

# Isoflavones & Lignans

## (so-called Phytoestrogens)



Phytoestrogens are naturally occurring polycyclic phenols found in certain plants that may, when ingested and metabolized, have weak estrogenic effects. Two important groups of phytoestrogens are isoflavones and lignans. The isoflavones considered in this report are daidzein, genistein, O-desmethyldangolensin (ODMA), and equol. The lignans considered in this report are enterodiol and enterolactone.

Plant sources of isoflavones include legumes, with the largest contribution coming from soy-based foods. Since soy flour and soy protein isolates may be added to processed meats, meat substitutes, breads, and protein-food bars, these items can be a major source of isoflavones (Grace 2004; Lampe 1999). However, the isoflavone content of soy protein preparations can vary widely and is affected by production techniques (Erdman 2004). Daidzein and genistein are the main soy isoflavones. Kudzu root, used in some dietary supplements, also contains appreciable amounts of daidzein. Naringenin, a precursor to genistein, is found in some citrus fruits. Formononetin and biochanin A are methylated isoflavones found in clovers, which may be used in red clover dietary supplements, and they are metabolized in the body to daidzein and genistein, respectively. Ingested daidzein is further metabolized to ODMA and to equol by intestinal bacteria. Equol, but not ODMA, has estrogenic activity. About 30 percent of adults produce equol and have higher serum equol concentrations after they consume daidzein (Setchell 2003a; Cassidy 2006). This ability to produce equol may be related to an individual's intestinal microflora and influenced by dietary habits (Rowland 2000; Setchell 2006). It is unclear whether the ability to produce equol results in any health-related effects (Vafeiadou 2006).

Lignans include matairesinol and secoisolariciresinol, which are transformed by intestinal bacteria into the estrogenic compounds, enterolactone, and enterodiol, respectively (Cornwell 2004; Rowland 2003). Enterodiol may also convert into enterolactone and vice versa. Lignans are found in flax seeds, whole wheat flour, tea, some fruits, and other cereal grains.

Diet is the source of human exposure to phytoestrogens. The absorption and metabolism of phytoestrogens varies considerably among individuals, which may relate to differences in absorption, enterohepatic circulation, and metabolism by intestinal bacteria. Phytoestrogens are ingested in their naturally occurring *beta*-glycosidic forms. The *beta*-glycosidic forms are hydrolyzed to their aglycones in the intestine, absorbed, and then linked in the intestinal wall and liver with glucuronic acid to make them more water-soluble, a process known as glucuronidation (Doerge 2000; Rowland 2003). The glucuronidated metabolites of isoflavones predominate in blood and urine (Setchell 2001).

Isoflavones are excreted from the body within about 24 hours after ingestion, mainly in urine and, to a lesser extent, in feces (Setchell 2001). Urinary concentrations of daidzein and genistein may not correlate well with the ingested doses, perhaps because of the limited absorption of these isoflavones at higher doses (Setchell 2003b). In contrast, lignan concentrations in plasma and urine concentrations after flax seed consumption increases in a dose-dependent manner (Nesbitt 1999). Equol excretion may depend on diet, the type of intestinal bacteria present, and individual genetic factors (Rowland 2000; Setchell 2002; Setchell 1999).

Generally, phytoestrogens are much less potent than endogenously produced estrogens, but phytoestrogens can be present in much greater quantities (100 to 1000 times the concentration of endogenous estrogens). Additionally, phytoestrogens bind less tightly to steroid-hormone serum-transport proteins than do endogenous estrogens (Nagel 1998). Equol has more potent estrogen activity than its precursor daidzein and has been proposed to be most important in explaining the mechanism of action of isoflavones in disease prevention (Setchell 2002).

In comparison with Western diets, Asian diets typically provide higher intakes of soy-based foods. Some have suggested that the higher isoflavone intake in Asian diets may account for the lower incidence among Asians of menopause-related symptoms and for other associated beneficial health outcomes, such as reduced risk for breast, prostate, and colon cancer; cardiovascular health; and modulation of osteoporosis. A recent evidence report from the Agency for Healthcare Research and Quality (Balk 2005) about the effects of soy on health outcomes reported that there is no conclusive evidence of a dose-response effect of either soy protein or isoflavone on cardiovascular diseases, menopausal symptoms, endocrine function, cancer, bone health, reproductive health, kidney diseases, cognitive function, or glucose metabolism. For reducing low-density lipoprotein concentrations, however, soy protein could possibly have a dose-response effect.

Adverse effects on fertility have been observed in animals that graze on red clover. Results of chronic feeding studies in pregnant animals suggest that high doses of

phytoestrogens alter the fetal hormonal environment (Cornwell 2004). Infants who consume soy-based formula can have plasma concentrations of isoflavones that are 13,000–22,000 times higher than concentrations of endogenous estrogen in infants (Setchell 1997). Yet, studies of children who had been fed soy-based formula as infants and who were followed through adolescence (Klein 1998) and young adulthood (Strom 2001) found no adverse reproductive or endocrine effects. In vitro and animal studies also suggest that soy isoflavones may have immunologic and thyroid effects (Doerge 2002). The Center for the Evaluation of Risks to Human Reproduction of the National Toxicology Program reviewed the developmental and reproductive toxicity of both soy formula and genistein and concluded that available data were inadequate to determine the effects of soy formula on developmental or reproductive toxicity (Rozman 2006a). The expert review panel expressed negligible concern for adverse effects in the general population of consuming dietary sources of genistein: under current exposure conditions, adults would be unlikely to consume sufficient daily levels of genistein to cause adverse reproductive and/or developmental effects (Rozman 2006b).

For more information about soy isoflavones, see the fact sheet from the National Institutes of Health, Office of Dietary Supplements ([http://ods.od.nih.gov/Health\\_Information/Information\\_About\\_Individual\\_Dietary\\_Supplements.aspx](http://ods.od.nih.gov/Health_Information/Information_About_Individual_Dietary_Supplements.aspx)).

Phytoestrogens have been measured in NHANES since 1999. In NHANES 1999–2000, CDC scientists detected enterolactone in the highest concentration, and daidzein was detected with the highest frequency among the six measured phytoestrogens (Valentin-Blasini 2005). CDC's Third National Report on Human Exposure to Environmental Chemicals has presented geometric means and selected percentiles (50th, 75th, 90th, and 95th) for concentrations of phytoestrogens by age, sex, and race/ethnicity for participants in NHANES 1999–2000 and 2001–2002 (U.S. Centers for Disease Control and Prevention 2005).



Chemist verifies sample for phytoestrogen analysis.

## Selected Observations and Highlights

The following example observations are taken from the uncorrected tables of 1999–2002 data 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 (i.e., age, sex, race/ethnicity) or other determinants of these urine concentrations (i.e., 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

- Urinary isoflavone (genistein, daidzein, equol, and ODMA) concentrations are generally lower in adults than they are in children and adolescents, whereas urinary lignan concentrations either do not differ by age (enterodiols) or show a U-shaped age pattern (enterolactone).
- Males and females have similar phytoestrogen concentrations.
- Non-Hispanic whites have higher equol concentrations than non-Hispanic blacks and Mexican Americans. Mexican Americans have lower ODMA concentrations than non-Hispanic blacks and non-Hispanic whites.

### Highlights

Urinary isoflavone and lignan concentrations show only small variations by demographic variables such as age, sex, or race/ethnicity.



### Table 5.1.a. Urinary genistein: Total population

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the total U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
<b>Males and Females</b>					
Total, 6 years and older	28.5 (25.5-31.8)	3.27 (2.70-4.17)	28.4 (25.7-30.7)	293 (253-330)	5351
6–11 years	33.8 (29.3-39.1)	5.80 (4.20-7.05)	31.8 (25.2-37.3)	248 (197-328)	727
12–19 years	38.0 (32.2-44.7)	5.60 (4.00-8.20)	34.8 (29.0-41.4)	314 (249-365)	1498
20–39 years	31.3 (26.5-37.0)	3.10 (2.40-4.80)	29.0 (25.8-34.3)	349 (269-437)	1140
40–59 years	23.7 (19.1-29.3)	2.22 (1.90-3.40)	24.4 (21.3-29.4)	298 (202-402)	951
60 years and older	24.1 (20.8-28.0)	2.90 (2.20-3.95)	24.2 (20.3-29.8)	227 (155-308)	1035
<b>Males</b>					
Total, 6 years and older	31.1 (26.8-36.2)	3.86 (3.10-5.20)	30.3 (27.6-34.0)	298 (235-341)	2597
6–11 years	34.6 (27.6-43.3)	5.36 (3.30-7.04)	35.2 (24.3-51.0)	218 (146-348)	368
12–19 years	36.3 (28.1-46.8)	6.21 (2.62-10.6)	31.0 (25.6-41.4)	299 (204-363)	736
20–39 years	33.5 (26.5-42.3)	3.16 (2.30-5.39)	30.7 (26.8-35.9)	385 (245-522)	500
40–59 years	26.5 (19.7-35.6)	3.35 (1.32-5.60)	28.4 (20.1-35.7)	281 (195-383)	480
60 years and older	29.8 (24.4-36.6)	4.17 (3.10-5.73)	31.1 (23.7-36.6)	233 (141-335)	513
<b>Females</b>					
Total, 6 years and older	26.1 (23.7-28.8)	2.85 (2.22-3.83)	25.6 (23.5-28.4)	285 (242-353)	2754
6–11 years	33.1 (26.2-41.9)	5.50 (3.75-7.84)	27.0 (21.8-36.1)	272 (197-426)	359
12–19 years	39.8 (34.0-46.7)	5.52 (4.00-8.40)	36.8 (31.3-46.3)	321 (247-445)	762
20–39 years	29.3 (24.0-35.8)	2.99 (1.95-4.86)	27.6 (22.5-36.3)	312 (217-461)	640
40–59 years	21.2 (17.3-26.1)	1.60 (<LOD-3.00)	22.8 (18.7-26.0)	327 (194-495)	471
60 years and older	20.5 (17.3-24.3)	2.50 (1.26-3.51)	20.3 (16.4-25.3)	190 (129-290)	522

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

### Table 5.1.b. Urinary genistein: Mexican Americans

Geometric mean and selected percentiles of urine concentrations (in µg/L) for Mexican Americans in the U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
<b>Males and Females</b>					
Total, 6 years and older	29.7 (25.4-34.8)	4.07 (3.40-4.60)	27.4 (23.5-32.5)	294 (216-328)	1498
6–11 years	37.5 (26.3-53.4)	3.78 (1.64-6.00)	42.6 (22.7-63.5)	432 (220-671)	226
12–19 years	32.4 (26.6-39.4)	3.80 (2.50-5.40)	34.2 (27.7-41.1)	314 (216-367)	543
20–39 years	30.7 (22.8-41.3)	4.50 (3.40-5.70)	25.8 (18.5-37.5)	302 (201-427)	301
40–59 years	24.8 (19.7-31.1)	3.60 (2.08-5.62)	25.7 (18.5-34.4)	168 (106-286)	221
60 years and older	20.3 (16.5-25.0)	2.48 (1.06-4.07)	19.0 (13.7-31.1)	190 (113-489)	207
<b>Males</b>					
Total, 6 years and older	33.6 (26.0-43.4)	4.28 (3.10-5.40)	31.6 (24.1-45.0)	324 (294-432)	724
6–11 years	37.7 (23.6-60.3)	3.30 (1.40-7.80)	42.8 (22.4-63.5)	341 (172-830)	117
12–19 years	34.0 (26.5-43.7)	3.67 (2.09-5.70)	39.7 (26.4-54.2)	324 (216-373)	276
20–39 years	37.3 (23.9-58.2)	4.50 (2.70-7.05)	32.3 (19.1-72.9)	406 (244-514)	127
40–59 years	28.7 (20.9-39.4)	4.40† (2.80-8.30)	29.0 (19.5-38.9)	205† (97.3-540)	105
60 years and older	19.1 (12.5-29.4)	2.48† (<LOD-6.30)	16.9 (11.2-31.1)	125† (57.0-614)	99
<b>Females</b>					
Total, 6 years and older	26.0 (23.0-29.4)	3.80 (3.18-4.38)	24.4 (20.7-26.9)	220 (193-309)	774
6–11 years	37.2 (23.9-57.8)	4.60† (<LOD-7.20)	27.4 (19.3-84.7)	523† (220-813)	109
12–19 years	30.6 (23.4-40.1)	3.94 (2.00-6.11)	30.2 (25.0-38.1)	267 (166-492)	267
20–39 years	24.3 (19.0-31.2)	4.32 (3.18-6.30)	20.0 (14.6-26.9)	215 (125-349)	174
40–59 years	21.3 (15.8-28.6)	2.95 (<LOD-5.62)	24.2 (17.0-34.4)	146 (87.3-286)	116
60 years and older	21.4 (14.9-30.6)	1.90† (<LOD-3.80)	23.5 (10.9-38.9)	213† (128-489)	108

< 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 5.1.c. Urinary genistein: Non-Hispanic blacks

Geometric mean and selected percentiles of urine concentrations (in µg/L) for non-Hispanic blacks in the U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
<b>Males and Females</b>					
Total, 6 years and older	31.5 (25.2-39.3)	3.73 (2.40-5.00)	33.2 (26.8-41.5)	328 (237-393)	1289
6–11 years	42.3 (32.8-54.4)	4.70 (3.50-6.90)	43.7 (32.4-58.0)	417 (272-600)	249
12–19 years	46.7 (37.7-57.9)	7.20 (5.84-10.0)	39.5 (34.4-48.0)	378 (306-467)	451
20–39 years	31.7 (22.9-43.8)	3.70 (1.60-6.30)	34.9 (25.4-49.1)	301 (164-474)	197
40–59 years	24.3 (16.3-36.4)	1.90 (<LOD-5.20)	27.9 (18.5-39.7)	246 (114-402)	210
60 years and older	24.6 (16.8-36.0)	2.79 (1.20-5.40)	23.7 (15.4-34.7)	228 (137-641)	182
<b>Males</b>					
Total, 6 years and older	33.5 (24.7-45.6)	4.60 (2.30-7.21)	36.9 (28.8-49.1)	257 (178-388)	628
6–11 years	45.0 (31.5-64.5)	4.96 (3.33-7.05)	49.6 (34.6-73.9)	387 (205-687)	127
12–19 years	45.8 (36.6-57.4)	7.00 (4.72-10.2)	43.0 (34.6-56.7)	334 (227-445)	212
20–39 years	30.2 (18.1-50.6)	3.80† (<LOD-8.30)	41.5 (24.0-57.2)	252† (104-513)	91
40–59 years	26.7 (16.3-44.0)	3.70† (<LOD-10.0)	30.1 (16.6-50.4)	178† (87.4-367)	109
60 years and older	33.2 (18.3-60.1)	4.70† (<LOD-7.96)	30.3 (15.9-58.6)	276† (108-1120)	89
<b>Females</b>					
Total, 6 years and older	29.8 (24.0-37.1)	3.00 (2.10-4.40)	30.3 (23.3-38.2)	363 (245-472)	661
6–11 years	39.4 (29.0-53.6)	4.74 (1.70-9.70)	34.5 (24.7-50.8)	432 (203-600)	122
12–19 years	47.7 (35.9-63.4)	7.54 (5.90-11.2)	37.4 (29.6-47.6)	394 (233-717)	239
20–39 years	32.8 (22.5-47.8)	2.99† (<LOD-8.40)	34.4 (21.0-50.7)	346† (161-577)	106
40–59 years	22.4 (14.0-35.9)	1.50† (<LOD-4.40)	23.3 (17.1-38.6)	285† (106-495)	101
60 years and older	20.2 (13.1-31.1)	2.30† (<LOD-5.42)	17.4 (10.6-33.3)	228† (105-641)	93

< 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 5.1.d. Urinary genistein: Non-Hispanic whites

Geometric mean and selected percentiles of urine concentrations (in µg/L) for non-Hispanic whites in the U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
<b>Males and Females</b>					
Total, 6 years and older	27.1 (24.2-30.4)	2.96 (2.40-3.91)	26.5 (23.9-29.5)	281 (238-330)	2112
6–11 years	31.3 (25.2-38.9)	6.40 (4.20-8.15)	28.4 (22.4-37.3)	217 (155-272)	196
12–19 years	36.4 (29.3-45.3)	5.10 (3.30-9.70)	33.3 (27.9-41.0)	257 (209-331)	375
20–39 years	30.5 (24.0-38.7)	2.80 (1.92-4.86)	27.9 (23.7-34.0)	387 (254-537)	529
40–59 years	23.9 (18.6-30.6)	2.14 (<LOD-3.40)	24.3 (19.7-29.5)	335 (214-466)	434
60 years and older	22.2 (19.0-26.0)	2.74 (1.71-3.98)	22.5 (18.7-27.9)	182 (129-282)	578
<b>Males</b>					
Total, 6 years and older	30.6 (26.1-35.9)	3.90 (2.80-5.60)	29.5 (26.5-33.1)	293 (226-371)	1038
6–11 years	31.0 (22.9-42.0)	6.20† (3.10-8.15)	32.9 (20.6-48.3)	190† (104-257)	101
12–19 years	33.2 (22.9-48.1)	5.09 (2.20-11.5)	28.3 (22.8-38.8)	238 (141-371)	190
20–39 years	32.2 (23.7-43.8)	2.90 (1.90-5.91)	27.9 (23.7-34.3)	413 (229-734)	231
40–59 years	29.1 (21.7-39.1)	3.42 (1.32-5.85)	28.7 (21.7-38.7)	298 (195-447)	225
60 years and older	28.9 (23.0-36.4)	4.17 (3.10-6.00)	29.8 (21.9-36.7)	229 (129-335)	291
<b>Females</b>					
Total, 6 years and older	24.1 (21.6-27.0)	2.59 (1.50-3.20)	23.7 (20.9-26.1)	268 (226-353)	1074
6–11 years	31.7 (21.7-46.3)	6.89† (3.51-10.2)	26.7 (17.3-37.9)	256† (131-500)	95
12–19 years	40.4 (33.6-48.6)	5.10 (3.51-9.13)	37.8 (29.0-53.2)	305 (212-446)	185
20–39 years	28.9 (21.6-38.8)	2.59 (1.40-4.90)	27.0 (18.7-39.0)	330 (206-626)	298
40–59 years	19.6 (14.5-26.6)	.960 (<LOD-2.87)	18.7 (14.3-24.9)	355 (174-627)	209
60 years and older	18.1 (14.8-22.1)	2.20 (1.00-3.75)	18.4 (14.1-24.3)	136 (118-202)	287

< 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 5.1.e. Urinary genistein: Total population (creatinine corrected)**

Geometric mean and selected percentiles of urine concentrations (in µg/g creatinine) for the total U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
<b>Males and Females</b>					
Total, 6 years and older	26.6 (23.7-29.8)	3.78 (3.08-4.46)	24.8 (22.5-27.6)	242 (209-274)	5351
6–11 years	36.7 (31.1-43.4)	6.94 (5.22-8.13)	34.9 (27.6-41.3)	243 (186-292)	727
12–19 years	27.5 (23.3-32.4)	4.36 (3.68-5.09)	24.4 (20.9-30.8)	192 (153-258)	1498
20–39 years	25.1 (21.5-29.2)	3.77 (2.96-4.59)	22.8 (19.1-26.3)	244 (202-318)	1140
40–59 years	23.8 (19.3-29.3)	2.48 (1.17-4.08)	22.3 (18.5-28.7)	270 (196-335)	951
60 years and older	28.9 (25.4-33.0)	4.48 (3.17-5.31)	26.6 (22.4-32.3)	222 (175-285)	1035
<b>Males</b>					
Total, 6 years and older	25.0 (21.4-29.3)	4.02 (3.25-4.74)	23.0 (19.8-26.8)	203 (177-265)	2597
6–11 years	36.5 (28.4-46.8)	6.65 (4.52-8.13)	35.4 (27.1-50.3)	200 (154-286)	368
12–19 years	25.8 (20.4-32.5)	4.23 (3.54-5.09)	22.2 (18.6-31.7)	164 (115-264)	736
20–39 years	23.3 (18.4-29.4)	4.01 (1.99-5.04)	19.0 (15.6-24.7)	227 (170-330)	500
40–59 years	22.0 (16.1-30.0)	3.21 (1.36-4.87)	21.0 (16.1-30.9)	222 (167-334)	480
60 years and older	28.0 (23.6-33.2)	4.74 (3.44-6.19)	27.1 (22.2-33.1)	177 (143-324)	513
<b>Females</b>					
Total, 6 years and older	28.1 (25.3-31.3)	3.50 (2.95-4.23)	26.6 (23.8-29.7)	265 (230-308)	2754
6–11 years	37.0 (28.2-48.6)	7.69 (4.92-9.64)	30.9 (21.9-47.9)	255 (182-488)	359
12–19 years	29.3 (24.9-34.6)	4.65 (3.09-6.00)	28.2 (23.2-33.2)	216 (162-304)	762
20–39 years	27.0 (22.4-32.5)	3.32 (3.01-4.41)	25.8 (21.1-30.3)	265 (192-349)	640
40–59 years	25.6 (21.2-30.8)	2.23 (<LOD-3.81)	24.7 (17.6-36.0)	287 (230-381)	471
60 years and older	29.7 (24.8-35.5)	4.27 (2.52-5.68)	26.6 (21.6-35.0)	252 (191-319)	522

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

**Table 5.1.f. Urinary genistein: Mexican Americans (creatinine corrected)**

Geometric mean and selected percentiles of urine concentrations (in µg/g creatinine) for Mexican Americans in the U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
<b>Males and Females</b>					
Total, 6 years and older	27.6 (24.1-31.6)	3.85 (3.35-4.65)	24.5 (19.7-30.0)	243 (208-279)	1498
6–11 years	48.0 (37.4-61.6)	5.98 (3.95-8.12)	42.4 (31.7-62.9)	601 (317-717)	226
12–19 years	25.5 (21.4-30.4)	3.42 (2.96-4.23)	24.6 (19.7-31.7)	188 (165-254)	543
20–39 years	25.3 (19.5-32.9)	3.79 (3.16-5.11)	19.1 (14.8-32.6)	215 (181-257)	301
40–59 years	24.8 (19.9-31.0)	4.01 (2.88-5.44)	25.6 (18.6-32.8)	176 (124-279)	221
60 years and older	23.4 (18.4-29.6)	3.49 (1.13-5.08)	22.1 (15.8-35.0)	216 (142-329)	207
<b>Males</b>					
Total, 6 years and older	27.7 (22.5-34.1)	4.01 (3.10-5.17)	25.7 (18.7-34.9)	228 (190-285)	724
6–11 years	45.3 (30.6-66.9)	4.29 (2.85-9.69)	40.7 (29.1-66.8)	627 (206-776)	117
12–19 years	25.6 (20.3-32.3)	3.62 (2.22-4.66)	24.7 (18.3-40.4)	185 (165-270)	276
20–39 years	27.5 (18.7-40.3)	3.99 (2.72-5.71)	19.8 (13.5-41.2)	226 (180-323)	127
40–59 years	24.1 (17.7-32.8)	4.91† (3.21-6.44)	25.6 (14.8-34.3)	159† (96.9-335)	105
60 years and older	18.0 (12.2-26.6)	3.05† (<LOD-5.74)	18.5 (10.8-32.4)	135† (50.5-292)	99
<b>Females</b>					
Total, 6 years and older	27.5 (24.0-31.4)	3.72 (3.27-4.42)	23.8 (19.2-26.2)	253 (195-324)	774
6–11 years	51.0 (37.5-69.4)	7.40† (<LOD-9.57)	44.0 (25.1-94.3)	537† (253-926)	109
12–19 years	25.5 (19.4-33.4)	3.42 (2.71-4.65)	24.5 (16.1-36.3)	195 (131-313)	267
20–39 years	23.0 (18.2-29.1)	3.60 (3.20-4.61)	16.8 (13.8-25.5)	205 (119-325)	174
40–59 years	25.6 (19.8-33.2)	3.17 (<LOD-5.96)	24.4 (17.5-33.6)	219 (121-324)	116
60 years and older	29.0 (19.9-42.2)	3.50† (<LOD-11.2)	27.9 (14.7-59.2)	237† (142-408)	108

< LOD means less than the limit of detection for the uncorrected urine value, 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 5.1.g. Urinary genistein: Non-Hispanic blacks (creatinine corrected)**

Geometric mean and selected percentiles of urine concentrations (in µg/g creatinine) for non-Hispanic blacks in the U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
<b>Males and Females</b>					
Total, 6 years and older	21.2 (17.0-26.4)	3.24 (2.52-4.26)	21.1 (17.2-26.1)	192 (154-239)	1289
6–11 years	39.5 (31.0-50.4)	5.59 (3.92-9.81)	38.5 (28.9-51.2)	279 (203-409)	249
12–19 years	26.2 (21.4-32.1)	4.25 (3.54-5.18)	24.9 (20.0-30.8)	224 (138-351)	451
20–39 years	18.0 (12.8-25.3)	2.82 (3.44-4.26)	19.0 (13.4-25.6)	186 (95.1-281)	197
40–59 years	16.4 (11.4-23.7)	2.56 (<LOD-4.68)	16.4 (11.5-23.7)	152 (101-217)	210
60 years and older	23.1 (17.0-31.5)	4.13 (2.22-5.31)	20.9 (14.9-30.9)	178 (106-384)	182
<b>Males</b>					
Total, 6 years and older	20.3 (15.1-27.3)	3.24 (1.99-4.68)	20.7 (16.4-28.5)	162 (109-222)	628
6–11 years	41.8 (29.2-59.7)	5.47 (3.10-12.9)	41.3 (28.5-71.2)	274 (165-450)	127
12–19 years	25.0 (20.1-31.0)	3.12 (1.84-5.01)	26.1 (20.0-34.8)	176 (114-260)	212
20–39 years	14.7 (8.72-24.7)	2.82† (<LOD-5.12)	17.2 (10.1-25.6)	103† (53.9-191)	91
40–59 years	16.3 (10.0-26.5)	2.56† (<LOD-5.14)	18.7 (10.4-30.4)	112† (49.6-236)	109
60 years and older	24.7 (14.3-42.4)	4.86† (<LOD-7.14)	20.4 (14.7-32.8)	322† (74.5-783)	89
<b>Females</b>					
Total, 6 years and older	22.1 (17.9-27.1)	3.33 (2.58-4.15)	21.6 (16.5-26.9)	224 (159-317)	661
6–11 years	37.3 (28.2-49.4)	5.59 (2.77-9.59)	31.6 (21.3-54.0)	344 (185-462)	122
12–19 years	27.6 (21.0-36.2)	5.14 (4.13-6.43)	22.9 (16.6-32.3)	261 (130-460)	239
20–39 years	21.2 (14.5-31.1)	3.01† (<LOD-5.56)	23.3 (13.5-30.3)	247† (140-415)	106
40–59 years	16.5 (10.9-25.0)	2.22† (<LOD-4.89)	14.3 (10.6-25.0)	154† (109-247)	101
60 years and older	22.1 (15.5-31.6)	3.95† (<LOD-5.45)	20.0 (13.1-33.8)	178† (90.2-446)	93
< LOD means less than the limit of detection for the uncorrected urine value, 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 5.1.h. Urinary genistein: Non-Hispanic whites (creatinine corrected)**

Geometric mean and selected percentiles of urine concentrations (in µg/g creatinine) for non-Hispanic whites in the U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
<b>Males and Females</b>					
Total, 6 years and older	27.0 (24.1-30.2)	3.80 (2.98-4.66)	25.6 (22.7-28.8)	242 (207-284)	2112
6–11 years	34.0 (26.7-43.3)	7.20 (4.92-10.4)	31.7 (23.3-40.8)	186 (145-279)	196
12–19 years	27.6 (22.0-34.7)	4.76 (2.77-6.72)	24.1 (20.6-33.0)	166 (130-232)	375
20–39 years	26.6 (21.7-32.5)	3.89 (2.96-4.86)	24.4 (17.5-31.5)	268 (208-348)	529
40–59 years	25.0 (19.6-31.9)	2.47 (<LOD-4.07)	24.2 (18.1-33.2)	287 (204-367)	434
60 years and older	27.7 (24.4-31.4)	4.63 (2.98-6.09)	26.0 (21.9-32.0)	185 (150-274)	578
<b>Males</b>					
Total, 6 years and older	25.9 (22.1-30.4)	4.35 (3.66-5.13)	24.6 (20.6-29.3)	196 (169-284)	1038
6–11 years	34.1 (24.7-47.1)	6.08† (2.28-11.9)	35.3 (18.9-60.1)	168† (115-279)	101
12–19 years	25.2 (17.9-35.5)	4.35 (2.76-6.73)	21.0 (17.0-29.6)	124 (95.4-264)	190
20–39 years	24.5 (18.3-32.7)	4.48 (1.42-5.71)	19.5 (14.8-28.4)	246 (170-365)	231
40–59 years	24.5 (17.9-33.5)	3.32 (1.55-5.13)	22.0 (16.3-35.8)	271 (167-379)	225
60 years and older	27.6 (23.4-32.7)	4.85 (3.73-6.59)	26.8 (20.5-34.3)	170 (111-285)	291
<b>Females</b>					
Total, 6 years and older	28.1 (25.0-31.6)	3.16 (2.45-4.27)	26.6 (22.5-31.3)	274 (230-323)	1074
6–11 years	33.9 (22.4-51.4)	7.69† (4.25-11.6)	27.6 (17.4-41.1)	200† (140-571)	95
12–19 years	30.5 (24.3-38.4)	4.74 (2.59-7.08)	29.8 (21.7-40.1)	203 (141-304)	185
20–39 years	28.8 (22.6-36.7)	3.20 (2.63-4.86)	27.0 (19.6-37.3)	283 (206-357)	298
40–59 years	25.5 (19.2-34.0)	1.62 (<LOD-4.07)	24.2 (15.6-40.4)	323 (220-480)	209
60 years and older	27.8 (22.5-34.2)	4.27 (2.00-6.44)	25.9 (19.9-35.0)	222 (155-319)	287
< LOD means less than the limit of detection for the uncorrected urine value, 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 5.2.a. Urinary daidzein: Total population

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the total U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
<b>Males and Females</b>					
Total, 6 years and older	61.0 (55.2-67.3)	6.75 (5.68-8.00)	59.2 (54.0-66.6)	545 (491-642)	5347
6–11 years	88.1 (78.0-99.4)	15.6 (13.0-19.7)	80.2 (68.2-108)	544 (446-726)	726
12–19 years	89.7 (73.2-110)	10.9 (7.50-16.5)	87.5 (74.3-103)	786 (569-1090)	1497
20–39 years	63.7 (55.6-73.1)	6.59 (5.20-8.10)	57.3 (49.9-70.6)	590 (494-781)	1138
40–59 years	52.3 (43.4-63.1)	5.62 (2.90-7.81)	53.9 (44.2-63.0)	505 (397-725)	951
60 years and older	44.8 (38.9-51.6)	4.80 (2.00-6.70)	44.6 (38.7-54.2)	394 (300-519)	1035
<b>Males</b>					
Total, 6 years and older	64.8 (57.2-73.4)	7.29 (5.62-9.40)	63.0 (57.2-70.9)	542 (470-694)	2595
6–11 years	95.6 (77.5-118)	19.1 (14.4-20.3)	83.6 (56.3-139)	544 (443-745)	368
12–19 years	87.4 (65.2-117)	12.0 (6.72-18.7)	87.5 (71.0-118)	660 (445-1100)	735
20–39 years	64.4 (53.6-77.3)	6.50 (4.00-11.4)	57.0 (48.2-69.8)	663 (494-935)	499
40–59 years	54.8 (43.2-69.4)	5.70 (3.50-7.81)	58.1 (49.5-68.4)	467 (332-774)	480
60 years and older	54.2 (44.6-65.9)	4.89 (2.60-8.70)	57.9 (43.3-78.7)	414 (300-576)	513
<b>Females</b>					
Total, 6 years and older	57.5 (51.9-63.7)	6.41 (5.00-8.00)	56.0 (49.3-62.0)	553 (459-702)	2752
6–11 years	80.7 (66.0-98.8)	13.7 (11.3-19.7)	76.6 (62.3-106)	524 (390-989)	358
12–19 years	92.1 (75.4-112)	10.4 (6.10-16.5)	89.7 (70.2-115)	922 (642-1330)	762
20–39 years	63.1 (51.3-77.7)	7.18 (4.70-8.40)	58.1 (48.2-79.2)	517 (411-987)	639
40–59 years	50.2 (40.5-62.1)	4.40 (1.86-8.22)	46.1 (37.8-61.0)	591 (364-1220)	471
60 years and older	38.7 (32.8-45.7)	4.40 (1.80-6.97)	37.4 (32.0-43.6)	356 (280-461)	522

### Table 5.2.b. Urinary daidzein: Mexican Americans

Geometric mean and selected percentiles of urine concentrations (in µg/L) for Mexican Americans in the U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
<b>Males and Females</b>					
Total, 6 years and older	55.9 (45.6-68.6)	5.10 (2.41-6.76)	52.5 (43.8-67.4)	618 (513-824)	1495
6–11 years	81.7 (56.7-118)	10.2 (4.39-14.0)	74.5 (43.4-123)	866 (534-1240)	225
12–19 years	71.6 (61.0-84.1)	8.50 (6.30-11.4)	74.6 (56.5-98.5)	595 (475-915)	543
20–39 years	51.9 (36.3-74.2)	3.50 (<LOD-6.82)	47.1 (29.7-68.6)	585 (406-931)	299
40–59 years	46.8 (35.3-62.2)	3.20 (<LOD-6.90)	53.9 (35.8-71.4)	584 (297-980)	221
60 years and older	35.1 (24.7-49.8)	1.96 (<LOD-7.99)	36.3 (27.1-47.3)	366 (182-635)	207
<b>Males</b>					
Total, 6 years and older	62.7 (45.6-86.2)	5.20 (1.80-8.41)	62.9 (45.8-85.0)	745 (515-994)	723
6–11 years	91.4 (61.1-137)	12.7 (4.37-26.6)	84.3 (50.0-123)	896 (505-1240)	117
12–19 years	74.9 (57.6-97.4)	7.50 (4.33-11.7)	81.0 (55.8-117)	664 (498-1100)	276
20–39 years	61.9 (37.0-104)	2.40 (<LOD-9.60)	57.6 (30.1-108)	706 (446-1070)	126
40–59 years	52.5 (33.6-82.1)	5.03† (<LOD-11.2)	56.0 (33.5-92.5)	872† (331-1090)	105
60 years and older	29.1 (16.5-51.3)	< LOD†	31.6 (18.2-47.3)	284† (106-659)	99
<b>Females</b>					
Total, 6 years and older	49.4 (41.1-59.4)	5.40 (1.70-7.52)	45.9 (35.7-54.0)	522 (388-682)	772
6–11 years	72.8 (43.9-121)	6.59† (<LOD-12.5)	60.6 (29.5-195)	824† (514-1420)	108
12–19 years	68.1 (57.5-80.8)	9.70 (6.30-11.8)	69.0 (48.5-93.2)	541 (299-1440)	267
20–39 years	42.2 (28.9-61.6)	4.30 (<LOD-10.7)	35.4 (26.3-51.4)	450 (324-669)	173
40–59 years	41.5 (28.4-60.6)	< LOD	50.1 (26.2-71.4)	302 (213-800)	116
60 years and older	41.0 (25.7-65.5)	2.70† (<LOD-11.2)	37.4 (22.8-76.8)	370† (170-804)	108

< 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 5.2.c. Urinary daidzein: Non-Hispanic blacks

Geometric mean and selected percentiles of urine concentrations (in µg/L) for non-Hispanic blacks in the U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
<b>Males and Females</b>					
Total, 6 years and older	76.1 (62.0-93.4)	8.10 (5.45-11.1)	88.4 (68.8-106)	628 (491-906)	1288
6–11 years	120 (95.7-151)	12.5 (8.61-17.9)	135 (99.1-172)	1130 (628-1850)	249
12–19 years	119 (98.9-144)	15.1 (10.6-20.4)	118 (98.1-148)	950 (660-1370)	450
20–39 years	77.7 (56.4-107)	9.50 (3.00-12.2)	91.3 (58.1-149)	578 (363-1330)	197
40–59 years	58.7 (40.0-86.2)	6.05 (<LOD-12.1)	66.1 (41.5-96.3)	529 (393-816)	210
60 years and older	45.2 (29.3-69.9)	1.90 (<LOD-6.60)	44.7 (26.5-70.9)	556 (377-1140)	182
<b>Males</b>					
Total, 6 years and older	78.3 (56.9-108)	8.98 (<LOD-14.2)	90.4 (65.6-122)	632 (489-1040)	627
6–11 years	142 (104-194)	16.4 (11.3-24.2)	161 (94.9-244)	1360 (597-1850)	127
12–19 years	123 (101-150)	14.9 (10.5-21.1)	142 (104-183)	1030 (650-1320)	211
20–39 years	74.4 (45.4-122)	8.45† (<LOD-15.0)	86.4 (42.6-198)	582† (305-1340)	91
40–59 years	52.3 (29.5-92.9)	5.80† (<LOD-16.4)	65.5 (31.2-117)	358† (233-594)	109
60 years and older	55.7 (28.3-110)	< LOD†	58.1 (31.0-104)	519† (377-1960)	89
<b>Females</b>					
Total, 6 years and older	74.2 (61.5-89.6)	7.70 (3.61-11.3)	85.9 (66.6-103)	611 (473-856)	661
6–11 years	100 (70.3-144)	10.0 (<LOD-26.2)	107 (79.6-152)	1130 (467-2300)	122
12–19 years	115 (88.3-151)	15.2 (6.80-24.8)	106 (85.2-129)	805 (545-1840)	239
20–39 years	80.4 (57.7-112)	9.50† (2.80-14.3)	98.0 (58.7-155)	465† (331-1400)	106
40–59 years	64.8 (44.8-93.5)	5.70† (<LOD-13.6)	68.8 (37.7-101)	541† (393-1170)	101
60 years and older	39.4 (23.9-64.8)	2.30† (<LOD-5.45)	33.9 (21.6-61.6)	560† (267-1140)	93

< 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 5.2.d. Urinary daidzein: Non-Hispanic whites

Geometric mean and selected percentiles of urine concentrations (in µg/L) for non-Hispanic whites in the U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
<b>Males and Females</b>					
Total, 6 years and older	58.4 (53.0-64.3)	6.60 (5.33-8.10)	56.2 (51.5-61.0)	505 (439-636)	2112
6–11 years	83.8 (69.3-101)	16.5 (13.0-20.3)	76.6 (58.9-112)	443 (385-694)	196
12–19 years	84.2 (62.7-113)	9.60 (4.93-16.9)	85.3 (68.3-119)	755 (493-1310)	375
20–39 years	62.0 (52.1-73.8)	6.59 (4.00-9.20)	52.1 (44.3-65.5)	601 (437-987)	529
40–59 years	54.7 (44.4-67.5)	5.70 (3.16-8.00)	54.8 (44.8-62.3)	508 (393-852)	434
60 years and older	41.5 (35.3-48.9)	5.00 (2.00-7.70)	41.7 (36.9-50.6)	337 (235-416)	578
<b>Males</b>					
Total, 6 years and older	63.4 (55.9-71.9)	7.77 (5.80-10.1)	59.0 (53.2-69.8)	505 (418-667)	1038
6–11 years	86.4 (62.7-119)	20.2† (13.0-26.6)	77.7 (43.8-155)	470† (317-694)	101
12–19 years	79.2 (50.9-123)	11.1 (3.70-19.2)	76.9 (53.0-121)	586 (354-1300)	190
20–39 years	59.7 (48.0-74.3)	5.30 (2.00-12.0)	48.9 (37.3-66.9)	663 (362-1410)	231
40–59 years	62.4 (50.6-76.9)	6.30 (5.20-10.1)	58.4 (49.8-71.1)	501 (322-838)	225
60 years and older	53.1 (42.5-66.3)	5.20 (2.90-10.0)	57.2 (42.3-78.2)	377 (273-570)	291
<b>Females</b>					
Total, 6 years and older	54.0 (48.2-60.4)	6.20 (3.63-7.77)	52.0 (44.8-59.2)	505 (432-705)	1074
6–11 years	81.0 (59.0-111)	13.7† (11.6-22.0)	76.6 (58.9-121)	466† (284-1130)	95
12–19 years	90.3 (67.4-121)	9.30 (3.80-18.9)	90.5 (68.3-140)	922 (566-1410)	185
20–39 years	64.3 (49.0-84.4)	6.70 (3.63-9.30)	56.2 (43.1-79.2)	530 (369-1300)	298
40–59 years	48.1 (35.4-65.4)	3.16 (<LOD-10.1)	45.0 (35.4-64.2)	638 (220-1370)	209
60 years and older	34.3 (27.8-42.3)	3.60 (<LOD-7.08)	34.6 (28.5-41.1)	262 (190-398)	287

< 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 5.2.e. Urinary daidzein: Total population (creatinine corrected)**

Geometric mean and selected percentiles of urine concentrations (in µg/g creatinine) for the total U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
<b>Males and Females</b>					
Total, 6 years and older	56.9 (51.4-63.0)	6.67 (5.54-8.00)	56.3 (50.0-64.0)	536 (460-600)	5347
6–11 years	95.6 (83.2-110)	18.4 (14.3-21.2)	88.9 (73.4-112)	635 (494-733)	726
12–19 years	64.8 (52.3-80.3)	8.03 (5.73-10.4)	63.4 (50.0-86.2)	600 (402-797)	1497
20–39 years	51.1 (44.8-58.3)	5.91 (4.85-7.32)	48.8 (41.2-57.7)	523 (390-624)	1138
40–59 years	52.6 (43.7-63.2)	5.54 (3.58-7.49)	51.0 (43.3-65.4)	535 (391-689)	951
60 years and older	53.7 (46.4-62.1)	6.01 (3.90-8.62)	55.5 (43.5-71.3)	389 (308-555)	1035
<b>Males</b>					
Total, 6 years and older	52.1 (45.8-59.3)	5.96 (5.05-7.39)	51.0 (45.2-59.7)	497 (373-601)	2595
6–11 years	101 (80.4-127)	22.7 (14.5-30.1)	88.8 (58.6-143)	553 (447-733)	368
12–19 years	62.0 (47.2-81.5)	9.03 (6.10-10.4)	61.6 (48.6-85.6)	547 (301-921)	735
20–39 years	44.8 (36.8-54.7)	5.36 (3.66-7.20)	41.2 (33.1-47.9)	497 (268-847)	499
40–59 years	45.5 (35.9-57.6)	5.05 (3.28-7.38)	45.2 (32.0-65.0)	478 (263-693)	480
60 years and older	50.9 (41.8-62.0)	4.52 (3.09-7.91)	61.8 (44.2-81.0)	363 (255-659)	513
<b>Females</b>					
Total, 6 years and older	61.9 (55.4-69.1)	7.18 (5.91-9.10)	61.0 (53.3-70.4)	564 (468-628)	2752
6–11 years	90.3 (72.6-112)	14.9 (11.9-19.0)	86.3 (70.8-112)	668 (414-838)	358
12–19 years	67.9 (54.6-84.3)	6.80 (5.25-9.92)	65.1 (48.1-91.9)	628 (478-742)	762
20–39 years	58.1 (47.6-70.9)	6.74 (3.67-9.55)	56.2 (45.0-78.2)	571 (370-783)	639
40–59 years	60.3 (48.0-75.8)	6.58 (3.42-9.23)	62.4 (43.2-75.6)	564 (387-950)	471
60 years and older	56.0 (47.2-66.3)	6.52 (4.52-11.4)	50.9 (39.3-64.8)	451 (312-560)	522

**Table 5.2.f. Urinary daidzein: Mexican Americans (creatinine corrected)**

Geometric mean and selected percentiles of urine concentrations (in µg/g creatinine) for Mexican Americans in the U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
<b>Males and Females</b>					
Total, 6 years and older	52.0 (43.7-61.9)	4.81 (3.32-7.03)	48.7 (38.2-65.0)	546 (460-645)	1495
6–11 years	105 (81.0-136)	11.9 (8.98-17.4)	91.1 (65.5-149)	957 (715-1660)	225
12–19 years	56.5 (47.8-66.8)	7.20 (5.28-9.29)	58.1 (45.6-71.6)	511 (358-684)	543
20–39 years	43.0 (31.3-59.0)	3.88 (<LOD-6.82)	35.3 (23.2-57.9)	486 (307-608)	299
40–59 years	46.9 (35.3-62.4)	3.22 (<LOD-6.50)	47.5 (36.0-67.3)	483 (303-708)	221
60 years and older	40.3 (28.2-57.8)	3.97 (<LOD-8.56)	41.0 (27.1-73.4)	343 (223-638)	207
<b>Males</b>					
Total, 6 years and older	51.8 (39.5-68.0)	4.77 (2.90-7.95)	51.0 (38.2-72.0)	585 (471-708)	723
6–11 years	110 (79.0-152)	14.8 (10.2-24.5)	91.1 (57.4-149)	957 (596-1140)	117
12–19 years	56.4 (43.0-73.9)	5.65 (3.59-9.03)	64.9 (39.8-90.0)	614 (358-837)	276
20–39 years	45.8 (28.9-72.6)	3.90 (<LOD-7.95)	40.6 (21.8-91.4)	495 (307-641)	126
40–59 years	44.2 (27.9-69.9)	3.31† (<LOD-9.43)	45.9 (32.2-68.7)	542† (198-1020)	105
60 years and older	27.4 (15.6-48.1)	< LOD†	35.5 (15.0-63.9)	201† (141-458)	99
<b>Females</b>					
Total, 6 years and older	52.2 (44.0-62.0)	4.81 (3.00-8.02)	43.5 (34.1-65.5)	495 (384-600)	772
6–11 years	100 (70.6-142)	8.61† (<LOD-15.7)	103 (55.2-201)	1080† (649-2300)	108
12–19 years	56.6 (47.1-68.0)	8.23 (5.38-9.99)	51.2 (36.9-65.0)	399 (266-684)	267
20–39 years	39.9 (27.9-57.0)	3.50 (<LOD-10.4)	30.6 (22.1-66.4)	384 (271-517)	173
40–59 years	50.1 (36.0-69.6)	< LOD	49.8 (27.9-102)	474 (245-708)	116
60 years and older	55.6 (35.9-86.1)	8.02† (<LOD-12.3)	54.0 (28.9-89.9)	479† (258-984)	108

< LOD means less than the limit of detection for the uncorrected urine value, 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 5.2.g. Urinary daidzein: Non-Hispanic blacks (creatinine corrected)**

Geometric mean and selected percentiles of urine concentrations (in µg/g creatinine) for non-Hispanic blacks in the U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
<b>Males and Females</b>					
Total, 6 years and older	51.3 (42.1-62.4)	5.54 (3.95-7.05)	57.1 (46.5-70.5)	447 (306-599)	1288
6–11 years	113 (91.3-139)	15.4 (10.2-21.8)	109 (83.6-145)	955 (683-1280)	249
12–19 years	67.0 (56.1-80.1)	9.23 (6.59-10.9)	75.7 (54.8-93.7)	561 (317-975)	450
20–39 years	44.2 (32.2-60.8)	5.07 (2.92-7.58)	52.1 (38.4-71.7)	348 (207-541)	197
40–59 years	39.6 (28.3-55.4)	3.95 (<LOD-7.27)	46.5 (26.5-64.1)	272 (215-446)	210
60 years and older	42.5 (29.7-60.7)	2.34 (<LOD-8.65)	40.4 (27.2-79.3)	488 (249-721)	182
<b>Males</b>					
Total, 6 years and older	47.3 (34.8-64.3)	5.07 (<LOD-8.50)	54.1 (40.2-70.2)	472 (297-600)	627
6–11 years	132 (96.4-180)	17.7 (9.66-30.8)	151 (80.0-229)	1050 (661-1300)	127
12–19 years	67.3 (55.8-81.2)	9.03 (4.93-11.3)	80.8 (61.6-106)	499 (370-650)	211
20–39 years	36.1 (22.5-57.7)	5.17† (<LOD-8.50)	41.2 (24.5-70.2)	249† (162-541)	91
40–59 years	31.9 (18.4-55.2)	1.76† (<LOD-10.2)	38.4 (20.4-64.8)	258† (117-696)	109
60 years and older	41.4 (22.1-77.7)	< LOD†	36.0 (23.1-92.3)	562† (214-1370)	89
<b>Females</b>					
Total, 6 years and older	54.9 (46.3-65.0)	6.20 (3.75-8.65)	62.2 (48.7-77.1)	430 (302-639)	661
6–11 years	95.0 (71.7-126)	11.9 (<LOD-20.6)	86.3 (69.7-129)	773 (381-1640)	122
12–19 years	66.7 (51.9-85.8)	9.35 (5.68-12.5)	72.7 (42.1-91.2)	622 (251-1160)	239
20–39 years	51.9 (37.2-72.6)	4.86† (2.92-7.58)	64.6 (47.0-92.1)	372† (207-639)	106
40–59 years	47.6 (35.3-64.2)	6.58† (<LOD-11.1)	48.4 (29.1-70.8)	302† (215-802)	101
60 years and older	43.2 (28.0-66.6)	2.31† (<LOD-10.0)	44.0 (24.3-85.9)	463† (248-828)	93

< LOD means less than the limit of detection for the uncorrected urine value, 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 5.2.h. Urinary daidzein: Non-Hispanic whites (creatinine corrected)**

Geometric mean and selected percentiles of urine concentrations (in µg/g creatinine) for non-Hispanic whites in the U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
<b>Males and Females</b>					
Total, 6 years and older	58.1 (52.9-64.0)	6.90 (5.66-9.03)	57.8 (51.0-64.2)	506 (413-601)	2112
6–11 years	90.9 (75.0-110)	19.0 (14.3-25.4)	88.3 (70.8-112)	494 (324-710)	196
12–19 years	63.8 (46.5-87.6)	7.18 (4.27-12.2)	63.6 (44.8-96.2)	601 (386-987)	375
20–39 years	54.0 (47.0-62.1)	6.52 (4.85-8.83)	49.8 (39.7-60.4)	579 (384-847)	529
40–59 years	57.4 (47.5-69.3)	6.54 (4.23-9.94)	59.0 (44.1-70.2)	548 (377-807)	434
60 years and older	51.8 (44.0-61.0)	6.01 (3.86-8.87)	53.4 (41.3-69.6)	318 (260-475)	578
<b>Males</b>					
Total, 6 years and older	53.7 (47.4-60.7)	6.62 (5.39-8.80)	54.1 (45.5-63.3)	464 (336-586)	1038
6–11 years	95.0 (70.0-129)	24.9† (14.1-31.9)	88.3 (56.2-152)	425† (302-710)	101
12–19 years	60.2 (39.6-91.4)	9.03 (4.43-12.7)	58.5 (41.9-92.6)	463 (217-1030)	190
20–39 years	45.4 (36.2-56.9)	5.50 (2.82-8.07)	40.4 (29.1-54.6)	497 (248-850)	231
40–59 years	52.5 (43.0-64.0)	6.03 (4.60-9.94)	47.0 (34.5-71.5)	502 (276-723)	225
60 years and older	50.7 (40.7-63.3)	5.14 (3.40-8.87)	61.7 (45.4-80.0)	313 (215-555)	291
<b>Females</b>					
Total, 6 years and older	62.8 (55.9-70.5)	7.48 (5.49-10.5)	60.8 (52.8-70.4)	564 (423-655)	1074
6–11 years	86.6 (62.6-120)	16.5† (11.1-21.2)	86.6 (55.2-113)	655† (275-938)	95
12–19 years	68.2 (48.9-95.0)	6.56 (4.27-9.12)	73.4 (45.1-113)	628 (442-990)	185
20–39 years	64.0 (51.1-80.2)	8.28 (2.74-14.0)	58.0 (44.1-88.7)	607 (384-852)	298
40–59 years	62.7 (46.3-84.9)	6.79 (<LOD-12.6)	65.4 (41.0-79.9)	564 (356-1220)	209
60 years and older	52.6 (42.5-65.1)	6.27 (<LOD-11.3)	49.2 (35.1-66.1)	316 (250-555)	287

< LOD means less than the limit of detection for the uncorrected urine value, 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 5.3.a. Urinary equol: Total population

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the total U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
<b>Males and Females</b>					
Total, 6 years and older	8.77 (7.84-9.81)	< LOD	8.28 (7.21-9.50)	38.5 (33.1-45.2)	4976
6–11 years	11.5 (9.82-13.5)	< LOD	13.4 (10.1-16.1)	45.9 (32.3-59.6)	668
12–19 years	10.4 (9.08-11.9)	< LOD	10.5 (8.70-12.1)	43.1 (35.6-53.1)	1401
20–39 years	8.54 (7.40-9.86)	< LOD	8.16 (6.78-9.80)	37.6 (29.5-47.4)	1043
40–59 years	8.39 (7.24-9.73)	< LOD	7.80 (6.20-9.20)	37.1 (28.7-48.7)	909
60 years and older	7.52 (6.59-8.58)	< LOD	6.68 (5.13-8.20)	34.5 (27.9-41.7)	955
<b>Males</b>					
Total, 6 years and older	9.26 (8.17-10.5)	< LOD	8.70 (7.63-10.3)	39.6 (32.7-48.7)	2417
6–11 years	12.7 (10.1-16.0)	< LOD	13.7 (8.95-17.2)	56.0 (38.3-78.9)	347
12–19 years	10.5 (8.82-12.5)	< LOD	10.4 (8.49-12.9)	43.1 (35.2-56.1)	690
20–39 years	8.68 (7.39-10.2)	< LOD	7.90 (6.40-9.40)	38.2 (29.5-48.9)	454
40–59 years	8.90 (7.47-10.6)	< LOD	9.20 (7.10-10.5)	34.4 (27.4-45.2)	454
60 years and older	8.19 (6.75-9.94)	< LOD	6.83 (5.30-9.68)	35.6 (29.8-46.7)	472
<b>Females</b>					
Total, 6 years and older	8.33 (7.39-9.39)	< LOD	7.89 (6.80-9.17)	37.6 (32.2-42.7)	2559
6–11 years	10.3 (8.60-12.3)	< LOD	12.6 (9.40-15.5)	33.5 (28.0-51.0)	321
12–19 years	10.3 (8.87-11.9)	< LOD	10.5 (8.70-12.1)	42.9 (32.1-58.7)	711
20–39 years	8.40 (6.97-10.1)	< LOD	8.60 (6.50-10.9)	37.5 (25.3-50.9)	589
40–59 years	7.94 (6.53-9.66)	< LOD	6.27 (4.70-8.04)	40.3 (28.5-56.6)	455
60 years and older	7.04 (6.28-7.89)	< LOD	6.56 (4.60-8.13)	30.5 (23.5-43.2)	483

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

### Table 5.3.b. Urinary equol: Mexican Americans

Geometric mean and selected percentiles of urine concentrations (in µg/L) for Mexican Americans in the U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
<b>Males and Females</b>					
Total, 6 years and older	6.16 (5.59-6.79)	< LOD	5.20 (4.44-6.05)	25.0 (19.9-31.0)	1405
6–11 years	7.70 (6.18-9.60)	< LOD	6.51 (5.11-9.20)	29.0 (20.7-48.7)	216
12–19 years	7.72 (6.95-8.58)	< LOD	6.90 (5.70-8.10)	33.0 (25.9-44.4)	507
20–39 years	*	< LOD	4.40 (<LOD-5.50)	21.1 (13.7-32.2)	276
40–59 years	6.06 (5.00-7.34)	< LOD	5.10 (4.00-6.44)	21.3 (13.4-39.9)	213
60 years and older	*	< LOD	4.07 (<LOD-5.05)	16.9 (12.9-22.8)	193
<b>Males</b>					
Total, 6 years and older	6.25 (5.48-7.14)	< LOD	5.18 (4.20-6.50)	26.2 (19.1-32.9)	676
6–11 years	8.16 (6.20-10.8)	< LOD	8.53 (4.83-12.8)	29.5 (20.3-48.7)	112
12–19 years	7.31 (6.40-8.35)	< LOD	6.50 (5.50-7.67)	31.0 (19.7-48.6)	256
20–39 years	*	< LOD	4.20 (<LOD-5.49)	20.5 (13.7-32.1)	117
40–59 years	6.91 (5.13-9.30)	< LOD†	6.50 (3.86-9.48)	22.1† (14.0-42.4)	98
60 years and older	*	< LOD†	4.14 (<LOD-5.51)	14.8† (9.20-22.8)	93
<b>Females</b>					
Total, 6 years and older	6.07 (5.49-6.71)	< LOD	5.36 (4.30-6.00)	22.3 (19.1-29.0)	729
6–11 years	7.25 (5.56-9.44)	< LOD†	6.30 (4.96-8.20)	28.6† (18.8-76.3)	104
12–19 years	8.20 (7.23-9.30)	< LOD	7.56 (5.84-8.90)	37.2 (21.3-56.4)	251
20–39 years	5.51 (4.44-6.85)	< LOD	4.99 (3.30-6.60)	16.9 (12.3-35.4)	159
40–59 years	5.32 (4.29-6.59)	< LOD	4.50 (3.50-5.42)	17.3 (10.1-32.7)	115
60 years and older	*	< LOD†	3.88 (<LOD-6.08)	19.0† (8.30-160)	100

< 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.

\* Not calculated. Proportion of results below limit of detection was too high to provide a valid result.

### Table 5.3.c. Urinary equol: Non-Hispanic blacks

Geometric mean and selected percentiles of urine concentrations (in µg/L) for non-Hispanic blacks in the U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
<b>Males and Females</b>					
Total, 6 years and older	6.89 (6.04-7.86)	< LOD	6.09 (4.86-7.50)	28.8 (23.3-34.4)	1196
6–11 years	8.83 (7.19-10.8)	< LOD	9.90 (5.70-13.6)	31.0 (23.5-44.0)	223
12–19 years	9.45 (8.03-11.1)	< LOD	9.90 (7.77-12.0)	40.4 (29.9-51.0)	424
20–39 years	6.93 (5.62-8.55)	< LOD	5.90 (4.40-7.80)	29.6 (21.4-41.4)	178
40–59 years	6.12 (5.16-7.26)	< LOD	5.00 (3.60-7.43)	24.4 (19.4-30.2)	199
60 years and older	*	< LOD	< LOD	18.9 (11.6-27.6)	172
<b>Males</b>					
Total, 6 years and older	7.68 (6.62-8.92)	< LOD	6.90 (5.10-8.50)	31.4 (26.1-39.8)	588
6–11 years	9.56 (7.44-12.3)	< LOD	9.90 (5.49-13.6)	34.4 (30.2-79.5)	120
12–19 years	9.68 (7.99-11.7)	< LOD	10.6 (6.90-13.6)	40.8 (28.4-51.6)	201
20–39 years	7.64 (5.88-9.92)	< LOD†	5.47 (4.20-9.71)	35.6† (21.5-89.9)	80
40–59 years	7.30 (6.02-8.84)	< LOD†	7.40 (5.05-9.00)	26.0† (19.8-35.3)	104
60 years and older	*	< LOD†	< LOD	18.9† (7.60-32.0)	83
<b>Females</b>					
Total, 6 years and older	6.28 (5.36-7.36)	< LOD	5.44 (3.70-7.13)	26.2 (18.9-35.4)	608
6–11 years	8.00 (6.05-10.6)	< LOD†	9.48 (4.10-14.7)	26.2† (19.8-31.8)	103
12–19 years	9.22 (7.50-11.3)	< LOD	9.60 (7.20-11.6)	40.8 (29.9-73.4)	223
20–39 years	6.44 (4.84-8.57)	< LOD†	6.17 (3.50-8.30)	22.9† (14.3-43.4)	98
40–59 years	*	< LOD†	3.80 (<LOD-6.99)	21.2† (13.4-34.1)	95
60 years and older	*	< LOD†	< LOD	20.7† (10.5-43.8)	89

< 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.  
\* Not calculated. Proportion of results below limit of detection was too high to provide a valid result.

### Table 5.3.d. Urinary equol: Non-Hispanic whites

Geometric mean and selected percentiles of urine concentrations (in µg/L) for non-Hispanic whites in the U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
<b>Males and Females</b>					
Total, 6 years and older	9.62 (8.32-11.1)	< LOD	9.49 (7.73-11.2)	41.3 (35.0-48.9)	1955
6–11 years	13.7 (10.7-17.6)	< LOD	15.2 (11.1-19.4)	53.3 (38.5-68.1)	179
12–19 years	11.3 (9.28-13.7)	< LOD	11.7 (9.74-13.6)	45.5 (36.9-58.8)	350
20–39 years	9.66 (7.87-11.9)	< LOD	9.80 (7.63-12.4)	39.0 (29.2-55.1)	486
40–59 years	9.34 (7.68-11.4)	< LOD	9.00 (6.50-10.8)	41.7 (31.7-60.7)	415
60 years and older	7.92 (6.81-9.21)	< LOD	7.30 (5.58-9.40)	34.5 (27.9-41.7)	525
<b>Males</b>					
Total, 6 years and older	10.1 (8.58-11.8)	< LOD	9.86 (8.00-12.2)	44.0 (35.1-53.8)	965
6–11 years	14.6 (10.1-21.2)	< LOD†	15.2 (8.00-26.3)	59.0† (45.9-85.4)	95
12–19 years	11.1 (8.64-14.4)	< LOD	10.9 (7.90-15.2)	48.1 (36.9-81.5)	179
20–39 years	9.81 (7.97-12.1)	< LOD	9.18 (7.60-12.3)	38.6 (29.5-57.5)	214
40–59 years	9.51 (7.58-11.9)	< LOD	9.82 (6.70-12.5)	39.7 (27.4-53.8)	213
60 years and older	8.91 (7.00-11.3)	< LOD	7.51 (5.52-12.4)	36.8 (30.1-46.7)	264
<b>Females</b>					
Total, 6 years and older	9.22 (7.83-10.8)	< LOD	9.00 (7.40-11.1)	39.7 (34.1-45.8)	990
6–11 years	12.7 (9.69-16.7)	< LOD†	15.1 (11.7-19.4)	36.3† (28.6-53.3)	84
12–19 years	11.4 (9.19-14.1)	< LOD	12.1 (9.90-14.1)	39.4 (25.1-61.5)	171
20–39 years	9.51 (7.30-12.4)	< LOD	10.0 (7.11-13.3)	39.0 (26.2-55.1)	272
40–59 years	9.18 (6.95-12.1)	< LOD	7.80 (5.04-9.80)	42.1 (33.3-93.9)	202
60 years and older	7.21 (6.46-8.06)	< LOD	7.26 (4.97-8.67)	28.5 (22.1-38.4)	261

< 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 5.3.e. Urinary equol: Total population (creatinine corrected)**

Geometric mean and selected percentiles of urine concentrations (in µg/g creatinine) for the total U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
<b>Males and Females</b>					
Total, 6 years and older	8.22 (7.38-9.17)	< LOD	7.98 (7.07-9.04)	35.1 (30.3-39.5)	4976
6–11 years	12.4 (10.5-14.7)	< LOD	12.5 (10.3-16.0)	45.6 (33.6-62.8)	668
12–19 years	7.68 (6.80-8.67)	< LOD	7.82 (6.91-8.70)	30.3 (24.3-39.1)	1401
20–39 years	6.90 (6.03-7.89)	< LOD	6.68 (5.68-7.53)	30.3 (25.0-36.3)	1043
40–59 years	8.40 (7.25-9.73)	< LOD	7.88 (6.66-9.16)	37.3 (29.6-46.3)	909
60 years and older	9.02 (7.98-10.2)	< LOD	8.94 (7.32-10.2)	37.8 (27.8-42.4)	955
<b>Males</b>					
Total, 6 years and older	7.39 (6.53-8.36)	< LOD	7.38 (6.30-8.42)	31.1 (27.0-37.8)	2417
6–11 years	13.3 (10.4-16.9)	< LOD	12.7 (8.51-17.5)	48.1 (33.8-93.3)	347
12–19 years	7.55 (6.50-8.77)	< LOD	7.63 (6.45-8.89)	32.2 (25.9-45.3)	690
20–39 years	5.95 (5.04-7.03)	< LOD	5.59 (4.93-6.42)	25.0 (19.7-32.9)	454
40–59 years	7.30 (6.20-8.59)	< LOD	7.53 (6.06-8.81)	27.7 (22.4-39.5)	454
60 years and older	7.69 (6.43-9.20)	< LOD	7.36 (5.50-9.92)	27.9 (22.3-42.4)	472
<b>Females</b>					
Total, 6 years and older	9.10 (8.09-10.2)	< LOD	8.71 (7.60-9.84)	37.8 (32.9-42.5)	2559
6–11 years	11.5 (9.40-14.0)	< LOD	12.3 (10.3-16.3)	37.5 (29.0-50.0)	321
12–19 years	7.82 (6.72-9.10)	< LOD	8.02 (6.97-9.00)	27.0 (23.3-31.7)	711
20–39 years	7.97 (6.78-9.36)	< LOD	7.61 (6.23-9.54)	32.9 (25.6-41.3)	589
40–59 years	9.57 (7.81-11.7)	< LOD	8.63 (6.66-10.0)	46.3 (36.4-67.7)	455
60 years and older	10.2 (9.23-11.3)	< LOD	9.64 (8.27-10.6)	38.8 (27.8-44.8)	483

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

**Table 5.3.f. Urinary equol: Mexican Americans (creatinine corrected)**

Geometric mean and selected percentiles of urine concentrations (in µg/g creatinine) for Mexican Americans in the U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
<b>Males and Females</b>					
Total, 6 years and older	5.77 (5.28-6.31)	< LOD	5.68 (4.95-6.39)	26.3 (22.3-28.8)	1405
6–11 years	9.84 (8.15-11.9)	< LOD	9.32 (7.52-11.9)	37.1 (27.6-47.8)	216
12–19 years	6.19 (5.75-6.65)	< LOD	6.02 (5.42-6.85)	23.4 (19.2-30.2)	507
20–39 years	*	< LOD	4.46 (<LOD-5.96)	18.9 (15.2-23.6)	276
40–59 years	6.12 (5.11-7.34)	< LOD	5.68 (4.55-7.16)	27.6 (18.7-32.6)	213
60 years and older	*	< LOD	5.16 (<LOD-7.14)	21.8 (16.2-33.3)	193
<b>Males</b>					
Total, 6 years and older	5.24 (4.74-5.79)	< LOD	5.05 (4.19-6.31)	21.2 (17.9-24.6)	676
6–11 years	9.88 (7.79-12.5)	< LOD	10.0 (7.61-13.4)	31.4 (22.3-46.6)	112
12–19 years	5.60 (4.95-6.34)	< LOD	5.92 (4.60-6.66)	22.8 (16.2-28.6)	256
20–39 years	*	< LOD	3.66 (<LOD-5.72)	15.2 (10.7-19.9)	117
40–59 years	5.84 (4.35-7.84)	< LOD†	5.46 (3.86-7.32)	27.6† (14.9-36.3)	98
60 years and older	*	< LOD†	3.76 (<LOD-5.42)	14.7† (7.75-34.2)	93
<b>Females</b>					
Total, 6 years and older	6.40 (5.66-7.24)	< LOD	5.99 (5.19-6.97)	29.2 (25.3-35.3)	729
6–11 years	9.80 (7.76-12.4)	< LOD†	9.00 (6.55-11.4)	43.1† (27.9-106)	104
12–19 years	6.89 (6.07-7.82)	< LOD	6.06 (5.10-7.73)	25.2 (19.1-39.0)	251
20–39 years	5.13 (4.19-6.30)	< LOD	5.17 (3.54-6.64)	24.0 (15.7-39.6)	159
40–59 years	6.42 (4.80-8.60)	< LOD	5.68 (4.55-8.65)	27.9 (18.7-41.1)	115
60 years and older	*	< LOD†	6.77 (<LOD-8.26)	25.9† (16.9-51.7)	100

< LOD means less than the limit of detection for the uncorrected urine value, which may vary for some compounds by year. See Appendix D for LOD.  
† Estimate is subject to greater uncertainty due to small cell size.  
\* Not calculated. Proportion of results below limit of detection was too high to provide a valid result.



**Table 5.3.g. Urinary equol: Non-Hispanic blacks (creatinine corrected)**

Geometric mean and selected percentiles of urine concentrations (in µg/g creatinine) for non-Hispanic blacks in the U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
<b>Males and Females</b>					
Total, 6 years and older	4.68 (4.10-5.34)	< LOD	4.48 (3.70-5.41)	19.1 (16.5-23.3)	1196
6–11 years	8.21 (6.66-10.1)	< LOD	8.40 (6.92-10.6)	33.6 (20.5-45.4)	223
12–19 years	5.35 (4.55-6.28)	< LOD	5.46 (4.72-6.49)	21.0 (17.2-28.1)	424
20–39 years	4.02 (3.23-4.99)	< LOD	3.56 (2.85-4.96)	15.8 (13.0-23.1)	178
40–59 years	4.09 (3.31-5.05)	< LOD	3.64 (2.99-5.00)	17.1 (11.9-22.7)	199
60 years and older	*	< LOD	< LOD	18.8 (12.3-25.7)	172
<b>Males</b>					
Total, 6 years and older	4.66 (3.95-5.50)	< LOD	4.48 (3.48-5.49)	19.5 (16.9-25.2)	588
6–11 years	8.62 (6.68-11.1)	< LOD	8.38 (6.11-12.2)	38.3 (25.6-48.1)	120
12–19 years	5.27 (4.27-6.52)	< LOD	5.49 (4.76-7.37)	20.2 (14.0-33.9)	201
20–39 years	3.82 (2.78-5.23)	< LOD†	3.47 (1.97-4.57)	15.8† (10.5-35.3)	80
40–59 years	4.32 (3.51-5.30)	< LOD†	4.07 (3.28-5.42)	17.3† (11.6-27.0)	104
60 years and older	*	< LOD†	< LOD	12.3† (9.13-22.5)	83
<b>Females</b>					
Total, 6 years and older	4.69 (4.05-5.45)	< LOD	4.48 (3.56-5.75)	18.6 (15.0-24.5)	608
6–11 years	7.74 (5.98-10.0)	< LOD†	8.63 (6.25-10.9)	26.2† (17.1-43.8)	103
12–19 years	5.42 (4.46-6.59)	< LOD	5.44 (4.15-6.94)	24.2 (17.0-32.1)	223
20–39 years	4.18 (3.16-5.53)	< LOD†	3.76 (2.72-5.93)	15.0† (12.3-23.1)	98
40–59 years	*	< LOD†	3.05 (<LOD-5.74)	17.1† (9.11-38.0)	95
60 years and older	*	< LOD†	< LOD	21.2† (12.5-31.3)	89

< LOD means less than the limit of detection for the uncorrected urine value, which may vary for some compounds by year. See Appendix D for LOD.  
† Estimate is subject to greater uncertainty due to small cell size.  
\* Not calculated. Proportion of results below limit of detection was too high to provide a valid result.

**Table 5.3.h. Urinary equol: Non-Hispanic whites (creatinine corrected)**

Geometric mean and selected percentiles of urine concentrations (in µg/g creatinine) for non-Hispanic whites in the U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
<b>Males and Females</b>					
Total, 6 years and older	9.61 (8.36-11.0)	< LOD	9.30 (7.93-10.6)	38.7 (32.7-46.3)	1955
6–11 years	14.6 (11.3-18.8)	< LOD	15.1 (11.4-21.4)	51.5 (33.8-99.8)	179
12–19 years	8.77 (7.38-10.4)	< LOD	8.89 (7.38-10.2)	31.9 (25.8-47.4)	350
20–39 years	8.46 (7.10-10.1)	< LOD	8.57 (6.85-10.3)	32.9 (28.0-41.4)	486
40–59 years	9.78 (8.16-11.7)	< LOD	8.78 (7.22-10.4)	44.5 (32.3-55.9)	415
60 years and older	9.85 (8.61-11.3)	< LOD	10.0 (8.48-11.6)	38.0 (27.8-42.8)	525
<b>Males</b>					
Total, 6 years and older	8.44 (7.22-9.86)	< LOD	8.48 (7.07-9.94)	35.8 (28.8-43.3)	965
6–11 years	15.9 (11.1-22.8)	< LOD†	15.8 (8.10-27.0)	64.3† (37.4-120)	95
12–19 years	8.63 (6.94-10.7)	< LOD	8.51 (7.06-10.2)	37.3 (26.8-64.3)	179
20–39 years	7.22 (5.89-8.86)	< LOD	7.02 (5.59-9.20)	28.8 (20.5-37.8)	214
40–59 years	7.97 (6.53-9.72)	< LOD	7.97 (6.66-9.70)	30.2 (22.7-42.3)	213
60 years and older	8.49 (6.91-10.4)	< LOD	8.71 (5.85-12.3)	28.9 (22.3-42.8)	264
<b>Females</b>					
Total, 6 years and older	10.9 (9.38-12.7)	< LOD	10.2 (8.63-12.3)	41.8 (36.4-50.0)	990
6–11 years	13.2 (9.56-18.1)	< LOD†	14.7 (11.6-20.7)	43.3† (28.8-60.7)	84
12–19 years	8.94 (7.23-11.1)	< LOD	9.00 (7.33-11.5)	26.0 (21.5-41.7)	171
20–39 years	9.92 (8.12-12.1)	< LOD	9.54 (7.50-12.7)	36.4 (28.0-55.9)	272
40–59 years	11.9 (9.14-15.5)	< LOD	9.71 (7.33-12.5)	65.3 (37.7-94.0)	202
60 years and older	11.1 (9.88-12.4)	< LOD	10.3 (9.38-12.0)	41.0 (27.8-53.2)	261

< LOD means less than the limit of detection for the uncorrected urine value, 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 5.4.a. Urinary O-desmethylangolensin: Total population**

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the total U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
<b>Males and Females</b>					
Total, 6 years and older	4.18 (3.65-4.78)	< LOD	4.00 (3.40-4.74)	98.7 (75.9-122)	5065
6–11 years	5.97 (4.69-7.59)	< LOD	6.50 (4.63-9.68)	105 (59.6-176)	683
12–19 years	5.87 (4.59-7.50)	< LOD	6.47 (4.47-8.60)	122 (99.0-152)	1411
20–39 years	3.59 (2.91-4.43)	< LOD	3.03 (2.50-4.10)	121 (70.1-189)	1085
40–59 years	4.67 (3.64-5.98)	< LOD	4.30 (3.20-5.50)	111 (66.1-160)	896
60 years and older	2.94 (2.39-3.62)	< LOD	3.01 (1.90-4.12)	63.9 (40.3-73.7)	990
<b>Males</b>					
Total, 6 years and older	4.24 (3.58-5.01)	< LOD	4.22 (3.50-5.29)	102 (74.2-137)	2462
6–11 years	6.61 (4.59-9.51)	< LOD	8.40 (3.96-11.3)	121 (52.7-235)	345
12–19 years	6.19 (4.51-8.50)	< LOD	7.00 (4.22-10.6)	105 (74.1-148)	690
20–39 years	3.44 (2.53-4.66)	< LOD	3.00 (2.00-4.47)	135 (53.9-259)	474
40–59 years	4.49 (3.45-5.86)	< LOD	4.50 (2.80-6.30)	108 (57.3-160)	455
60 years and older	3.18 (2.56-3.95)	< LOD	3.60 (2.43-5.57)	58.4 (36.3-85.2)	498
<b>Females</b>					
Total, 6 years and older	4.12 (3.55-4.79)	< LOD	3.90 (3.00-4.56)	93.3 (70.9-128)	2603
6–11 years	5.38 (4.06-7.12)	< LOD	5.10 (3.43-8.80)	88.5 (59.2-161)	338
12–19 years	5.56 (4.09-7.55)	< LOD	5.69 (3.63-7.80)	137 (85.6-195)	721
20–39 years	3.75 (2.85-4.95)	< LOD	3.11 (2.40-4.90)	94.8 (57.2-228)	611
40–59 years	4.84 (3.43-6.82)	< LOD	4.10 (2.83-5.51)	125 (64.9-233)	441
60 years and older	2.77 (2.05-3.73)	< LOD	2.40 (1.50-4.00)	68.0 (33.8-81.6)	492

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

**Table 5.4.b. Urinary O-desmethylangolensin: Mexican Americans**

Geometric mean and selected percentiles of urine concentrations (in µg/L) for Mexican Americans in the U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
<b>Males and Females</b>					
Total, 6 years and older	2.43 (1.78-3.34)	< LOD	1.80 (1.00-2.84)	86.0 (59.7-105)	1400
6–11 years	3.17 (2.23-4.49)	< LOD	2.84 (1.70-4.04)	61.5 (36.8-129)	212
12–19 years	3.07 (2.35-4.01)	< LOD	2.49 (1.83-3.50)	98.0 (65.2-137)	508
20–39 years	*	< LOD	1.40 (<LOD-3.40)	87.8 (44.2-129)	282
40–59 years	*	< LOD	1.30 (.700-3.60)	95.2 (36.5-191)	209
60 years and older	*	< LOD	.420 (<LOD-2.40)	25.2 (16.0-37.9)	189
<b>Males</b>					
Total, 6 years and older	2.70 (1.77-4.13)	< LOD	2.10 (.800-4.70)	90.9 (66.4-129)	686
6–11 years	3.72 (2.29-6.02)	< LOD†	3.75 (1.60-8.50)	60.2† (29.3-140)	111
12–19 years	3.32 (2.53-4.36)	< LOD	3.20 (2.00-5.02)	86.5 (61.0-144)	262
20–39 years	*	< LOD	1.31 (<LOD-6.54)	97.6 (59.7-189)	122
40–59 years	2.49 (1.48-4.19)	< LOD†	1.30 (.500-4.70)	122† (28.3-237)	100
60 years and older	*	< LOD†	.420 (<LOD-3.30)	17.0† (8.73-34.6)	91
<b>Females</b>					
Total, 6 years and older	2.16 (1.63-2.87)	< LOD	1.62 (.880-2.50)	70.9 (40.6-90.1)	714
6–11 years	2.67 (1.88-3.81)	< LOD†	2.28 (1.44-3.30)	55.0† (20.3-129)	101
12–19 years	2.80 (1.86-4.23)	< LOD	2.40 (1.25-3.60)	98.0 (48.2-152)	246
20–39 years	*	< LOD	1.39 (<LOD-2.83)	57.4 (25.2-88.3)	160
40–59 years	*	< LOD†	1.00 (<LOD-5.20)	86.0† (18.6-191)	109
60 years and older	*	< LOD†	< LOD	33.2† (18.4-150)	98

< 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.

\* Not calculated. Proportion of results below limit of detection was too high to provide a valid result.

**Table 5.4.c. Urinary O-desmethylangolensin: Non-Hispanic blacks**

Geometric mean and selected percentiles of urine concentrations (in µg/L) for non-Hispanic blacks in the U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
<b>Males and Females</b>					
Total, 6 years and older	5.54 (4.63-6.64)	< LOD	6.40 (5.10-7.98)	116 (95.5-155)	1219
6–11 years	10.6 (7.78-14.5)	< LOD	13.4 (9.40-22.5)	226 (157-303)	235
12–19 years	10.5 (7.71-14.3)	< LOD	13.2 (8.40-17.8)	165 (131-238)	424
20–39 years	4.69 (2.93-7.51)	< LOD	5.55 (2.66-9.30)	103 (52.4-161)	187
40–59 years	4.42 (2.98-6.55)	< LOD	4.67 (2.40-8.71)	87.6 (58.0-114)	199
60 years and older	3.33 (1.97-5.64)	< LOD	3.04 (1.20-5.70)	99.1 (33.4-357)	174
<b>Males</b>					
Total, 6 years and older	6.36 (4.70-8.59)	< LOD	7.20 (4.80-10.2)	143 (105-177)	590
6–11 years	13.2 (8.14-21.3)	< LOD	22.5 (10.1-39.1)	250 (158-355)	121
12–19 years	12.2 (8.73-17.0)	< LOD	14.5 (7.90-20.7)	171 (136-394)	194
20–39 years	5.91 (3.47-10.1)	< LOD†	5.93 (2.60-14.3)	128† (52.4-308)	85
40–59 years	3.78 (2.07-6.90)	< LOD†	3.50 (1.10-9.30)	99.4† (31.4-120)	103
60 years and older	4.09 (2.10-7.93)	< LOD†	5.30 (1.18-7.60)	77.4† (33.7-255)	87
<b>Females</b>					
Total, 6 years and older	4.94 (4.05-6.02)	< LOD	5.69 (4.50-7.90)	100 (73.8-128)	629
6–11 years	8.38 (5.30-13.2)	< LOD	10.4 (5.53-13.6)	147 (64.2-281)	114
12–19 years	9.07 (5.81-14.2)	< LOD	11.8 (6.64-20.1)	141 (95.1-201)	230
20–39 years	3.92 (2.22-6.93)	< LOD†	4.98 (1.40-9.40)	79.7† (26.6-191)	102
40–59 years	5.04 (2.88-8.81)	< LOD†	5.30 (2.10-13.3)	81.6† (40.2-313)	96
60 years and older	2.89 (1.62-5.16)	< LOD†	2.70 (.700-5.31)	99.1† (21.0-502)	87

< 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 5.4.d. Urinary O-desmethylangolensin: Non-Hispanic whites**

Geometric mean and selected percentiles of urine concentrations (in µg/L) for non-Hispanic whites in the U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
<b>Males and Females</b>					
Total, 6 years and older	4.25 (3.59-5.04)	< LOD	3.98 (3.30-4.80)	98.7 (72.8-135)	2021
6–11 years	5.98 (4.20-8.50)	< LOD	6.97 (3.43-11.5)	88.0 (45.0-191)	181
12–19 years	6.26 (4.47-8.77)	< LOD	6.50 (4.00-10.0)	122 (76.9-172)	360
20–39 years	3.47 (2.58-4.66)	< LOD	2.80 (2.03-4.40)	129 (61.0-228)	511
40–59 years	5.40 (4.03-7.23)	< LOD	4.56 (3.31-6.40)	137 (76.4-202)	405
60 years and older	2.88 (2.23-3.71)	< LOD	2.83 (1.71-4.20)	58.4 (30.2-78.0)	564
<b>Males</b>					
Total, 6 years and older	4.22 (3.44-5.18)	< LOD	4.12 (3.31-5.40)	96.8 (65.7-137)	995
6–11 years	6.33 (3.52-11.4)	< LOD†	7.20 (3.30-15.7)	88.0† (43.4-311)	90
12–19 years	6.27 (4.21-9.32)	< LOD	6.50 (3.60-13.5)	103 (61.6-148)	181
20–39 years	2.95 (1.95-4.48)	< LOD	2.51 (1.20-4.47)	96.0 (25.2-260)	223
40–59 years	5.35 (4.05-7.06)	< LOD	5.28 (3.31-8.00)	111 (58.4-178)	213
60 years and older	3.27 (2.60-4.12)	< LOD	3.60 (1.90-6.00)	58.4 (29.9-98.9)	288
<b>Females</b>					
Total, 6 years and older	4.29 (3.50-5.25)	< LOD	3.98 (2.79-4.98)	106 (70.6-154)	1026
6–11 years	5.63 (3.55-8.95)	< LOD†	5.90 (2.70-14.3)	72.2† (30.5-176)	91
12–19 years	6.26 (3.92-10.0)	< LOD	6.40 (3.50-11.7)	166 (58.3-367)	179
20–39 years	4.05 (2.76-5.94)	< LOD	3.80 (2.05-5.71)	135 (51.2-250)	288
40–59 years	5.46 (3.47-8.59)	< LOD	4.30 (2.36-6.40)	154 (64.9-322)	192
60 years and older	2.59 (1.81-3.72)	< LOD	2.10 (1.21-4.05)	59.9 (17.7-85.1)	276

< 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 5.4.e. Urinary O-desmethylangolensin: Total population (creatinine corrected)

Geometric mean and selected percentiles of urine concentrations (in µg/g creatinine) for the total U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
<b>Males and Females</b>					
Total, 6 years and older	3.91 (3.38-4.52)	< LOD	3.74 (3.09-4.50)	87.6 (69.8-108)	5065
6–11 years	6.62 (5.15-8.52)	< LOD	6.64 (4.63-10.6)	93.7 (65.0-144)	683
12–19 years	4.28 (3.25-5.65)	< LOD	4.45 (3.22-6.51)	76.5 (61.6-102)	1411
20–39 years	2.89 (2.33-3.59)	< LOD	2.63 (1.96-3.66)	87.8 (50.8-126)	1085
40–59 years	4.67 (3.70-5.90)	< LOD	3.87 (2.73-5.68)	112 (71.8-155)	896
60 years and older	3.51 (2.81-4.37)	< LOD	3.19 (2.12-4.95)	64.7 (50.8-76.0)	990
<b>Males</b>					
Total, 6 years and older	3.43 (2.85-4.12)	< LOD	3.51 (2.56-4.45)	75.2 (58.5-96.5)	2462
6–11 years	7.12 (4.73-10.7)	< LOD	6.80 (3.59-17.0)	97.8 (56.2-233)	345
12–19 years	4.45 (3.20-6.19)	< LOD	4.71 (3.41-8.02)	70.2 (48.8-115)	690
20–39 years	2.40 (1.73-3.33)	< LOD	2.05 (1.38-3.06)	88.9 (34.3-151)	474
40–59 years	3.76 (2.88-4.92)	< LOD	3.66 (2.46-5.76)	80.3 (53.1-118)	455
60 years and older	2.96 (2.35-3.73)	< LOD	2.92 (1.84-4.68)	51.7 (35.4-64.2)	498
<b>Females</b>					
Total, 6 years and older	4.43 (3.76-5.21)	< LOD	3.92 (3.15-5.00)	98.3 (70.3-140)	2603
6–11 years	6.14 (4.67-8.09)	< LOD	6.61 (4.42-10.5)	88.0 (52.7-158)	338
12–19 years	4.12 (2.97-5.71)	< LOD	3.87 (2.50-5.90)	89.5 (61.4-111)	721
20–39 years	3.45 (2.58-4.61)	< LOD	3.62 (2.28-4.64)	86.0 (43.2-155)	611
40–59 years	5.76 (4.18-7.94)	< LOD	3.90 (2.69-7.27)	147 (85.2-280)	441
60 years and older	4.00 (2.93-5.47)	< LOD	3.40 (1.92-6.17)	69.8 (56.9-109)	492

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

### Table 5.4.f. Urinary O-desmethylangolensin: Mexican Americans (creatinine corrected)

Geometric mean and selected percentiles of urine concentrations (in µg/g creatinine) for Mexican Americans in the U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
<b>Males and Females</b>					
Total, 6 years and older	2.26 (1.70-3.00)	< LOD	1.69 (1.12-2.67)	58.8 (48.6-87.8)	1400
6–11 years	4.11 (3.09-5.47)	< LOD	3.69 (2.16-7.00)	79.8 (53.6-114)	212
12–19 years	2.43 (1.85-3.19)	< LOD	2.13 (1.55-3.17)	61.5 (47.4-86.3)	508
20–39 years	*	< LOD	1.17 (<LOD-2.67)	56.4 (29.9-103)	282
40–59 years	*	< LOD	1.56 (.805-3.55)	58.8 (27.8-145)	209
60 years and older	*	< LOD	1.03 (<LOD-2.70)	30.4 (21.4-55.3)	189
<b>Males</b>					
Total, 6 years and older	2.23 (1.52-3.27)	< LOD	1.64 (.932-3.90)	61.4 (48.6-93.0)	686
6–11 years	4.52 (2.88-7.09)	< LOD†	4.87 (1.72-8.95)	93.0† (50.2-145)	111
12–19 years	2.50 (1.87-3.35)	< LOD	2.82 (1.54-4.31)	56.1 (37.2-71.2)	262
20–39 years	*	< LOD	1.45 (<LOD-4.56)	60.0 (25.8-113)	122
40–59 years	2.04 (1.26-3.32)	< LOD†	1.42 (.661-4.23)	57.2† (19.6-218)	100
60 years and older	*	< LOD†	.698 (<LOD-3.02)	23.6† (11.1-33.2)	91
<b>Females</b>					
Total, 6 years and older	2.30 (1.77-2.99)	< LOD	1.69 (1.17-2.08)	57.7 (41.7-87.6)	714
6–11 years	3.73 (2.62-5.29)	< LOD†	2.44 (1.68-7.00)	78.3† (27.1-108)	101
12–19 years	2.35 (1.57-3.52)	< LOD	1.78 (1.10-2.78)	68.3 (45.6-115)	246
20–39 years	*	< LOD	1.03 (<LOD-2.15)	41.7 (15.5-87.6)	160
40–59 years	*	< LOD†	1.77 (<LOD-3.90)	76.8† (29.1-145)	109
60 years and older	*	< LOD†	< LOD	55.3† (20.9-97.0)	98

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

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

\* Not calculated. Proportion of results below limit of detection was too high to provide a valid result.

**Table 5.4.g. Urinary O-desmethylangolensin: Non-Hispanic blacks (creatinine corrected)**

Geometric mean and selected percentiles of urine concentrations (in µg/g creatinine) for non-Hispanic blacks in the U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
<b>Males and Females</b>					
Total, 6 years and older	3.73 (3.08-4.51)	< LOD	4.12 (3.20-5.48)	71.9 (54.7-100)	1219
6–11 years	9.94 (7.43-13.3)	< LOD	10.6 (8.27-18.2)	217 (118-305)	235
12–19 years	5.88 (4.34-7.98)	< LOD	7.25 (4.64-10.2)	95.0 (57.0-142)	424
20–39 years	2.68 (1.70-4.23)	< LOD	3.66 (1.67-5.69)	45.4 (26.8-100)	187
40–59 years	2.95 (2.07-4.19)	< LOD	2.93 (1.61-5.48)	60.4 (36.7-81.9)	199
60 years and older	3.11 (1.99-4.85)	< LOD	2.91 (1.64-4.83)	75.6 (47.2-167)	174
<b>Males</b>					
Total, 6 years and older	3.84 (2.85-5.19)	< LOD	4.45 (2.64-7.30)	79.7 (55.2-118)	590
6–11 years	12.3 (7.52-20.0)	< LOD	18.0 (9.43-32.4)	233 (119-363)	121
12–19 years	6.63 (4.79-9.18)	< LOD	7.65 (4.69-11.1)	109 (59.1-198)	194
20–39 years	2.87 (1.70-4.84)	< LOD†	2.95 (1.28-8.61)	42.9† (23.4-100)	85
40–59 years	2.27 (1.24-4.17)	< LOD†	2.18 (.996-5.61)	67.8† (23.2-84.4)	103
60 years and older	3.05 (1.64-5.69)	< LOD†	2.79 (1.12-5.83)	79.7† (26.3-151)	87
<b>Females</b>					
Total, 6 years and older	3.63 (2.96-4.46)	< LOD	4.05 (3.26-5.22)	64.4 (47.0-90.4)	629
6–11 years	7.89 (5.57-11.2)	< LOD	8.27 (4.80-10.9)	104 (62.9-305)	114
12–19 years	5.24 (3.35-8.21)	< LOD	5.83 (3.15-11.1)	71.9 (47.5-142)	230
20–39 years	2.54 (1.45-4.46)	< LOD†	3.36 (1.42-5.69)	42.1† (22.1-185)	102
40–59 years	3.67 (2.23-6.04)	< LOD†	3.61 (1.61-7.58)	54.4† (34.1-147)	96
60 years and older	3.14 (1.90-5.19)	< LOD†	2.91 (1.31-6.30)	75.6† (23.8-359)	87

< LOD means less than the limit of detection for the uncorrected urine value, 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 5.4.h. Urinary O-desmethylangolensin: Non-Hispanic whites (creatinine corrected)**

Geometric mean and selected percentiles of urine concentrations (in µg/g creatinine) for non-Hispanic whites in the U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
<b>Males and Females</b>					
Total, 6 years and older	4.24 (3.55-5.07)	< LOD	3.78 (3.05-4.95)	97.4 (71.8-125)	2021
6–11 years	6.69 (4.67-9.58)	< LOD	6.80 (3.78-13.6)	85.2 (47.9-190)	181
12–19 years	4.79 (3.27-7.03)	< LOD	4.70 (3.14-8.91)	83.6 (60.3-125)	360
20–39 years	3.01 (2.28-3.98)	< LOD	2.72 (1.89-3.77)	97.4 (50.8-151)	511
40–59 years	5.67 (4.36-7.37)	< LOD	5.32 (2.96-7.96)	136 (71.8-210)	405
60 years and older	3.56 (2.74-4.64)	< LOD	3.17 (1.83-5.45)	64.5 (45.6-83.0)	564
<b>Males</b>					
Total, 6 years and older	3.60 (2.89-4.49)	< LOD	3.51 (2.54-4.68)	76.4 (54.1-102)	995
6–11 years	7.20 (3.84-13.5)	< LOD†	6.80 (2.85-21.3)	90.2† (39.0-407)	90
12–19 years	4.85 (3.15-7.46)	< LOD	4.71 (3.05-13.5)	62.2 (45.9-125)	181
20–39 years	2.24 (1.48-3.39)	< LOD	1.96 (1.27-3.06)	88.2 (23.5-151)	223
40–59 years	4.56 (3.50-5.94)	< LOD	4.91 (2.73-7.08)	96.5 (43.2-161)	213
60 years and older	3.12 (2.43-4.01)	< LOD	3.17 (1.83-5.10)	49.3 (31.6-76.0)	288
<b>Females</b>					
Total, 6 years and older	4.97 (4.04-6.10)	< LOD	4.15 (3.15-6.03)	120 (72.2-153)	1026
6–11 years	6.19 (4.04-9.49)	< LOD†	6.86 (3.85-13.6)	84.7† (37.9-179)	91
12–19 years	4.74 (2.93-7.67)	< LOD	4.64 (2.43-8.27)	98.9 (61.4-292)	179
20–39 years	4.01 (2.77-5.79)	< LOD	4.01 (2.52-5.73)	97.4 (45.6-165)	288
40–59 years	7.07 (4.69-10.7)	< LOD	5.35 (2.45-10.1)	159 (97.6-421)	192
60 years and older	3.96 (2.70-5.81)	< LOD	2.86 (1.64-6.60)	71.5 (49.1-114)	276

< LOD means less than the limit of detection for the uncorrected urine value, 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 5.5.a. Urinary enterodiol: Total population

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the total U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
<b>Males and Females</b>					
Total, 6 years and older	31.1 (28.2-34.3)	4.35 (3.35-5.50)	36.7 (34.2-39.4)	173 (155-189)	5321
6–11 years	30.2 (25.1-36.5)	5.70 (3.50-7.90)	33.4 (28.3-39.4)	154 (113-219)	723
12–19 years	32.5 (28.8-36.8)	5.50 (4.40-6.96)	36.8 (31.8-40.7)	165 (134-188)	1488
20–39 years	31.2 (27.1-35.8)	4.15 (2.50-5.70)	37.6 (34.4-44.2)	170 (140-197)	1139
40–59 years	31.9 (27.1-37.5)	3.80 (1.72-6.20)	37.7 (33.9-42.6)	191 (167-231)	945
60 years and older	29.1 (25.5-33.1)	4.20 (2.80-5.50)	33.1 (29.3-37.6)	163 (142-190)	1026
<b>Males</b>					
Total, 6 years and older	30.3 (26.8-34.2)	3.79 (2.70-5.05)	36.7 (33.2-40.4)	168 (146-187)	2581
6–11 years	30.1 (24.1-37.6)	5.70 (2.74-9.10)	34.6 (27.0-44.1)	132 (109-162)	366
12–19 years	28.6 (24.2-33.7)	4.30 (2.70-6.94)	32.7 (27.9-38.0)	140 (111-186)	729
20–39 years	30.6 (25.9-36.0)	3.60 (2.40-5.13)	37.3 (32.0-46.5)	152 (131-190)	500
40–59 years	32.7 (26.5-40.4)	3.50 (<LOD-6.66)	40.2 (33.8-48.4)	207 (163-269)	478
60 years and older	27.0 (22.4-32.7)	3.35 (2.00-4.47)	33.1 (26.5-39.1)	155 (118-197)	508
<b>Females</b>					
Total, 6 years and older	31.8 (28.9-35.1)	5.01 (3.50-6.40)	37.0 (34.7-39.8)	175 (160-197)	2740
6–11 years	30.3 (23.2-39.7)	5.85 (2.40-8.53)	33.4 (25.6-40.2)	174 (98.1-279)	357
12–19 years	37.3 (31.6-44.0)	6.70 (5.01-8.57)	41.7 (34.7-49.8)	171 (148-215)	759
20–39 years	31.8 (27.3-37.0)	5.30 (1.80-7.40)	38.5 (32.8-45.7)	180 (139-220)	639
40–59 years	31.1 (25.5-37.9)	3.88 (<LOD-8.50)	36.0 (30.9-41.4)	183 (148-231)	467
60 years and older	30.7 (26.1-36.2)	5.00 (2.84-7.17)	32.8 (29.3-37.7)	163 (139-209)	518

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

### Table 5.5.b. Urinary enterodiol: Mexican Americans

Geometric mean and selected percentiles of urine concentrations (in µg/L) for Mexican Americans in the U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
<b>Males and Females</b>					
Total, 6 years and older	25.8 (23.1-28.8)	2.76 (1.68-4.00)	30.9 (27.5-35.2)	146 (128-169)	1470
6–11 years	19.4 (16.0-23.6)	< LOD	22.3 (18.6-30.2)	120 (92.6-156)	222
12–19 years	27.2 (22.6-32.8)	3.80 (1.68-5.50)	29.5 (25.4-37.8)	159 (134-213)	533
20–39 years	28.6 (23.3-35.0)	3.60 (1.60-6.50)	34.3 (26.9-42.4)	143 (110-202)	300
40–59 years	26.5 (21.5-32.6)	2.38 (<LOD-6.60)	32.4 (26.0-38.7)	173 (141-256)	216
60 years and older	19.6 (15.3-25.2)	2.13 (<LOD-5.40)	23.8 (20.4-34.6)	92.1 (74.0-143)	199
<b>Males</b>					
Total, 6 years and older	23.5 (20.0-27.6)	2.04 (<LOD-3.80)	29.5 (23.7-35.0)	137 (105-169)	710
6–11 years	18.4 (15.3-22.1)	< LOD	21.3 (15.1-32.8)	99.2 (79.2-158)	115
12–19 years	20.9 (16.8-26.0)	1.68 (<LOD-4.53)	24.9 (20.4-29.0)	121 (99.9-159)	269
20–39 years	26.7 (19.8-36.0)	1.84 (<LOD-6.30)	30.9 (21.3-43.3)	144 (92.5-216)	127
40–59 years	25.0 (18.6-33.6)	2.36† (<LOD-7.70)	33.0 (19.2-43.3)	115† (75.9-244)	104
60 years and older	18.4 (12.8-26.4)	< LOD†	22.0 (15.7-31.9)	73.1† (43.8-134)	95
<b>Females</b>					
Total, 6 years and older	28.5 (25.3-32.2)	3.80 (2.21-5.74)	33.4 (28.3-39.0)	168 (141-192)	760
6–11 years	20.6 (14.6-29.0)	2.01† (<LOD-5.30)	24.2 (16.5-35.3)	120† (92.6-219)	107
12–19 years	36.2 (29.2-45.0)	5.20 (3.90-9.21)	38.5 (29.3-51.0)	197 (152-282)	264
20–39 years	31.0 (24.7-38.9)	5.83 (<LOD-9.20)	36.0 (26.9-48.1)	132 (97.3-187)	173
40–59 years	28.2 (20.9-38.0)	2.21 (<LOD-7.20)	31.3 (20.0-47.2)	197 (159-279)	112
60 years and older	20.7 (15.1-28.5)	2.21† (<LOD-5.48)	25.5 (16.8-37.9)	101† (63.9-199)	104

< 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 5.5.c. Urinary enterodiol: Non-Hispanic blacks

Geometric mean and selected percentiles of urine concentrations (in µg/L) for non-Hispanic blacks in the U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
<b>Males and Females</b>					
Total, 6 years and older	30.4 (26.5-34.9)	4.87 (3.30-6.21)	35.4 (31.4-38.4)	168 (140-181)	1289
6–11 years	30.7 (26.3-35.9)	6.64 (4.46-8.75)	33.7 (27.5-38.7)	132 (112-167)	249
12–19 years	34.9 (30.9-39.3)	6.11 (3.56-8.33)	41.6 (36.8-47.6)	162 (132-213)	451
20–39 years	28.8 (22.0-37.7)	5.80 (<LOD-8.67)	35.3 (26.6-41.7)	167 (115-210)	197
40–59 years	32.3 (25.6-40.9)	4.54 (2.30-10.3)	33.2 (25.7-44.9)	207 (123-278)	210
60 years and older	25.7 (19.0-34.9)	2.72 (<LOD-4.33)	32.9 (24.4-40.4)	147 (107-219)	182
<b>Males</b>					
Total, 6 years and older	25.2 (21.6-29.3)	4.00 (1.80-5.97)	29.9 (25.0-34.3)	124 (104-163)	628
6–11 years	29.5 (23.2-37.5)	5.80 (3.30-8.75)	35.5 (26.2-44.5)	129 (80.3-167)	127
12–19 years	30.3 (25.8-35.4)	5.70 (3.01-8.57)	34.6 (25.9-42.1)	140 (119-218)	212
20–39 years	22.8 (16.3-32.0)	< LOD†	27.9 (16.6-35.3)	107† (72.4-214)	91
40–59 years	25.2 (17.8-35.5)	3.50† (<LOD-10.5)	26.0 (20.0-34.9)	123† (75.8-227)	109
60 years and older	20.3 (14.8-28.0)	< LOD†	29.1 (19.3-38.0)	96.3† (65.0-143)	89
<b>Females</b>					
Total, 6 years and older	35.8 (29.9-42.9)	5.50 (3.30-8.70)	41.7 (35.4-47.0)	180 (154-237)	661
6–11 years	32.1 (25.6-40.2)	7.34 (4.00-11.4)	33.7 (27.2-38.8)	137 (92.6-230)	122
12–19 years	40.2 (33.4-48.4)	6.13 (3.20-12.0)	47.0 (38.7-59.2)	171 (125-247)	239
20–39 years	34.7 (24.7-48.8)	7.80† (<LOD-10.6)	41.7 (32.5-50.4)	176† (115-237)	106
40–59 years	40.0 (28.9-55.4)	5.50† (2.30-13.1)	37.8 (25.9-63.7)	250† (144-340)	101
60 years and older	30.1 (18.5-48.8)	2.80† (<LOD-6.25)	36.3 (22.5-49.2)	172† (123-396)	93

< 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 5.5.d. Urinary enterodiol: Non-Hispanic whites

Geometric mean and selected percentiles of urine concentrations (in µg/L) for non-Hispanic whites in the U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
<b>Males and Females</b>					
Total, 6 years and older	32.4 (29.3-35.8)	4.68 (3.50-5.90)	38.5 (36.0-41.7)	173 (152-195)	2110
6–11 years	32.5 (24.6-42.8)	5.90 (2.40-10.5)	35.7 (28.1-44.8)	152 (106-253)	196
12–19 years	32.7 (27.6-38.7)	6.10 (3.97-7.80)	35.4 (29.7-43.8)	162 (127-185)	375
20–39 years	33.4 (28.3-39.5)	4.70 (2.70-6.10)	43.1 (37.4-47.1)	174 (138-214)	529
40–59 years	33.2 (27.3-40.4)	3.80 (<LOD-7.40)	40.5 (35.8-46.7)	207 (158-254)	433
60 years and older	29.6 (25.7-34.1)	4.35 (2.74-6.10)	33.4 (29.7-38.7)	160 (139-190)	577
<b>Males</b>					
Total, 6 years and older	32.7 (28.6-37.4)	4.20 (2.92-5.56)	40.0 (35.4-44.1)	174 (146-198)	1036
6–11 years	33.7 (24.0-47.3)	7.55† (<LOD-14.6)	37.8 (25.7-50.9)	135† (103-215)	101
12–19 years	28.6 (22.9-35.7)	4.30 (2.38-7.80)	32.5 (24.3-40.7)	131 (99.1-174)	190
20–39 years	33.9 (27.3-42.2)	3.79 (<LOD-5.95)	44.2 (34.9-55.1)	174 (132-226)	231
40–59 years	35.9 (28.1-46.0)	3.65 (<LOD-7.40)	46.7 (37.8-53.2)	213 (167-263)	224
60 years and older	28.1 (22.8-34.7)	3.35 (2.00-5.30)	33.2 (26.5-40.0)	163 (120-205)	290
<b>Females</b>					
Total, 6 years and older	32.1 (29.0-35.6)	5.35 (3.53-6.70)	37.6 (35.0-41.1)	171 (148-209)	1074
6–11 years	31.2 (20.5-47.7)	5.85† (<LOD-12.2)	34.1 (22.3-50.8)	174† (87.0-327)	95
12–19 years	38.0 (29.5-48.9)	6.87 (3.97-11.2)	43.5 (29.3-58.0)	170 (144-245)	185
20–39 years	33.0 (26.9-40.4)	5.70 (1.80-7.60)	41.1 (30.1-47.8)	166 (130-220)	298
40–59 years	30.8 (24.1-39.4)	4.09 (<LOD-10.4)	36.2 (27.8-42.5)	195 (127-259)	209
60 years and older	30.8 (25.6-37.2)	5.18 (2.74-7.50)	32.9 (29.2-39.8)	160 (127-209)	287

< 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 5.5.e. Urinary enterodiol: Total population (creatinine corrected)**

Geometric mean and selected percentiles of urine concentrations (in µg/g creatinine) for the total U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
<b>Males and Females</b>					
Total, 6 years and older	29.0 (26.5-31.7)	4.17 (3.19-5.13)	33.6 (31.1-36.8)	150 (136-163)	5321
6–11 years	32.8 (27.6-39.0)	5.61 (3.48-7.95)	36.2 (30.8-42.7)	188 (140-244)	723
12–19 years	23.5 (21.1-26.3)	4.27 (2.64-5.42)	26.6 (24.1-30.4)	102 (93.2-117)	1488
20–39 years	25.0 (21.6-28.9)	3.52 (2.52-5.12)	28.2 (25.3-32.7)	124 (108-156)	1139
40–59 years	32.0 (27.7-36.9)	3.50 (2.54-5.86)	39.1 (33.2-44.8)	162 (140-197)	945
60 years and older	34.9 (31.1-39.2)	5.13 (4.30-7.13)	41.3 (35.6-46.2)	174 (157-194)	1026
<b>Males</b>					
Total, 6 years and older	24.3 (21.7-27.4)	3.17 (2.52-4.34)	28.8 (25.2-31.7)	129 (111-152)	2581
6–11 years	31.8 (25.1-40.2)	4.62 (2.80-8.38)	34.8 (28.3-43.7)	172 (112-244)	366
12–19 years	20.3 (17.2-23.9)	3.27 (1.98-4.96)	23.9 (20.5-28.1)	94.1 (81.5-111)	729
20–39 years	21.3 (18.3-24.8)	2.84 (2.15-4.03)	24.6 (21.2-28.1)	111 (96.4-130)	500
40–59 years	27.2 (22.4-33.0)	3.19 (<LOD-5.80)	31.7 (28.3-41.9)	160 (121-201)	478
60 years and older	25.5 (20.5-31.7)	2.96 (2.04-4.74)	30.2 (23.8-35.4)	138 (105-179)	508
<b>Females</b>					
Total, 6 years and older	34.2 (31.2-37.5)	5.26 (4.20-7.08)	39.9 (36.6-43.8)	162 (148-178)	2740
6–11 years	33.9 (26.8-42.8)	6.64 (3.93-8.55)	37.3 (28.6-50.1)	193 (108-304)	357
12–19 years	27.5 (24.0-31.5)	5.26 (3.66-7.26)	30.0 (26.2-34.9)	115 (100-132)	759
20–39 years	29.2 (24.7-34.6)	4.73 (2.54-7.41)	33.5 (28.1-40.6)	141 (108-182)	639
40–59 years	37.3 (31.0-44.9)	4.11 (<LOD-9.07)	44.6 (39.0-53.0)	165 (140-217)	467
60 years and older	44.4 (38.2-51.7)	7.53 (5.23-12.3)	51.4 (44.8-58.8)	188 (164-222)	518

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

**Table 5.5.f. Urinary enterodiol: Mexican Americans (creatinine corrected)**

Geometric mean and selected percentiles of urine concentrations (in µg/g creatinine) for Mexican Americans in the U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
<b>Males and Females</b>					
Total, 6 years and older	23.8 (21.5-26.3)	3.21 (2.34-4.32)	27.6 (25.2-30.2)	134 (116-158)	1470
6–11 years	24.8 (20.1-30.6)	< LOD	32.4 (23.9-40.2)	140 (105-182)	222
12–19 years	21.7 (18.2-25.7)	3.35 (1.53-5.17)	23.9 (19.0-30.4)	115 (99.3-134)	533
20–39 years	23.6 (19.5-28.6)	2.78 (1.62-5.36)	27.1 (22.4-30.1)	127 (91.4-181)	300
40–59 years	26.0 (21.3-31.6)	4.20 (<LOD-6.80)	30.6 (21.5-42.2)	157 (126-192)	216
60 years and older	22.7 (17.8-28.9)	2.26 (<LOD-7.79)	31.3 (25.7-38.1)	110 (80.0-149)	199
<b>Males</b>					
Total, 6 years and older	19.4 (16.9-22.2)	2.48 (<LOD-4.32)	21.9 (18.9-26.1)	117 (87.5-141)	710
6–11 years	21.9 (17.5-27.5)	< LOD	26.9 (19.9-39.3)	129 (83.7-188)	115
12–19 years	15.9 (12.6-20.2)	1.99 (<LOD-3.66)	18.3 (15.2-22.5)	85.9 (73.8-115)	269
20–39 years	19.6 (14.9-25.9)	2.34 (<LOD-5.83)	20.0 (15.7-27.8)	117 (82.1-179)	127
40–59 years	20.9 (15.9-27.5)	4.92† (<LOD-6.91)	23.5 (13.6-36.6)	120† (59.6-192)	104
60 years and older	17.5 (12.0-25.7)	< LOD†	22.7 (17.0-36.2)	74.3† (49.3-179)	95
<b>Females</b>					
Total, 6 years and older	29.8 (26.5-33.6)	4.68 (2.71-7.01)	34.4 (29.6-38.8)	154 (127-193)	760
6–11 years	28.1 (20.5-38.7)	2.82† (<LOD-6.25)	37.3 (25.1-48.1)	144† (98.7-279)	107
12–19 years	30.3 (25.3-36.3)	6.40 (3.13-9.44)	31.6 (24.0-43.4)	156 (112-195)	264
20–39 years	29.3 (23.8-36.0)	5.23 (<LOD-9.41)	31.0 (27.1-38.8)	133 (93.6-193)	173
40–59 years	32.7 (24.9-43.0)	4.56 (<LOD-10.1)	44.8 (27.0-59.4)	183 (141-235)	112
60 years and older	28.2 (20.3-39.3)	3.80† (<LOD-8.93)	34.5 (28.6-42.2)	130† (78.9-213)	104

< LOD means less than the limit of detection for the uncorrected urine value, 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 5.5.g. Urinary enterodiol: Non-Hispanic blacks (creatinine corrected)**

Geometric mean and selected percentiles of urine concentrations (in µg/g creatinine) for non-Hispanic blacks in the U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
<b>Males and Females</b>					
Total, 6 years and older	20.5 (17.5-24.0)	3.30 (2.47-4.03)	23.3 (19.7-26.6)	118 (97.4-138)	1289
6–11 years	28.7 (24.0-34.4)	5.03 (4.02-7.59)	31.1 (26.1-38.8)	126 (95.2-168)	249
12–19 years	19.6 (17.2-22.3)	3.48 (2.11-4.47)	23.5 (19.7-27.2)	86.8 (72.7-116)	451
20–39 years	16.4 (12.2-22.0)	2.15 (<LOD-4.41)	19.3 (14.1-23.8)	96.0 (68.6-128)	197
40–59 years	21.8 (16.9-28.2)	3.57 (2.35-5.11)	23.3 (16.2-31.4)	145 (94.5-187)	210
60 years and older	24.2 (17.8-32.8)	2.94 (<LOD-5.25)	27.0 (22.7-38.6)	146 (88.0-241)	182
<b>Males</b>					
Total, 6 years and older	15.2 (12.9-18.0)	2.40 (1.44-3.12)	18.0 (14.6-21.0)	84.6 (65.9-108)	628
6–11 years	27.3 (20.5-36.4)	4.14 (2.52-9.49)	30.8 (25.6-42.5)	106 (77.7-168)	127
12–19 years	16.5 (14.0-19.5)	2.23 (1.22-4.05)	20.0 (15.1-24.3)	82.9 (61.4-103)	212
20–39 years	11.1 (7.62-16.1)	< LOD†	12.9 (10.3-18.0)	70.4† (30.6-154)	91
40–59 years	15.3 (11.1-21.3)	2.65† (<LOD-5.24)	15.9 (12.8-21.0)	72.6† (41.9-155)	109
60 years and older	15.1 (11.2-20.4)	< LOD†	24.0 (13.9-30.2)	66.1† (45.5-97.2)	89
<b>Females</b>					
Total, 6 years and older	26.5 (21.6-32.5)	4.41 (3.40-5.50)	30.1 (23.5-37.7)	138 (112-180)	661
6–11 years	30.3 (24.4-37.7)	6.64 (4.20-8.88)	33.8 (23.2-41.8)	134 (93.9-209)	122
12–19 years	23.2 (19.3-28.0)	3.96 (2.30-6.55)	26.2 (22.6-30.0)	106 (71.7-145)	239
20–39 years	22.4 (15.8-31.8)	4.87† (<LOD-7.83)	26.6 (18.2-41.9)	99.4† (68.6-138)	106
40–59 years	29.4 (20.0-43.3)	4.32† (2.35-8.07)	34.8 (22.6-48.1)	158† (118-321)	101
60 years and older	33.0 (20.2-53.7)	3.35† (<LOD-9.66)	33.3 (22.7-54.5)	229† (123-590)	93

< LOD means less than the limit of detection for the uncorrected urine value, 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 5.5.h. Urinary enterodiol: Non-Hispanic whites (creatinine corrected)**

Geometric mean and selected percentiles of urine concentrations (in µg/g creatinine) for non-Hispanic whites in the U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
<b>Males and Females</b>					
Total, 6 years and older	32.3 (29.5-35.3)	5.15 (3.94-6.23)	37.4 (33.7-41.4)	158 (140-174)	2110
6–11 years	35.3 (27.5-45.2)	6.62 (3.23-9.63)	40.3 (29.4-50.4)	188 (132-281)	196
12–19 years	24.8 (21.2-29.0)	5.02 (2.36-7.01)	28.1 (24.3-33.6)	99.5 (91.3-121)	375
20–39 years	29.1 (24.9-34.2)	4.84 (2.92-6.99)	31.3 (27.2-37.6)	140 (109-182)	529
40–59 years	34.9 (29.3-41.5)	3.68 (<LOD-7.14)	43.4 (37.7-52.9)	165 (135-208)	433
60 years and older	37.0 (32.4-42.2)	5.89 (4.17-7.67)	44.0 (36.7-50.3)	179 (155-209)	577
<b>Males</b>					
Total, 6 years and older	27.7 (24.5-31.3)	3.53 (2.80-5.38)	31.9 (28.0-36.9)	138 (114-170)	1036
6–11 years	37.0 (25.9-52.8)	6.62† (<LOD-14.2)	42.2 (21.7-60.2)	202† (105-290)	101
12–19 years	21.7 (17.2-27.5)	4.74 (1.98-6.23)	24.7 (20.8-33.1)	94.1 (71.7-119)	190
20–39 years	25.8 (21.2-31.4)	3.41 (<LOD-6.26)	28.0 (24.0-34.9)	121 (100-167)	231
40–59 years	30.2 (24.4-37.5)	3.13 (<LOD-6.83)	38.0 (30.0-51.0)	160 (114-216)	224
60 years and older	27.0 (21.1-34.5)	3.19 (2.17-5.13)	31.1 (23.8-40.0)	138 (104-189)	290
<b>Females</b>					
Total, 6 years and older	37.4 (34.2-40.9)	7.08 (4.81-7.92)	43.1 (38.7-48.7)	168 (151-196)	1074
6–11 years	33.4 (23.1-48.3)	6.28† (<LOD-10.0)	35.5 (27.5-60.6)	150† (87.0-325)	95
12–19 years	28.7 (23.3-35.3)	6.14 (3.02-7.64)	32.1 (26.2-38.8)	112 (90.2-146)	185
20–39 years	32.8 (27.1-39.8)	6.46 (3.12-10.7)	34.9 (27.8-47.5)	166 (107-235)	298
40–59 years	40.1 (32.3-49.8)	6.00 (<LOD-14.4)	48.7 (39.0-58.5)	165 (129-224)	209
60 years and older	47.2 (39.4-56.7)	8.54 (6.23-14.9)	53.0 (46.4-65.3)	189 (157-225)	287

< LOD means less than the limit of detection for the uncorrected urine value, 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 5.6.a. Urinary enterolactone: Total population

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the total U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
<b>Males and Females</b>					
Total, 6 years and older	249 (227-273)	23.6 (19.6-29.5)	330 (303-370)	1710 (1500-1960)	5342
6–11 years	297 (251-352)	55.1 (41.1-73.7)	340 (288-412)	1420 (1250-2050)	727
12–19 years	256 (223-294)	31.5 (22.1-48.0)	317 (266-377)	1560 (1250-1900)	1490
20–39 years	237 (203-276)	20.3 (13.0-28.0)	317 (255-380)	1850 (1420-2320)	1139
40–59 years	231 (190-280)	15.9 (11.0-25.3)	334 (272-399)	1810 (1510-2240)	951
60 years and older	276 (245-311)	32.9 (17.9-50.3)	362 (303-417)	1680 (1330-2170)	1035
<b>Males</b>					
Total, 6 years and older	258 (234-285)	21.7 (17.5-25.3)	349 (310-389)	1890 (1600-2280)	2594
6–11 years	322 (267-387)	55.3 (35.8-102)	363 (309-456)	1380 (1120-1810)	368
12–19 years	246 (212-287)	29.6 (19.4-41.7)	318 (252-391)	1560 (1250-1820)	733
20–39 years	249 (208-299)	19.2 (11.2-30.9)	337 (258-389)	2050 (1650-2540)	500
40–59 years	246 (194-312)	16.6 (12.7-25.3)	360 (278-438)	1940 (1580-2530)	480
60 years and older	274 (228-330)	19.9 (12.9-43.2)	361 (291-458)	1790 (1410-2470)	513
<b>Females</b>					
Total, 6 years and older	241 (215-270)	25.9 (18.1-38.7)	321 (281-359)	1500 (1300-1810)	2748
6–11 years	273 (203-368)	55.5 (24.0-83.6)	325 (236-420)	1520 (847-2280)	359
12–19 years	267 (218-326)	37.2 (20.1-59.1)	314 (259-383)	1500 (1040-2130)	757
20–39 years	225 (181-279)	21.4 (9.30-38.4)	312 (239-381)	1450 (991-2000)	639
40–59 years	217 (164-288)	15.8 (7.30-44.9)	311 (227-399)	1510 (1180-1810)	471
60 years and older	277 (231-333)	43.4 (18.9-66.5)	362 (282-419)	1490 (1190-2140)	522

### Table 5.6.b. Urinary enterolactone: Mexican Americans

Geometric mean and selected percentiles of urine concentrations (in µg/L) for Mexican Americans in the U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
<b>Males and Females</b>					
Total, 6 years and older	236 (198-280)	32.0 (17.7-40.2)	316 (266-354)	1550 (1230-1890)	1492
6–11 years	209 (155-282)	31.4 (17.7-50.6)	265 (192-375)	913 (796-1420)	226
12–19 years	272 (238-312)	36.6 (29.5-61.7)	314 (253-370)	1650 (1350-1990)	538
20–39 years	262 (203-340)	34.5 (8.76-49.8)	346 (280-424)	1840 (1280-2620)	300
40–59 years	192 (149-249)	12.9 (8.00-35.8)	245 (200-347)	1390 (929-2060)	221
60 years and older	197 (137-285)	23.0 (6.66-50.5)	296 (180-415)	967 (825-1490)	207
<b>Males</b>					
Total, 6 years and older	253 (200-320)	32.7 (15.7-46.3)	346 (266-416)	1640 (1000-2380)	722
6–11 years	236 (170-328)	35.1 (24.7-55.1)	316 (171-476)	972 (815-1800)	117
12–19 years	236 (210-266)	34.3 (21.7-55.3)	293 (210-357)	1510 (950-1900)	274
20–39 years	317 (225-446)	39.6 (6.81-79.5)	455 (280-628)	2380 (1280-3560)	127
40–59 years	166 (104-265)	10.4† (4.10-38.8)	238 (148-389)	1030† (647-2120)	105
60 years and older	266 (176-402)	37.2† (6.66-99.7)	374 (248-488)	967† (679-2570)	99
<b>Females</b>					
Total, 6 years and older	218 (167-285)	30.2 (11.9-53.2)	279 (228-344)	1380 (980-1840)	770
6–11 years	184 (106-319)	16.8† (<LOD-80.4)	236 (170-375)	847† (745-1550)	109
12–19 years	319 (241-422)	56.1 (19.5-105)	352 (258-473)	1710 (1290-2530)	264
20–39 years	209 (134-328)	17.3 (2.91-77.7)	308 (183-414)	1100 (790-2580)	173
40–59 years	224 (159-316)	19.1 (3.44-58.0)	245 (193-392)	1480 (980-2200)	116
60 years and older	154 (96.7-246)	11.3† (<LOD-43.0)	231 (148-322)	920† (524-1490)	108

< 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 5.6.c. Urinary enterolactone: Non-Hispanic blacks

Geometric mean and selected percentiles of urine concentrations (in µg/L) for non-Hispanic blacks in the U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
<b>Males and Females</b>					
Total, 6 years and older	272 (230-322)	26.3 (17.6-43.6)	392 (339-441)	1500 (1270-1890)	1286
6–11 years	369 (297-457)	75.1 (41.0-99.1)	470 (391-521)	1520 (1220-2160)	249
12–19 years	351 (315-391)	53.9 (34.8-87.3)	428 (385-479)	1850 (1450-2340)	448
20–39 years	239 (167-344)	12.0 (5.40-49.4)	342 (248-504)	1680 (993-2300)	197
40–59 years	254 (202-320)	23.1 (14.5-45.9)	366 (283-479)	1350 (1050-1920)	210
60 years and older	237 (179-312)	15.2 (7.90-44.9)	399 (296-502)	1270 (1020-1960)	182
<b>Males</b>					
Total, 6 years and older	266 (215-329)	20.9 (12.0-36.5)	416 (339-497)	1630 (1250-2080)	627
6–11 years	362 (304-430)	65.4 (21.5-107)	487 (341-524)	1370 (1070-1720)	127
12–19 years	330 (266-409)	38.6 (26.3-77.1)	422 (363-484)	1770 (1360-2440)	211
20–39 years	261 (163-417)	17.7† (4.49-116)	416 (260-596)	1670† (1000-2500)	91
40–59 years	235 (160-345)	16.6† (4.20-34.6)	401 (184-559)	1350† (741-2580)	109
60 years and older	183 (119-281)	6.00† (3.30-19.5)	267 (155-488)	1290† (1000-1980)	89
<b>Females</b>					
Total, 6 years and older	278 (235-327)	39.1 (18.9-53.2)	360 (314-427)	1500 (1190-1870)	659
6–11 years	376 (259-547)	75.8 (28.7-130)	416 (299-664)	1740 (1050-2410)	122
12–19 years	374 (325-431)	87.3 (39.1-136)	441 (378-521)	1870 (1320-2260)	237
20–39 years	224 (152-330)	9.10† (3.10-49.7)	314 (219-499)	1500† (854-2140)	106
40–59 years	272 (218-340)	43.4† (15.2-71.6)	358 (246-469)	1270† (842-1540)	101
60 years and older	281 (197-401)	32.6† (9.50-102)	438 (307-565)	1270† (900-2210)	93

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

### Table 5.6.d. Urinary enterolactone: Non-Hispanic whites

Geometric mean and selected percentiles of urine concentrations (in µg/L) for non-Hispanic whites in the U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
<b>Males and Females</b>					
Total, 6 years and older	259 (230-291)	23.9 (18.1-33.1)	344 (301-387)	1810 (1580-2100)	2112
6–11 years	308 (244-388)	57.5 (35.8-103)	331 (262-412)	1600 (1290-2310)	196
12–19 years	249 (203-306)	29.6 (17.5-58.1)	310 (242-384)	1620 (1200-2420)	375
20–39 years	235 (196-281)	19.1 (11.1-33.1)	317 (240-383)	1780 (1300-2180)	529
40–59 years	249 (195-319)	16.4 (9.30-34.1)	387 (278-424)	2030 (1610-2750)	434
60 years and older	297 (256-345)	44.8 (19.9-73.6)	372 (303-424)	1730 (1340-2260)	578
<b>Males</b>					
Total, 6 years and older	272 (240-308)	22.9 (17.2-33.1)	360 (310-400)	1970 (1620-2450)	1038
6–11 years	336 (257-441)	70.2† (35.8-152)	348 (283-474)	1390† (881-2600)	101
12–19 years	242 (192-306)	23.2 (10.6-64.4)	316 (222-445)	1560 (1150-2180)	190
20–39 years	236 (185-300)	19.2 (11.0-32.3)	258 (209-389)	2000 (1300-2620)	231
40–59 years	290 (218-386)	17.3 (12.7-39.6)	424 (307-555)	2400 (1710-3540)	225
60 years and older	296 (236-372)	29.6 (12.9-62.1)	377 (292-492)	1750 (1310-2730)	291
<b>Females</b>					
Total, 6 years and older	246 (212-286)	25.4 (15.8-43.7)	328 (280-383)	1490 (1290-2010)	1074
6–11 years	279 (185-420)	47.3† (15.7-117)	325 (224-427)	1530† (719-2900)	95
12–19 years	257 (189-349)	45.4 (17.5-62.1)	286 (222-403)	1800 (944-2950)	185
20–39 years	234 (176-310)	17.4 (7.50-43.7)	323 (238-431)	1310 (980-1970)	298
40–59 years	214 (148-310)	13.0 (5.28-46.1)	347 (206-418)	1660 (1010-2750)	209
60 years and older	298 (245-363)	53.0 (19.4-78.0)	348 (265-418)	1700 (1190-2240)	287

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

**Table 5.6.e. Urinary enterolactone: Total population (creatinine corrected)**

Geometric mean and selected percentiles of urine concentrations (in µg/g creatinine) for the total U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
<b>Males and Females</b>					
Total, 6 years and older	233 (213-254)	21.2 (17.4-24.5)	309 (286-335)	1500 (1380-1630)	5342
6–11 years	323 (277-375)	69.3 (41.1-91.9)	375 (305-423)	1490 (1190-1780)	727
12–19 years	185 (163-211)	23.4 (15.2-31.9)	231 (206-256)	1110 (908-1330)	1490
20–39 years	190 (163-221)	14.0 (10.4-20.9)	278 (240-304)	1290 (1110-1520)	1139
40–59 years	232 (194-277)	16.3 (11.7-24.2)	315 (267-377)	1630 (1380-1940)	951
60 years and older	331 (286-383)	37.6 (20.3-65.1)	437 (380-492)	1860 (1540-2040)	1035
<b>Males</b>					
Total, 6 years and older	208 (190-227)	17.4 (13.9-21.6)	279 (254-303)	1360 (1210-1540)	2594
6–11 years	339 (283-408)	76.0 (49.3-101)	397 (291-480)	1580 (1130-2120)	368
12–19 years	175 (152-201)	19.0 (12.9-29.6)	226 (200-247)	1090 (907-1310)	733
20–39 years	174 (143-210)	15.1 (10.4-22.6)	240 (206-276)	1180 (872-1530)	500
40–59 years	204 (165-253)	12.3 (8.16-24.2)	282 (243-350)	1420 (1150-1850)	480
60 years and older	257 (208-318)	18.2 (11.4-35.3)	380 (282-486)	1590 (1210-1940)	513
<b>Females</b>					
Total, 6 years and older	259 (232-290)	27.9 (18.6-32.9)	342 (307-379)	1590 (1440-1800)	2748
6–11 years	306 (237-394)	55.4 (30.2-126)	343 (263-401)	1400 (1110-1610)	359
12–19 years	197 (163-237)	25.9 (16.2-36.8)	243 (198-306)	1150 (850-1490)	757
20–39 years	207 (165-259)	13.9 (8.20-27.9)	302 (259-360)	1370 (1120-1800)	639
40–59 years	261 (204-335)	18.7 (9.02-39.1)	355 (267-447)	1850 (1450-2300)	471
60 years and older	401 (339-474)	60.5 (30.9-103)	472 (404-562)	2020 (1590-2250)	522

**Table 5.6.f. Urinary enterolactone: Mexican Americans (creatinine corrected)**

Geometric mean and selected percentiles of urine concentrations (in µg/g creatinine) for Mexican Americans in the U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
<b>Males and Females</b>					
Total, 6 years and older	219 (191-252)	24.2 (18.6-33.2)	283 (258-328)	1270 (1030-1490)	1492
6–11 years	268 (200-359)	41.3 (20.8-64.7)	348 (240-437)	1190 (871-1980)	226
12–19 years	215 (185-250)	33.0 (18.7-49.5)	257 (215-296)	1110 (955-1310)	538
20–39 years	217 (174-270)	24.2 (9.46-37.2)	281 (242-398)	1410 (995-1730)	300
40–59 years	193 (146-254)	18.1 (6.78-23.3)	277 (214-371)	1220 (1020-1430)	221
60 years and older	227 (160-323)	25.3 (10.0-60.4)	334 (231-450)	1200 (985-1800)	207
<b>Males</b>					
Total, 6 years and older	208 (169-257)	22.6 (14.9-36.1)	264 (227-328)	1270 (946-1730)	722
6–11 years	284 (191-421)	41.3 (12.9-83.0)	355 (217-504)	1840 (898-2790)	117
12–19 years	178 (152-208)	19.9 (14.6-43.8)	233 (184-281)	939 (716-1150)	274
20–39 years	233 (171-318)	26.9 (9.46-54.1)	280 (206-444)	1570 (868-2190)	127
40–59 years	140 (90.5-216)	8.37† (3.50-22.6)	213 (126-282)	1030† (597-1430)	105
60 years and older	251 (161-390)	26.8† (3.62-67.2)	298 (206-503)	1390† (989-2520)	99
<b>Females</b>					
Total, 6 years and older	231 (193-277)	24.2 (11.1-58.9)	308 (273-366)	1280 (1070-1440)	770
6–11 years	252 (166-382)	28.5† (<LOD-97.1)	319 (223-455)	1010† (786-1490)	109
12–19 years	266 (208-339)	50.2 (18.0-87.9)	282 (225-373)	1400 (1030-1630)	264
20–39 years	199 (138-286)	13.3 (2.46-70.4)	280 (179-409)	1220 (981-1650)	173
40–59 years	270 (189-387)	21.9 (7.00-73.6)	394 (233-611)	1480 (1170-2140)	116
60 years and older	209 (135-324)	21.1† (<LOD-63.0)	333 (154-422)	1070† (773-1500)	108

< LOD means less than the limit of detection for the uncorrected urine value, 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 5.6.g. Urinary enterolactone: Non-Hispanic blacks (creatinine corrected)**

Geometric mean and selected percentiles of urine concentrations (in µg/g creatinine) for non-Hispanic blacks in the U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
<b>Males and Females</b>					
Total, 6 years and older	183 (153-220)	17.9 (12.0-29.9)	269 (219-309)	1090 (911-1230)	1286
6–11 years	345 (285-417)	76.0 (48.1-108)	429 (331-495)	1170 (972-1650)	249
12–19 years	197 (176-221)	32.3 (14.1-53.4)	244 (215-273)	931 (804-1180)	448
20–39 years	136 (92.9-199)	7.64 (3.17-26.6)	197 (138-288)	888 (628-1590)	197
40–59 years	172 (134-220)	15.8 (7.07-28.9)	251 (181-318)	1010 (678-1230)	210
60 years and older	222 (167-295)	15.7 (6.74-56.4)	341 (252-439)	1390 (872-1690)	182
<b>Males</b>					
Total, 6 years and older	161 (128-202)	12.0 (7.64-31.9)	236 (197-278)	1010 (850-1220)	627
6–11 years	335 (272-413)	60.3 (38.6-112)	409 (329-507)	1100 (937-1570)	127
12–19 years	180 (147-221)	20.1 (11.8-45.1)	217 (186-271)	931 (728-1250)	211
20–39 years	126 (78.3-204)	7.64† (1.31-32.6)	177 (125-242)	1100† (556-1590)	91
40–59 years	143 (97.7-209)	9.30† (2.81-28.1)	252 (152-319)	820† (615-1420)	109
60 years and older	136 (86.0-215)	7.45† (1.61-15.7)	220 (128-344)	885† (705-1470)	89
<b>Females</b>					
Total, 6 years and older	205 (172-245)	28.9 (17.0-37.7)	298 (241-340)	1090 (911-1390)	659
6–11 years	356 (270-468)	88.1 (59.4-126)	431 (279-552)	1180 (972-1670)	122
12–19 years	216 (187-250)	50.3 (24.3-69.9)	262 (221-298)	911 (686-1300)	237
20–39 years	144 (96.1-217)	12.1† (2.05-37.2)	218 (142-326)	888† (622-1670)	106
40–59 years	200 (157-256)	28.4† (7.07-51.5)	247 (184-354)	1060† (604-1440)	101
60 years and older	308 (214-443)	41.0† (17.0-90.6)	428 (302-549)	1460† (869-2020)	93

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

**Table 5.6.h. Urinary enterolactone: Non-Hispanic whites (creatinine corrected)**

Geometric mean and selected percentiles of urine concentrations (in µg/g creatinine) for non-Hispanic whites in the U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999–2002.

	Geometric mean (95% conf. interval)	Selected percentiles (95% conf. interval)			Sample size
		10th	50th	90th	
<b>Males and Females</b>					
Total, 6 years and older	257 (229-289)	22.6 (17.1-27.9)	338 (308-377)	1630 (1460-1880)	2112
6–11 years	334 (277-402)	76.1 (48.9-108)	378 (291-435)	1580 (1220-2020)	196
12–19 years	189 (155-229)	22.8 (15.9-29.6)	238 (192-288)	1240 (900-1720)	375
20–39 years	205 (172-243)	14.5 (9.83-22.6)	296 (268-323)	1370 (1160-1640)	529
40–59 years	261 (210-326)	16.4 (10.2-29.9)	362 (282-444)	1850 (1410-2490)	434
60 years and older	371 (310-443)	44.3 (20.3-96.7)	468 (386-570)	1920 (1570-2200)	578
<b>Males</b>					
Total, 6 years and older	230 (206-257)	21.2 (14.6-25.2)	308 (276-336)	1520 (1290-1690)	1038
6–11 years	370 (282-484)	82.0† (69.3-123)	435 (247-601)	1780† (1180-2940)	101
12–19 years	184 (146-233)	19.7 (7.43-31.9)	238 (189-287)	1210 (900-1880)	190
20–39 years	179 (141-227)	14.0 (9.83-24.7)	251 (201-309)	1270 (755-1630)	231
40–59 years	244 (189-316)	16.0 (8.16-29.9)	327 (254-433)	1630 (1240-2490)	225
60 years and older	283 (220-364)	19.6 (13.0-44.7)	424 (301-576)	1590 (1170-1980)	291
<b>Females</b>					
Total, 6 years and older	287 (247-333)	27.9 (16.9-37.7)	370 (327-418)	1850 (1520-2020)	1074
6–11 years	299 (215-416)	55.2† (25.1-142)	342 (249-401)	1400† (847-1800)	95
12–19 years	194 (147-256)	21.7 (13.8-36.8)	241 (172-344)	1250 (783-1800)	185
20–39 years	233 (174-311)	14.0 (6.11-30.6)	322 (280-424)	1410 (1180-2010)	298
40–59 years	279 (204-383)	16.9 (6.44-48.4)	378 (281-532)	1930 (1450-2560)	209
60 years and older	457 (377-553)	76.3 (30.9-151)	513 (404-681)	2040 (1620-2580)	287

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

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