	74.0 (66.0-84.0)	115 (100-134)	198
12–19 years	94.1 (90.8-97.6)	53.0 (49.0-58.0)	97.0 (92.0-103)	156 (150-162)	481
20–39 years	102 (96.5-109)	62.0 (56.0-69.0)	107 (101-111)	162 (150-176)	170
40–59 years	101 (93.9-108)	62.0 (50.0-76.0)	102 (93.0-112)	151 (133-178)	152
60 years and older	87.3 (81.9-93.0)	44.0 (30.0-60.0)	95.0 (82.0-102)	141 (130-155)	195
Females					
Total, 1 year and older	70.8 (67.7-74.1)	36.0 (33.0-38.0)	76.0 (71.0-79.0)	127 (117-132)	1362
1–5 years	63.3 (56.3-71.1)	26.0 (16.0-37.0)	74.0 (58.0-86.0)	117 (105-138)	125
6–11 years	71.1 (64.4-78.4)	38.0 (22.0-51.0)	79.0 (70.0-84.0)	118 (110-129)	163
12–19 years	74.2 (66.6-82.7)	36.0 (30.0-46.0)	79.0 (71.0-87.0)	127 (96.0-144)	457
20–39 years	69.2 (61.3-78.1)	35.0 (30.0-41.0)	75.0 (66.0-84.0)	124 (111-129)	237
40–59 years	72.6 (68.4-77.0)	36.0 (27.0-47.0)	73.0 (66.0-83.0)	130 (116-154)	192
60 years and older	77.4 (70.5-85.1)	48.0 (37.0-57.0)	78.0 (72.0-86.0)	123 (109-137)	188

Table 3.2.c. Serum iron: Non-Hispanic blacks

Geometric mean and selected percentiles of serum concentrations (in µg/dL) for non-Hispanic blacks in the U.S. population aged 1 year and older, National Health and Nutrition Examination Survey, 1999–2000.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
Males and Females					
Total, 1 year and older	71.7 (69.0-74.6)	38.0 (35.0-39.0)	75.0 (71.0-80.0)	122 (119-130)	1784
1–5 years	67.2 (60.0-75.3)	37.0 (30.0-50.0)	69.0 (62.0-80.0)	109 (96.0-125)	172
6–11 years	71.5 (67.2-76.1)	40.0 (34.0-48.0)	77.0 (73.0-80.0)	117 (103-124)	261
12–19 years	73.5 (68.0-79.4)	39.0 (33.0-42.0)	79.0 (71.0-84.0)	127 (118-138)	584
20–39 years	74.1 (70.0-78.5)	35.0 (31.0-41.0)	81.0 (74.0-83.0)	133 (122-147)	274
40–59 years	71.5 (66.6-76.8)	39.0 (34.0-45.0)	71.0 (66.0-80.0)	126 (112-139)	251
60 years and older	65.4 (61.5-69.5)	33.0 (30.0-40.0)	67.0 (65.0-72.0)	109 (99.0-119)	242
Males					
Total, 1 year and older	80.4 (76.3-84.7)	47.0 (39.0-52.0)	82.0 (78.0-85.0)	132 (121-141)	875
1–5 years	68.4 (60.4-77.6)	37.0† (33.0-40.0)	69.0 (58.0-80.0)	110† (88.0-149)	93
6–11 years	71.4 (65.7-77.6)	37.0 (28.0-50.0)	79.0 (73.0-84.0)	117 (103-122)	129
12–19 years	82.2 (77.7-86.9)	46.0 (41.0-54.0)	89.0 (82.0-94.0)	132 (121-138)	301
20–39 years	88.4 (82.2-95.0)	57.0 (44.0-67.0)	91.0 (82.0-98.0)	137 (120-153)	117
40–59 years	80.4 (71.8-90.1)	50.0 (31.0-55.0)	80.0 (70.0-94.0)	136 (119-157)	122
60 years and older	73.0 (66.1-80.5)	35.0 (32.0-54.0)	72.0 (64.0-81.0)	119 (101-141)	113
Females					
Total, 1 year and older	64.7 (62.1-67.4)	33.0 (30.0-36.0)	67.0 (65.0-70.0)	118 (110-122)	909
1–5 years	65.8 (56.5-76.7)	33.0† (21.0-54.0)	71.0 (60.0-82.0)	103† (97.0-123)	79
6–11 years	71.6 (66.3-77.3)	40.0 (27.0-49.0)	76.0 (69.0-80.0)	119 (101-128)	132
12–19 years	65.3 (57.6-74.1)	34.0 (22.0-40.0)	69.0 (60.0-81.0)	123 (108-135)	283
20–39 years	63.9 (59.3-68.9)	30.0 (20.0-33.0)	67.0 (61.0-77.0)	123 (112-159)	157
40–59 years	64.7 (58.2-71.9)	36.0 (31.0-45.0)	67.0 (60.0-71.0)	106 (91.0-115)	129
60 years and older	60.3 (57.3-63.3)	35.0 (29.0-40.0)	65.0 (58.0-68.0)	103 (86.0-116)	129

† Estimate is subject to greater uncertainty due to small cell size.

Table 3.2.d. Serum iron: Non-Hispanic whites

Geometric mean and selected percentiles of serum concentrations (in µg/dL) for non-Hispanic whites in the U.S. population aged 1 year and older, National Health and Nutrition Examination Survey, 1999–2000.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
Males and Females					
Total, 1 year and older	84.0 (81.8-86.2)	47.0 (45.0-51.0)	88.0 (86.0-89.0)	139 (135-141)	2645
1–5 years	68.5 (63.2-74.3)	35.0 (25.0-44.0)	76.0 (66.0-85.0)	117 (109-132)	170
6–11 years	72.6 (67.2-78.5)	37.0 (30.0-41.0)	80.0 (66.0-90.0)	131 (113-146)	191
12–19 years	85.2 (81.2-89.4)	45.0 (40.0-51.0)	89.0 (85.0-91.0)	145 (137-153)	419
20–39 years	87.3 (81.7-93.3)	46.0 (41.0-56.0)	90.0 (85.0-96.0)	148 (139-158)	609
40–59 years	85.9 (82.0-90.0)	51.0 (48.0-54.0)	90.0 (85.0-96.0)	135 (129-140)	496
60 years and older	84.0 (80.4-87.8)	51.0 (47.0-56.0)	86.0 (84.0-90.0)	132 (127-139)	760
Males					
Total, 1 year and older	89.9 (86.9-92.9)	53.0 (50.0-56.0)	93.0 (90.0-96.0)	146 (141-151)	1315
1–5 years	67.7 (59.9-76.4)	33.0† (21.0-45.0)	72.0 (64.0-85.0)	118† (100-149)	91
6–11 years	70.0 (63.9-76.7)	32.0† (29.0-41.0)	79.0 (66.0-87.0)	115† (101-141)	101
12–19 years	94.4 (85.3-104)	52.0 (42.0-64.0)	97.0 (89.0-108)	161 (145-173)	214
20–39 years	94.8 (91.7-98.0)	60.0 (52.0-64.0)	95.0 (92.0-101)	154 (141-169)	265
40–59 years	95.3 (88.6-103)	59.0 (53.0-65.0)	98.0 (92.0-106)	140 (132-147)	254
60 years and older	87.6 (83.9-91.6)	53.0 (47.0-58.0)	88.0 (85.0-92.0)	146 (136-155)	390
Females					
Total, 1 year and older	78.5 (76.2-80.9)	43.0 (40.0-46.0)	84.0 (80.0-87.0)	132 (124-141)	1330
1–5 years	69.5 (62.4-77.5)	35.0† (25.0-40.0)	82.0 (58.0-88.0)	116† (108-132)	79
6–11 years	75.8 (64.4-89.1)	38.0† (24.0-50.0)	80.0 (60.0-99.0)	136† (118-155)	90
12–19 years	75.8 (68.3-84.1)	42.0 (36.0-46.0)	80.0 (69.0-87.0)	127 (115-144)	205
20–39 years	80.4 (72.7-89.0)	41.0 (29.0-47.0)	88.0 (74.0-96.0)	144 (130-161)	344
40–59 years	77.6 (74.6-80.6)	46.0 (39.0-51.0)	80.0 (72.0-85.0)	126 (113-135)	242
60 years and older	81.1 (76.2-86.3)	51.0 (43.0-58.0)	83.0 (79.0-87.0)	125 (113-135)	370

† Estimate is subject to greater uncertainty due to small cell size.

Table 3.3.a. Serum total iron-binding capacity: Total population

Geometric mean and selected percentiles of serum concentrations (in $\mu\text{g/dL}$) for the total U.S. population, aged 1 year and older, National Health and Nutrition Examination Survey, 1999–2000.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
Males and Females					
Total, 1 year and older	366 (360-371)	297 (292-304)	367 (359-374)	447 (441-453)	7847
1–5 years	371 (359-383)	309 (286-322)	374 (361-384)	446 (434-454)	699
6–11 years	369 (361-378)	312 (295-320)	372 (361-380)	438 (423-444)	883
12–19 years	383 (374-391)	312 (301-328)	385 (377-392)	461 (451-471)	2124
20–39 years	365 (359-371)	299 (289-306)	363 (357-371)	450 (446-459)	1468
40–59 years	364 (359-370)	298 (291-305)	364 (354-373)	441 (433-453)	1195
60 years and older	353 (347-358)	284 (276-290)	355 (347-361)	437 (424-450)	1478
Males					
Total, 1 year and older	356 (349-364)	294 (287-300)	358 (351-365)	431 (421-438)	3860
1–5 years	375 (363-387)	306 (276-327)	379 (363-390)	449 (429-477)	385
6–11 years	364 (351-377)	304 (281-323)	366 (357-381)	426 (408-442)	460
12–19 years	374 (366-383)	313 (297-329)	379 (367-386)	448 (436-461)	1076
20–39 years	349 (341-357)	293 (282-298)	350 (342-358)	416 (402-432)	631
40–59 years	357 (350-364)	294 (289-302)	357 (351-365)	425 (409-436)	567
60 years and older	345 (337-353)	283 (269-288)	348 (338-357)	431 (409-446)	741
Females					
Total, 1 year and older	375 (370-381)	305 (298-309)	377 (369-383)	460 (454-465)	3987
1–5 years	366 (352-381)	307 (271-321)	369 (351-386)	439 (424-447)	314
6–11 years	375 (367-383)	312 (305-320)	374 (370-387)	441 (427-453)	423
12–19 years	391 (382-402)	312 (302-335)	393 (383-401)	475 (456-491)	1048
20–39 years	382 (375-390)	308 (303-316)	383 (374-397)	477 (463-485)	837
40–59 years	371 (365-378)	300 (290-310)	373 (360-384)	450 (442-466)	628
60 years and older	359 (354-364)	289 (282-296)	361 (354-371)	439 (424-457)	737

Table 3.3.b. Serum total iron-binding capacity: Mexican Americans

Geometric mean and selected percentiles of serum concentrations (in $\mu\text{g/dL}$) for Mexican Americans in the U.S. population, aged 1 year and older, National Health and Nutrition Examination Survey, 1999–2000.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
Males and Females					
Total, 1 year and older	373 (363-384)	303 (288-314)	375 (366-385)	455 (438-478)	2707
1–5 years	378 (370-387)	316 (303-323)	377 (368-390)	453 (444-476)	274
6–11 years	379 (371-388)	320 (308-327)	385 (372-395)	441 (433-451)	361
12–19 years	396 (380-413)	328 (316-336)	395 (386-408)	486 (447-551)	938
20–39 years	370 (357-384)	299 (277-319)	375 (354-387)	457 (426-485)	407
40–59 years	365 (359-370)	291 (275-308)	367 (358-372)	439 (431-476)	344
60 years and older	345 (334-357)	277 (263-290)	350 (338-363)	415 (405-434)	383
Males					
Total, 1 year and older	365 (356-375)	301 (282-314)	370 (357-380)	437 (427-449)	1345
1–5 years	382 (370-394)	318 (299-329)	387 (368-396)	456 (436-492)	150
6–11 years	382 (371-393)	324 (313-337)	386 (366-403)	441 (425-452)	198
12–19 years	383 (374-392)	319 (304-330)	388 (381-395)	460 (448-469)	480
20–39 years	359 (344-374)	300 (275-319)	361 (348-380)	428 (411-442)	170
40–59 years	353 (345-361)	281 (270-305)	357 (347-367)	417 (403-437)	152
60 years and older	339 (327-352)	276 (250-288)	345 (324-362)	409 (383-434)	195
Females					
Total, 1 year and older	382 (370-395)	308 (293-318)	384 (373-393)	476 (449-504)	1362
1–5 years	374 (360-389)	316 (301-334)	368 (355-392)	449 (422-473)	124
6–11 years	376 (368-384)	315 (305-325)	383 (370-391)	449 (430-456)	163
12–19 years	409 (383-437)	337 (325-345)	405 (384-428)	529 (436-579)	458
20–39 years	384 (366-402)	301 (275-325)	383 (371-404)	485 (452-526)	237
40–59 years	376 (365-388)	299 (284-311)	374 (361-390)	475 (438-496)	192
60 years and older	351 (337-366)	276 (245-304)	354 (343-365)	421 (408-451)	188

Table 3.3.c. Serum total iron-binding capacity: Non-Hispanic blacks

[Geometric mean and selected percentiles of serum concentrations (in µg/dL) for non-Hispanic blacks in the U.S. population, aged 1 year and older, National Health and Nutrition Examination Survey, 1999–2000.]

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
Males and Females					
Total, 1 year and older	354 (349-359)	287 (282-293)	354 (346-360)	435 (427-443)	1774
1–5 years	370 (363-377)	315 (306-334)	365 (360-375)	435 (415-455)	172
6–11 years	366 (362-371)	316 (303-327)	367 (360-375)	427 (418-434)	257
12–19 years	374 (368-379)	312 (301-321)	375 (370-380)	447 (432-460)	582
20–39 years	356 (346-366)	288 (273-301)	346 (341-360)	444 (428-475)	273
40–59 years	342 (332-353)	276 (262-286)	346 (331-359)	426 (409-443)	249
60 years and older	323 (315-331)	259 (242-271)	322 (315-330)	401 (380-435)	241
Males					
Total, 1 year and older	342 (337-348)	283 (266-291)	344 (340-349)	414 (407-421)	868
1–5 years	368 (358-378)	320† (295-340)	367 (359-381)	416† (401-435)	93
6–11 years	365 (358-372)	318 (306-328)	364 (355-374)	423 (409-431)	126
12–19 years	365 (360-371)	307 (293-317)	369 (360-376)	432 (416-450)	299
20–39 years	331 (320-342)	265 (253-288)	331 (314-344)	401 (367-428)	117
40–59 years	333 (319-347)	266 (222-296)	333 (313-362)	405 (384-423)	120
60 years and older	324 (317-331)	259 (232-282)	325 (313-338)	397 (375-421)	113
Females					
Total, 1 year and older	364 (359-370)	290 (283-298)	364 (354-375)	447 (441-457)	906
1–5 years	372 (360-384)	315† (286-334)	362 (351-382)	475† (415-481)	79
6–11 years	368 (359-376)	311 (295-329)	371 (353-384)	432 (417-443)	131
12–19 years	382 (374-391)	321 (304-328)	382 (372-390)	456 (433-487)	283
20–39 years	379 (370-387)	309 (293-319)	379 (362-398)	478 (436-496)	156
40–59 years	351 (337-365)	275 (262-296)	352 (338-368)	442 (414-448)	129
60 years and older	323 (310-336)	254 (235-276)	321 (306-333)	406 (375-450)	128

† Estimate is subject to greater uncertainty due to small cell size.

Table 3.3.d. Serum total iron-binding capacity: Non-Hispanic whites

Geometric mean and selected percentiles of serum concentrations (in µg/dL) for non-Hispanic whites in the U.S. population, aged 1 year and older, National Health and Nutrition Examination Survey, 1999–2000.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
Males and Females					
Total, 1 year and older	367 (361-373)	300 (294-307)	367 (359-375)	448 (441-454)	2630
1–5 years	368 (349-387)	305 (265-331)	377 (351-394)	442 (424-451)	168
6–11 years	372 (363-382)	313 (304-321)	372 (359-388)	442 (413-467)	191
12–19 years	379 (368-391)	311 (293-328)	384 (374-395)	461 (448-474)	418
20–39 years	367 (362-371)	299 (291-307)	365 (359-374)	450 (442-463)	608
40–59 years	369 (362-376)	302 (294-314)	367 (354-379)	444 (433-458)	494
60 years and older	357 (351-362)	288 (284-293)	358 (349-368)	438 (427-454)	751
Males					
Total, 1 year and older	358 (350-366)	295 (286-302)	357 (350-366)	433 (419-442)	1306
1–5 years	370 (355-386)	301† (253-331)	379 (348-398)	446† (411-473)	90
6–11 years	364 (345-384)	304† (269-326)	367 (352-388)	426† (397-475)	101
12–19 years	372 (362-384)	310 (285-332)	377 (361-385)	447 (436-464)	213
20–39 years	351 (342-360)	296 (282-304)	352 (345-362)	418 (401-442)	264
40–59 years	364 (355-372)	301 (290-319)	362 (352-370)	426 (419-442)	253
60 years and older	347 (339-356)	284 (271-289)	348 (338-358)	434 (414-447)	385
Females					
Total, 1 year and older	376 (370-382)	306 (300-311)	378 (370-386)	461 (453-471)	1324
1–5 years	365 (338-395)	304† (201-336)	372 (334-401)	436† (398-457)	78
6–11 years	382 (374-391)	317† (313-338)	374 (370-393)	444† (427-467)	90
12–19 years	387 (375-400)	311 (295-335)	391 (378-403)	471 (450-479)	205
20–39 years	383 (375-391)	307 (303-316)	383 (367-401)	478 (454-495)	344
40–59 years	374 (365-384)	302 (289-317)	376 (355-389)	454 (440-479)	241
60 years and older	365 (360-370)	293 (287-307)	369 (359-376)	450 (424-471)	366

† Estimate is subject to greater uncertainty due to small cell size.

Table 3.4.a. Serum transferrin saturation: Total population

Geometric mean and selected percentiles of serum concentrations (in %) for the total U.S. population aged 1 year and older, National Health and Nutrition Examination Survey, 1999–2000.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
Males and Females					
Total, 1 year and older	22.2 (21.6-22.9)	12.0 (11.4-12.5)	23.5 (22.8-24.1)	38.8 (37.8-40.4)	7845
1–5 years	17.6 (16.7-18.6)	8.20 (7.30-9.20)	19.4 (16.8-20.8)	32.9 (29.7-35.3)	697
6–11 years	19.4 (18.4-20.5)	10.4 (9.40-11.2)	21.1 (18.9-22.4)	34.4 (32.0-35.8)	883
12–19 years	21.5 (20.6-22.4)	11.3 (10.2-12.3)	22.5 (21.5-23.4)	38.7 (36.0-41.4)	2124
20–39 years	23.1 (22.2-24.2)	12.3 (11.2-12.7)	24.5 (23.4-25.5)	42.0 (40.0-44.2)	1468
40–59 years	22.9 (22.0-23.9)	13.1 (12.3-14.1)	23.8 (22.7-25.3)	38.6 (36.4-40.5)	1195
60 years and older	23.2 (22.2-24.3)	13.3 (12.4-14.3)	24.2 (23.1-25.1)	38.4 (36.8-39.6)	1478
Males					
Total, 1 year and older	24.7 (23.9-25.6)	14.0 (13.3-14.5)	25.8 (24.8-26.5)	41.8 (40.2-43.8)	3858
1–5 years	17.4 (16.5-18.3)	8.30 (6.80-9.80)	18.3 (16.6-19.8)	32.4 (29.0-34.6)	383
6–11 years	19.1 (17.7-20.7)	10.6 (8.80-11.7)	21.2 (18.9-22.4)	32.2 (28.4-35.5)	460
12–19 years	24.5 (22.9-26.2)	13.3 (11.5-14.5)	25.8 (24.3-26.9)	42.8 (36.3-50.4)	1076
20–39 years	26.9 (26.1-27.7)	16.3 (14.7-17.4)	27.1 (25.7-28.4)	45.9 (43.7-48.8)	631
40–59 years	26.2 (24.7-27.8)	16.0 (14.3-17.9)	26.8 (25.4-28.9)	41.6 (39.8-43.2)	567
60 years and older	25.1 (24.0-26.3)	14.5 (13.3-15.4)	25.9 (24.7-27.3)	41.7 (39.4-43.8)	741
Females					
Total, 1 year and older	20.1 (19.5-20.7)	10.4 (9.60-11.3)	21.3 (20.9-21.7)	35.8 (33.6-38.4)	3987
1–5 years	17.9 (15.9-20.1)	7.70 (5.90-10.4)	20.2 (16.2-23.2)	34.1 (29.2-37.1)	314
6–11 years	19.7 (17.8-21.7)	10.1 (8.30-12.2)	21.1 (17.9-23.8)	36.1 (32.6-38.8)	423
12–19 years	18.8 (17.6-20.0)	9.90 (9.10-10.9)	19.8 (18.4-20.9)	32.9 (31.0-36.6)	1048
20–39 years	20.0 (18.8-21.2)	9.00 (7.90-11.1)	21.4 (19.8-23.3)	38.4 (35.0-41.1)	837
40–59 years	20.2 (19.3-21.1)	11.5 (9.20-13.1)	21.5 (20.5-22.5)	34.8 (32.0-37.6)	628
60 years and older	21.7 (20.5-23.0)	12.8 (11.1-14.2)	22.3 (21.1-23.6)	35.4 (31.8-37.9)	737

Table 3.4.b. Serum transferrin saturation: Mexican Americans

Geometric mean and selected percentiles of serum concentrations (in %) for Mexican Americans in the U.S. population aged 1 year and older, National Health and Nutrition Examination Survey, 1999–2000.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
Males and Females					
Total, 1 year and older	21.5 (20.5-22.5)	10.5 (9.90-11.4)	22.9 (21.6-24.0)	39.3 (37.0-41.2)	2707
1–5 years	16.6 (14.9-18.4)	7.20 (5.40-9.10)	18.3 (16.5-20.1)	32.9 (28.0-38.8)	274
6–11 years	18.8 (17.5-20.2)	10.7 (8.70-12.2)	19.9 (18.5-21.4)	30.8 (28.9-33.1)	361
12–19 years	21.1 (20.2-22.0)	10.6 (9.70-12.0)	22.0 (20.7-22.2)	38.6 (36.4-40.3)	938
20–39 years	23.0 (21.2-24.9)	12.1 (9.30-13.6)	24.2 (21.9-26.9)	41.2 (38.2-48.1)	407
40–59 years	23.4 (22.5-24.2)	12.5 (10.4-15.1)	24.7 (23.3-26.4)	41.1 (37.0-44.2)	344
60 years and older	23.6 (21.9-25.6)	13.2 (11.9-14.9)	24.0 (20.8-27.9)	41.4 (38.0-43.1)	383
Males					
Total, 1 year and older	24.6 (23.1-26.2)	13.2 (12.1-14.4)	25.8 (24.2-27.5)	43.7 (40.0-48.1)	1345
1–5 years	16.2 (14.2-18.5)	6.90 (5.10-8.60)	17.0 (15.0-19.8)	32.9 (25.6-41.5)	150
6–11 years	18.7 (16.8-20.8)	10.8 (8.60-12.9)	19.5 (18.2-21.3)	29.6 (27.4-34.2)	198
12–19 years	24.6 (23.3-26.0)	13.3 (12.1-14.9)	25.9 (24.3-27.3)	41.0 (38.7-44.1)	480
20–39 years	28.4 (26.0-30.9)	16.6 (14.6-19.5)	28.6 (25.0-33.0)	49.5 (41.8-56.0)	170
40–59 years	28.6 (26.8-30.5)	18.4 (14.1-21.2)	28.4 (26.7-30.8)	44.6 (40.9-49.3)	152
60 years and older	25.6 (23.9-27.5)	13.3 (10.4-16.3)	27.4 (23.2-30.4)	43.8 (38.5-49.0)	195
Females					
Total, 1 year and older	18.6 (17.5-19.7)	8.90 (8.00-10.0)	20.1 (18.9-21.2)	33.2 (31.0-35.8)	1362
1–5 years	17.1 (15.5-18.9)	6.80 (5.20-9.70)	19.8 (16.5-22.7)	33.4 (28.0-37.1)	124
6–11 years	18.9 (17.1-20.9)	10.4 (5.80-13.2)	20.3 (18.8-21.8)	30.8 (29.3-31.7)	163
12–19 years	18.2 (17.1-19.5)	8.70 (7.50-10.3)	19.7 (18.1-21.3)	33.4 (30.2-36.3)	458
20–39 years	18.1 (15.9-20.7)	8.10 (6.80-10.4)	19.0 (16.7-21.9)	32.5 (29.5-38.1)	237
40–59 years	19.3 (18.0-20.7)	8.90 (6.40-12.3)	20.6 (18.5-23.9)	34.1 (31.7-41.0)	192
60 years and older	21.9 (19.8-24.2)	12.8 (11.8-15.1)	23.0 (19.8-24.2)	35.0 (31.9-41.4)	188

Table 3.4.c. Serum transferrin saturation: Non-Hispanic blacks

Geometric mean and selected percentiles of serum concentrations (in %) for non-Hispanic blacks in the U.S. population aged 1 year and older, National Health and Nutrition Examination Survey, 1999–2000.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
Males and Females					
Total, 1 year and older	20.3 (19.5-21.2)	9.90 (9.30-10.8)	21.6 (20.5-22.7)	36.5 (34.4-39.0)	1773
1–5 years	18.3 (16.4-20.3)	10.2 (8.20-12.5)	19.0 (16.1-21.6)	30.7 (26.6-38.1)	171
6–11 years	19.6 (18.3-21.0)	10.8 (8.60-12.7)	21.3 (19.6-22.3)	31.0 (29.4-34.4)	257
12–19 years	19.7 (18.2-21.3)	10.0 (8.80-11.3)	21.3 (20.0-22.7)	34.9 (32.2-38.3)	582
20–39 years	20.8 (19.4-22.4)	8.90 (7.50-10.7)	22.1 (20.4-24.9)	38.4 (35.3-44.2)	273
40–59 years	20.9 (19.3-22.6)	10.7 (8.50-12.9)	21.4 (19.3-23.2)	37.6 (34.3-42.1)	249
60 years and older	20.2 (18.9-21.6)	11.4 (9.40-12.9)	21.2 (19.6-22.5)	34.9 (30.6-39.0)	241
Males					
Total, 1 year and older	23.5 (22.4-24.8)	13.6 (12.5-14.7)	24.5 (22.5-26.1)	39.3 (36.2-41.8)	867
1–5 years	18.7 (16.6-21.2)	10.4† (9.00-12.4)	19.0 (15.5-22.5)	30.2† (24.6-40.8)	92
6–11 years	19.7 (17.8-21.7)	10.4 (7.90-13.7)	21.7 (18.9-24.0)	30.1 (28.0-34.3)	126
12–19 years	22.5 (21.3-23.8)	12.2 (11.1-14.4)	24.2 (22.4-25.6)	36.5 (33.6-39.3)	299
20–39 years	26.7 (24.8-28.8)	17.4 (14.3-19.8)	27.1 (24.9-30.1)	40.3 (35.7-45.8)	117
40–59 years	24.2 (21.7-27.0)	13.9 (10.9-16.3)	23.9 (21.4-28.0)	42.2 (37.1-46.8)	120
60 years and older	22.6 (20.8-24.4)	12.9 (11.4-15.8)	22.4 (20.6-24.3)	38.1 (32.1-41.6)	113
Females					
Total, 1 year and older	17.8 (16.9-18.7)	8.60 (7.40-9.30)	19.2 (17.9-20.2)	34.3 (31.6-36.0)	906
1–5 years	17.7 (15.2-20.6)	9.40† (5.30-12.7)	19.4 (14.7-21.8)	29.4† (26.4-38.1)	79
6–11 years	19.5 (17.8-21.3)	11.5 (6.70-14.1)	21.0 (18.7-22.5)	32.7 (29.4-35.3)	131
12–19 years	17.1 (14.9-19.5)	8.10 (5.50-10.8)	18.9 (15.5-21.5)	32.3 (28.2-37.0)	283
20–39 years	16.9 (15.5-18.4)	7.30 (5.40-8.70)	18.0 (15.9-20.1)	37.4 (33.1-41.7)	156
40–59 years	18.5 (16.3-20.9)	9.90 (6.90-12.0)	19.9 (17.1-21.8)	31.5 (27.1-35.0)	129
60 years and older	18.6 (17.2-20.0)	9.40 (8.70-11.8)	19.9 (17.8-21.7)	31.3 (28.5-35.0)	128

† Estimate is subject to greater uncertainty due to small cell size.

Table 3.4.d. Serum transferrin saturation: Non-Hispanic whites

Geometric mean and selected percentiles of serum concentrations (in %) for non-Hispanic whites in the U.S. population aged 1 year and older, National Health and Nutrition Examination Survey, 1999–2000.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
Males and Females					
Total, 1 year and older	22.9 (22.0-23.8)	12.6 (11.7-13.2)	24.0 (23.2-24.9)	39.6 (38.3-41.5)	2629
1–5 years	18.7 (16.9-20.6)	9.20 (6.80-11.4)	20.8 (16.5-23.9)	34.0 (29.2-36.7)	167
6–11 years	19.5 (17.9-21.2)	9.90 (8.50-11.6)	21.2 (17.0-23.2)	35.7 (32.0-38.8)	191
12–19 years	22.4 (21.1-23.8)	11.6 (10.2-13.2)	23.2 (21.8-24.1)	41.4 (36.3-44.8)	418
20–39 years	23.8 (22.3-25.5)	12.7 (10.9-14.6)	25.1 (23.5-26.3)	43.5 (40.9-45.2)	608
40–59 years	23.4 (22.0-24.8)	14.0 (12.8-15.1)	24.1 (22.8-25.8)	38.6 (35.6-41.5)	494
60 years and older	23.5 (22.3-24.7)	13.6 (12.4-14.7)	24.5 (23.3-25.6)	38.5 (36.8-39.4)	751
Males					
Total, 1 year and older	25.1 (23.9-26.4)	14.4 (13.3-15.3)	25.9 (24.5-27.1)	43.0 (40.2-45.2)	1305
1–5 years	18.5 (16.4-20.8)	9.10† (6.80-12.3)	20.1 (16.5-23.1)	33.2† (28.8-36.7)	89
6–11 years	19.2 (17.1-21.7)	9.90† (6.10-11.7)	21.6 (17.5-23.4)	32.4† (28.7-36.4)	101
12–19 years	25.3 (22.8-28.0)	13.4 (11.3-14.5)	26.0 (23.0-29.0)	45.2 (38.4-57.1)	213
20–39 years	27.0 (26.2-27.9)	16.4 (14.5-18.0)	26.7 (25.2-28.8)	46.3 (44.1-48.9)	264
40–59 years	26.2 (24.0-28.6)	16.1 (14.1-18.5)	26.2 (24.6-29.2)	40.5 (38.6-43.8)	253
60 years and older	25.3 (24.0-26.7)	14.2 (13.0-15.9)	26.1 (25.0-27.8)	41.9 (39.2-45.4)	385
Females					
Total, 1 year and older	20.9 (20.1-21.7)	11.5 (10.4-12.4)	22.0 (21.1-22.9)	36.6 (34.0-39.2)	1324
1–5 years	19.0 (16.4-21.9)	9.20† (5.10-11.9)	21.1 (15.4-24.5)	34.2† (29.7-41.2)	78
6–11 years	19.8 (16.8-23.4)	10.2† (6.60-12.8)	21.1 (15.3-26.2)	38.4† (34.7-40.6)	90
12–19 years	19.6 (17.4-22.0)	10.1 (9.00-13.6)	19.9 (18.1-22.6)	33.0 (30.7-38.7)	205
20–39 years	21.1 (18.9-23.5)	10.9 (7.80-13.0)	23.0 (19.4-26.3)	39.2 (35.0-42.6)	344
40–59 years	20.8 (19.9-21.7)	12.4 (10.9-13.8)	21.9 (20.4-22.9)	35.6 (31.5-41.0)	241
60 years and older	22.1 (20.8-23.5)	13.1 (11.4-14.8)	22.8 (21.3-24.4)	36.1 (31.8-38.4)	366

† Estimate is subject to greater uncertainty due to small cell size.

Table 3.5.a. Erythrocyte protoporphyrin: Total population

Geometric mean and selected percentiles of red blood cell concentrations (in µg/dL) for the total U.S. population aged 1 year and older, National Health and Nutrition Examination Survey, 1999–2000.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
Males and Females					
Total, 1 year and older	47.6 (46.7-48.6)	33.0 (32.0-33.0)	46.0 (44.0-47.0)	72.0 (70.0-73.0)	7985
1–5 years	47.8 (45.9-49.9)	32.0 (31.0-34.0)	45.0 (42.0-48.0)	69.0 (67.0-72.0)	728
6–11 years	45.2 (42.7-47.8)	31.0 (29.0-34.0)	45.0 (42.0-48.0)	65.0 (60.0-72.0)	905
12–19 years	46.0 (44.5-47.5)	33.0 (31.0-34.0)	45.0 (43.0-46.0)	70.0 (67.0-73.0)	2139
20–39 years	46.7 (45.5-47.9)	31.0 (30.0-32.0)	44.0 (42.0-44.0)	72.0 (69.0-76.0)	1477
40–59 years	48.3 (47.3-49.3)	34.0 (32.0-35.0)	45.0 (44.0-47.0)	71.0 (67.0-75.0)	1217
60 years and older	51.1 (50.1-52.1)	33.0 (32.0-34.0)	48.0 (48.0-50.0)	76.0 (73.0-80.0)	1519
Males					
Total, 1 year and older	42.9 (41.9-44.0)	30.0 (30.0-32.0)	41.0 (40.0-43.0)	59.0 (58.0-61.0)	3926
1–5 years	47.2 (45.0-49.5)	31.0 (30.0-34.0)	46.0 (43.0-49.0)	68.0 (64.0-73.0)	401
6–11 years	44.1 (41.4-47.0)	31.0 (28.0-33.0)	43.0 (41.0-47.0)	61.0 (54.0-72.0)	473
12–19 years	41.6 (40.0-43.2)	30.0 (29.0-32.0)	41.0 (39.0-42.0)	56.0 (53.0-59.0)	1082
20–39 years	40.5 (38.8-42.2)	30.0 (28.0-31.0)	39.0 (37.0-40.0)	58.0 (54.0-61.0)	634
40–59 years	43.1 (42.2-44.2)	32.0 (30.0-33.0)	41.0 (40.0-42.0)	57.0 (55.0-61.0)	578
60 years and older	47.2 (46.3-48.1)	32.0 (32.0-34.0)	45.0 (43.0-46.0)	71.0 (66.0-76.0)	758
Females					
Total, 1 year and older	52.7 (51.5-53.9)	35.0 (34.0-37.0)	49.0 (48.0-51.0)	79.0 (77.0-82.0)	4059
1–5 years	48.6 (45.3-52.2)	34.0 (31.0-36.0)	45.0 (42.0-50.0)	71.0 (66.0-77.0)	327
6–11 years	46.4 (43.5-49.4)	32.0 (30.0-35.0)	46.0 (42.0-48.0)	68.0 (62.0-75.0)	432
12–19 years	51.1 (49.2-53.0)	34.0 (32.0-37.0)	49.0 (47.0-51.0)	76.0 (71.0-81.0)	1057
20–39 years	53.8 (52.5-55.0)	36.0 (36.0-37.0)	49.0 (49.0-51.0)	83.0 (78.0-89.0)	843
40–59 years	53.6 (51.3-56.0)	36.0 (34.0-37.0)	51.0 (48.0-52.0)	83.0 (74.0-93.0)	639
60 years and older	54.4 (52.5-56.5)	37.0 (34.0-38.0)	52.0 (49.0-55.0)	80.0 (75.0-85.0)	761

Table 3.5.b. Erythrocyte protoporphyrin: Mexican Americans

Geometric mean and selected percentiles of red blood cell concentrations (in µg/dL) for Mexican Americans in the U.S. population aged 1 year and older, National Health and Nutrition Examination Survey, 1999–2000.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
Males and Females					
Total, 1 year and older	52.3 (50.8-53.9)	35.0 (33.0-36.0)	49.0 (48.0-51.0)	84.0 (80.0-88.0)	2741
1–5 years	53.6 (50.5-56.9)	38.0 (35.0-40.0)	50.0 (48.0-52.0)	79.0 (71.0-94.0)	283
6–11 years	51.8 (49.6-54.1)	34.0 (33.0-38.0)	49.0 (47.0-53.0)	81.0 (73.0-87.0)	368
12–19 years	53.9 (50.6-57.5)	35.0 (34.0-37.0)	50.0 (48.0-52.0)	89.0 (73.0-116)	942
20–39 years	50.6 (47.7-53.7)	32.0 (32.0-36.0)	47.0 (45.0-51.0)	80.0 (71.0-93.0)	410
40–59 years	53.8 (52.0-55.8)	34.0 (33.0-36.0)	52.0 (48.0-55.0)	88.0 (79.0-94.0)	345
60 years and older	53.1 (50.8-55.4)	34.0 (33.0-37.0)	51.0 (47.0-54.0)	82.0 (77.0-86.0)	393
Males					
Total, 1 year and older	46.6 (45.1-48.1)	31.0 (29.0-33.0)	45.0 (43.0-46.0)	69.0 (66.0-71.0)	1361
1–5 years	55.4 (51.6-59.5)	39.0 (34.0-40.0)	52.0 (47.0-53.0)	84.0 (72.0-120)	156
6–11 years	50.6 (47.6-53.8)	37.0 (33.0-40.0)	48.0 (46.0-53.0)	73.0 (62.0-90.0)	200
12–19 years	47.5 (46.1-48.9)	33.0 (31.0-36.0)	45.0 (43.0-46.0)	70.0 (66.0-74.0)	482
20–39 years	42.7 (40.6-44.8)	31.0 (27.0-34.0)	41.0 (40.0-43.0)	61.0 (54.0-66.0)	172
40–59 years	45.9 (43.8-48.2)	32.0 (29.0-35.0)	44.0 (41.0-47.0)	66.0 (61.0-78.0)	153
60 years and older	47.7 (45.4-50.2)	33.0 (29.0-35.0)	46.0 (41.0-49.0)	73.0 (67.0-86.0)	198
Females					
Total, 1 year and older	59.2 (57.0-61.5)	38.0 (37.0-40.0)	56.0 (54.0-58.0)	96.0 (88.0-108)	1380
1–5 years	51.4 (47.8-55.3)	37.0 (31.0-41.0)	48.0 (45.0-53.0)	71.0 (64.0-88.0)	127
6–11 years	53.2 (50.8-55.7)	34.0 (33.0-38.0)	51.0 (48.0-54.0)	86.0 (73.0-89.0)	168
12–19 years	60.8 (55.0-67.1)	40.0 (38.0-42.0)	57.0 (53.0-61.0)	110 (69.0-127)	460
20–39 years	61.3 (56.1-67.0)	39.0 (36.0-42.0)	58.0 (52.0-63.0)	101 (81.0-138)	238
40–59 years	62.5 (60.3-64.8)	37.0 (34.0-41.0)	60.0 (56.0-64.0)	100 (90.0-119)	192
60 years and older	58.5 (55.6-61.5)	39.0 (36.0-41.0)	56.0 (53.0-59.0)	85.0 (80.0-97.0)	195

Table 3.5.c. Erythrocyte protoporphyrin: Non-Hispanic blacks

Geometric mean and selected percentiles of red blood cell concentrations (in µg/dL) for non-Hispanic blacks in the U.S. population aged 1 year and older, National Health and Nutrition Examination Survey, 1999–2000.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
Males and Females					
Total, 1 year and older	47.4 (45.8-49.1)	31.0 (30.0-33.0)	44.0 (43.0-47.0)	72.0 (69.0-75.0)	1817
1–5 years	45.4 (43.1-47.8)	31.0 (28.0-33.0)	45.0 (42.0-48.0)	61.0 (57.0-68.0)	180
6–11 years	44.9 (42.7-47.2)	30.0 (29.0-31.0)	44.0 (42.0-46.0)	63.0 (58.0-71.0)	270
12–19 years	45.2 (43.0-47.5)	31.0 (28.0-32.0)	42.0 (40.0-44.0)	67.0 (63.0-75.0)	587
20–39 years	48.0 (44.9-51.3)	32.0 (29.0-34.0)	45.0 (40.0-49.0)	76.0 (67.0-84.0)	277
40–59 years	48.3 (46.0-50.7)	32.0 (31.0-34.0)	46.0 (43.0-48.0)	71.0 (62.0-93.0)	255
60 years and older	51.0 (48.2-54.0)	34.0 (32.0-38.0)	48.0 (45.0-51.0)	78.0 (70.0-86.0)	248
Males					
Total, 1 year and older	41.9 (40.1-43.9)	29.0 (28.0-32.0)	41.0 (39.0-43.0)	58.0 (56.0-62.0)	890
1–5 years	45.4 (42.7-48.3)	31.0† (28.0-36.0)	46.0 (39.0-49.0)	61.0† (53.0-68.0)	98
6–11 years	43.4 (41.6-45.3)	30.0 (27.0-32.0)	43.0 (40.0-45.0)	60.0 (56.0-70.0)	134
12–19 years	40.5 (39.0-42.1)	29.0 (28.0-31.0)	39.0 (37.0-40.0)	57.0 (51.0-63.0)	301
20–39 years	39.3 (36.2-42.7)	29.0 (26.0-32.0)	38.0 (34.0-40.0)	54.0 (45.0-67.0)	117
40–59 years	42.7 (40.7-44.8)	30.0 (27.0-32.0)	42.0 (38.0-43.0)	57.0 (52.0-63.0)	123
60 years and older	47.5 (43.9-51.4)	32.0 (26.0-36.0)	46.0 (41.0-50.0)	71.0 (62.0-80.0)	117
Females					
Total, 1 year and older	53.0 (51.1-54.8)	34.0 (33.0-37.0)	50.0 (48.0-53.0)	82.0 (77.0-88.0)	927
1–5 years	45.4 (42.0-49.0)	31.0† (28.0-33.0)	43.0 (39.0-49.0)	68.0† (58.0-79.0)	82
6–11 years	46.5 (42.6-50.8)	30.0 (29.0-33.0)	45.0 (41.0-49.0)	72.0 (62.0-76.0)	136
12–19 years	50.7 (46.2-55.6)	35.0 (32.0-37.0)	46.0 (44.0-50.0)	79.0 (65.0-94.0)	286
20–39 years	56.6 (52.7-60.7)	37.0 (33.0-39.0)	54.0 (51.0-58.0)	82.0 (71.0-104)	160
40–59 years	53.6 (49.4-58.3)	34.0 (31.0-37.0)	53.0 (48.0-56.0)	84.0 (70.0-99.0)	132
60 years and older	53.8 (50.5-57.3)	36.0 (34.0-39.0)	51.0 (46.0-52.0)	82.0 (70.0-105)	131

† Estimate is subject to greater uncertainty due to small cell size.

Table 3.5.d. Erythrocyte protoporphyrin: Non-Hispanic whites

Geometric mean and selected percentiles of red blood cell concentrations (in µg/dL) for non-Hispanic whites in the U.S. population aged 1 year and older, National Health and Nutrition Examination Survey, 1999–2000.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
Males and Females					
Total, 1 year and older	46.3 (45.4-47.3)	31.0 (30.0-32.0)	43.0 (43.0-45.0)	68.0 (66.0-70.0)	2674
1–5 years	45.8 (43.0-48.8)	31.0 (30.0-34.0)	44.0 (40.0-47.0)	67.0 (60.0-72.0)	177
6–11 years	43.3 (39.7-47.2)	31.0 (27.0-34.0)	43.0 (40.0-46.0)	61.0 (53.0-73.0)	192
12–19 years	44.2 (42.1-46.3)	32.0 (29.0-33.0)	44.0 (41.0-45.0)	62.0 (58.0-72.0)	423
20–39 years	45.1 (43.5-46.8)	32.0 (30.0-32.0)	44.0 (42.0-44.0)	69.0 (61.0-73.0)	610
40–59 years	46.7 (45.8-47.6)	34.0 (32.0-35.0)	45.0 (43.0-46.0)	66.0 (63.0-71.0)	502
60 years and older	50.3 (49.5-51.0)	34.0 (32.0-34.0)	48.0 (47.0-50.0)	75.0 (72.0-78.0)	770
Males					
Total, 1 year and older	42.0 (40.8-43.2)	30.0 (30.0-32.0)	41.0 (40.0-42.0)	58.0 (56.0-60.0)	1330
1–5 years	44.1 (41.3-47.0)	31.0† (28.0-33.0)	44.0 (40.0-47.0)	64.0† (55.0-67.0)	95
6–11 years	41.9 (37.8-46.5)	29.0† (26.0-33.0)	41.0 (39.0-45.0)	61.0† (49.0-72.0)	103
12–19 years	40.7 (38.1-43.5)	28.0 (26.0-32.0)	41.0 (37.0-43.0)	54.0 (49.0-59.0)	215
20–39 years	39.1 (37.5-40.9)	29.0 (25.0-30.0)	37.0 (35.0-39.0)	53.0 (49.0-59.0)	265
40–59 years	42.7 (41.3-44.2)	32.0 (28.0-34.0)	41.0 (40.0-43.0)	56.0 (52.0-60.0)	258
60 years and older	46.4 (45.3-47.4)	33.0 (32.0-34.0)	43.0 (42.0-45.0)	67.0 (64.0-74.0)	394
Females					
Total, 1 year and older	51.0 (49.7-52.3)	35.0 (34.0-37.0)	47.0 (46.0-49.0)	75.0 (73.0-80.0)	1344
1–5 years	47.9 (42.0-54.7)	34.0† (31.0-36.0)	42.0 (38.0-49.0)	69.0† (60.0-93.0)	82
6–11 years	45.0 (40.8-49.5)	32.0† (29.0-35.0)	44.0 (39.0-50.0)	60.0† (55.0-77.0)	89
12–19 years	48.4 (46.0-50.9)	33.0 (32.0-37.0)	47.0 (45.0-50.0)	73.0 (67.0-77.0)	208
20–39 years	51.9 (49.2-54.8)	36.0 (34.0-39.0)	48.0 (47.0-49.0)	81.0 (72.0-99.0)	345
40–59 years	51.0 (48.8-53.3)	36.0 (34.0-37.0)	49.0 (45.0-52.0)	74.0 (68.0-83.0)	244
60 years and older	53.7 (51.8-55.7)	36.0 (34.0-39.0)	52.0 (49.0-56.0)	79.0 (73.0-84.0)	376

† Estimate is subject to greater uncertainty due to small cell size.

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