

Supplementary Online Content

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This supplementary material has been provided by the authors to give readers additional information about their work.

eTable 1. Sample Sizes for NHANES 1988-1994, 1999-2002, and 2007-2010^a

	1988-1994	1999-2002	2007-2010
	n(% total ^b)	n(% total ^b)	n(% total ^b)
Sample size, both sexes, 6-19 years^c	5759 (100)	6152 (100)	4205 (100)
Sex			
Male	2805 (51.0)	3094 (51.7)	2196 (51.7)
Female	2954 (49.0)	3058 (48.3)	2009 (48.2)
Age, years			
6-8	1362 (20.2)	910 (20.7)	945 (18.8)
9-11	1479 (22.2)	945 (20.5)	1013 (20.4)
12-15	1492 (28.9)	2178 (29.2)	1109 (30.3)
16-19	1426 (28.6)	2119 (29.6)	1138 (30.5)
Race/ethnicity			
Non-Hispanic White	1507 (66.7)	1553 (59.8)	1299 (57.8)
Non-Hispanic Black	1948 (14.9)	1823 (14.5)	955 (14.0)
Mexican American	2031 (8.6)	2262 (11.7)	1171 (14.4)
Other	273 (9.9)	514 (14.1)	780 (13.8)
Weight Status^d			
Underweight	186 (3.7)	186 (3.7)	132 (3.4)
Normal weight	3893 (71.8)	3705 (64.7)	2466 (62.5)
Overweight	792 (13.9)	944 (15.3)	682 (15.5)
Obese	749 (10.5)	1155 (16.3)	875 (18.6)
Fasting sample size, both sexes, 12-19 years	1106 (100)	1861 (100)	996 (100)
Sex			
Male	491 (49.3)	945 (51)	547 (50.9)
Female	615 (50.7)	916 (49)	449 (49.1)
Age			
12-15	559 (46.5)	924 (49.7)	483 (50.3)
16-19	547 (53.5)	937 (50.3)	513 (49.7)
Race/ethnicity			
Non-Hispanic White	277 (64.3)	491 (61.8)	326 (59.8)
Non-Hispanic Black	374 (14.8)	512 (13.9)	216 (15.0)
Mexican American	401 (8.4)	704 (10.7)	268 (12.5)
Other	54 (12.4)	154 (13.6)	186 (12.7)
Weight Status^d			
Underweight	37 (4.1)	57 (4.4)	25 (2.9)
Normal weight	700 (70.0)	1122 (65.8)	593 (63.6)
Overweight	166 (14.8)	281 (13.5)	171 (15.6)
Obese	161 (11.1)	345 (16.3)	185 (17.9)

Source: National Health and Nutrition Examination Survey

^a Sample sizes are un-weighted^b Percentages may not sum to 100% because of rounding^c Excludes those with missing total cholesterol or high density lipoprotein cholesterol^d Pregnant adolescents excluded from these analyses

Note: Requirement for fasting was 8.5 to 23 hours

eTable 2: Prevalence Over Time in Adverse Lipid Concentration by Sex, Age, Race/Ethnicity, Among Children and Adolescents, 6-19 Years, US, 1988-2010

	1988-1994 %(95% CI)	1999-2002 %(95% CI)	2007-2010 %(95% CI)	P ^a
Total cholesterol (≥200 mg/dL)				
Total	11.3(9.8-12.7)	10.9(9.2-12.6)	8.1(6.7-9.5)	0.002
Sex				
Boys	10.2(7.8-12.5)	9.3(6.8-11.8)	8.5(6.7-10.3)	0.269
Girls	12.4(10.8-14)	12.5(10.9-14.2)	7.7(5.9-9.5)	<0.001
Age (years)				
6-8	9.1(6.5-11.7)	9(6.4-11.7)	7.7(5.5-9.9)	0.412
9-11	13.6(9.6-17.7)	11.3(8.2-14.5)	9.4(7.3-11.6)	0.069
12-15	8.5(6.3-10.8)	9(6.6-11.5)	6.2(4.4-8)	0.105
16-19	13.7(10.4-17)	13.6(10.5-16.8)	9.4(7-11.8)	0.035
Race/ethnicity				
Non-Hispanic white	10.1(8.2-12)	10.7(8.4-13)	8.1(5.9-10.3)	0.166
Non-Hispanic black	16.1(13.5-18.6)	14(12.1-15.9)	8.1(6.2-10)	<0.001
Mexican American	11.6(9.4-13.9)	9.9(8.9-11)	7.5(5.1-9.9)	0.013
HDL cholesterol (< 40 mg/dL)				
Total	17.3(15-19.5)	18.3(17.1-19.4)	14.8(13.7-15.9)	0.051
Sex				
Boys	20.8(17.6-24)	21.6(19.7-23.5)	17.3(15.7-18.8)	0.047
Girls	13.5(10.8-16.3)	14.7(12.9-16.6)	12.2(10.3-14.2)	0.435
Age (years)				
6-8	14(10.7-17.2)	13.3(9.8-16.9)	11.1(8.7-13.4)	0.147
9-11	11.8(8.4-15.1)	16.5(12.4-20.5)	13.7(11-16.4)	0.373
12-15	19.7(15.6-23.8)	18.1(15.5-20.8)	13.9(11.3-16.5)	0.017
16-19	21.4(17.8-25)	23.1(20.7-25.5)	18.9(16.2-21.5)	0.259
Race/ethnicity				
Non-Hispanic white	19.7(16.9-22.5)	20.2(18.3-22.2)	15.3(13.5-17.1)	0.008
Non-Hispanic black	8.8(6.9-10.7)	10.2(7.8-12.6)	9.1(6.7-11.4)	0.863
Mexican American	15.6(12.8-18.4)	18.4(16.2-20.5)	17.7(15.6-19.8)	0.227

eTable 2: (continued)

NHDL Cholesterol (≥145 mg/dL)	1988-1994 %(95% CI)	1999-2002 %(95% CI)	2007-2010 %(95% CI)	P^a
Total	13.6(12.1-15)	14.9(13.1-16.6)	10(8.4-11.5)	0.001
Sex				
Boys	12.2(10.2-14.1)	14.2(12.1-16.3)	11(9-13)	0.424
Girls	15(12.8-17.3)	15.6(13.4-17.8)	8.8(6.8-10.8)	<0.001
Age (years)				
6-8	10.5(7.6-13.5)	11.8(8.6-15)	7.3(5.3-9.3)	0.067
9-11	15.6(11.7-19.5)	15.6(12.1-19.2)	11.1(8.9-13.3)	0.047
12-15	11.1(8.4-13.8)	13.1(11.1-15.1)	8.2(5.6-10.9)	0.124
16-19	16.6(13.3-19.8)	18.2(15.1-21.3)	12.6(10.3-14.8)	0.042
Race/ethnicity				
Non-Hispanic white	13.9(12.1-15.7)	15.9(13.5-18.2)	10.8(8.3-13.3)	0.046
Non-Hispanic black	14.1(12-16.2)	14.6(12.2-17)	7.5(6.1-8.9)	<0.001
Mexican American	13(10.4-15.6)	12.6(11.2-14)	9.5(7.6-11.4)	0.031
Either HDL cholesterol (<40 mg/dL) or NHDL cholesterol (≥145 mg/dL)				
Total	27.2(24.6-29.7)	28.4(26.9-30)	22(20.3-23.6)	0.001
Sex				
Boys	28.9(25.8-31.9)	30(28.1-32)	24.7(22.7-26.6)	0.022
Girls	25.4(22-28.7)	26.7(24.3-29.1)	19(16.6-21.5)	0.003
Age (years)				
6-8	21.4(17.3-25.4)	23.8(19-28.6)	16.8(14-19.7)	0.068
9-11	24(19.3-28.7)	26.8(22.9-30.7)	22.2(19.1-25.3)	0.522
12-15	27.8(22.6-33)	26.6(24-29.3)	19.6(16-23.3)	0.011
16-19	33.1(28.9-37.3)	34.5(31.9-37.1)	27.3(24.4-30.2)	0.022
Race/ethnicity				
Non-Hispanic white	29.1(26.1-32.2)	30.4(27.6-33.3)	23.2(20.2-26.1)	0.005
Non-Hispanic black	21(18.6-23.4)	22(18.8-25.2)	15.2(12.9-17.6)	0.001
Mexican American	24.9(21.1-28.7)	27.4(24.9-30)	23.8(20.5-27.1)	0.651

Source: National Health and Nutrition Examination Surveys

Abbreviations: HDL- high density lipoprotein; NHDL- non-high density lipoprotein; CI- confidence interval

^a P-value for linear trend between 1988-1994 and 2007-2010

eTable 3: Prevalence Over Time in Adverse Lipid Concentration by Sex, Age, Race/Ethnicity, Among Adolescents, 12-19 Years, US, 1988-2010

	1988-1994 %	1999-2002 %	2007-2010 %	P ^a
LDL cholesterol^b (≥130 mg/dL)				
Total	11.9(8.3-15.5)	9.2(7.1-11.4)	7.4(5.4-9.4)	0.030
Sex				
Boys	9.4(4.1-14.7)	9.8(6.3-13.2)	7.3(4.5-10.1)	0.489
Girls	14.4(10.1-18.6)	8.7(6.8-10.6)	7.6(5.3-9.9)	0.005
Age (years)				
12-15	7.5(5-10)	7.8(5.5-10.1)	5.6(3.2-8.1)	0.287
16-19	15.7(10.2-21.2)	10.7(7.4-13.9)	9.3(6.4-12.1)	0.037
Race/ethnicity				
Non-Hispanic White	13.7(8.5-18.9)	8.8(6.1-11.6)	7.8(4.7-11)	0.05
Non-Hispanic Black	12.6(8.7-16.4)	10.7(7.9-13.6)	9.2(5-13.4)	0.214
Mexican American	6.8(3.6-9.9)	7.8(5.1-10.6)	5.3(2.3-8.4)	0.495
Triglycerides (≥130 mg/dL)				
Total	17.3(13.6-21)	16.1(13-19.2)	12.4(10.1-14.8)	0.027
Sex				
Boys	16.1(8.9-23.3)	17.5(13.2-21.9)	13.3(9.3-17.4)	0.506
Girls	18.5(12.6-24.3)	14.7(9.8-19.6)	11.5(7-16.1)	0.061
Age (years)				
12-15	15.7(9.9-21.6)	13.8(10.5-17.1)	10(7.6-12.4)	0.068
16-19	18.6(12.4-24.9)	18.4(13.5-23.3)	14.9(11.3-18.5)	0.302
Race/ethnicity				
Non-Hispanic White	18.9(13.5-24.2)	18(13.4-22.6)	13.7(10.6-16.9)	0.093
Non-Hispanic Black	4.8(2.4-7.2)	7.3(4.5-10.1)	3.7(1.4-6)	0.488
Mexican American	17.1(12.3-22)	16.5(13.7-19.4)	18(13.4-22.6)	0.779

Source: National Health and Nutrition Examination Surveys

Abbreviation: LDL- low density lipoprotein; LL- lower limit for the 95% confidence interval; UL- upper limit for the 95% confidence interval

^a P-value for linear trend between 1988-1994 and 2007-2010

^b Low density lipoprotein cholesterol is calculated by the Friedewald Equation as follows: LDL=Serum total cholesterol-HDL-serum triglyceride/5. This equation is valid only if serum triglyceride≤400 mg/dL.

eTable 4: Linear Regression Analyses of Serum Lipid Concentrations With Adjustment for Age, Race/Ethnicity, and Weight Status, US, 6-19 Years , 1988-2010

	Total cholesterol Beta-coefficient (95% CI)		HDL cholesterol Beta-coefficient (95% CI)		Non-HDL cholesterol ^a Beta-coefficient (95% CI)		LDL cholesterol ^{b,c} Beta-coefficient (95% CI)		Log triglyceride ^c Beta-coefficient (95% CI)	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Total^d										
1988-1994	0.0 (ref)	0.0 (ref)	0.0 (ref)	0.0 (ref)	0.0 (ref)	0.0 (ref)	0.0 (ref)	0.0 (ref)	0.0 (ref)	0.0 (ref)
1999-2002	-1.2 (-4.1, 1.8)	-1.0 (-3.2, 1.3)	-0.6 (-1.6, 0.4)	0.0 (-0.9, 0.9)	-0.6 (-3.2, 2.1)	-1.0 (-3.3, 1.3)	3.7 (-1.4, 8.8)	-4.7 (-9.8, 0.5)	0.00 (-0.07, 0.08)	-0.05 (-0.13, 0.02)
2007-2010	-5.3 (-8.1, -2.6)	-7.3 (-9.9, -4.6)	2.7 (1.6, 3.8)	2.1 (1.1, 3.2)	-8.0 (-10.7, -5.3)	-9.4 (-12.1, -6.7)	-3.2 (-8.6, 2.3)	-9.0 (-14.1, -3.8)	-0.10 (-0.18, 0.01)	-0.18 (-0.28, 0.09)

Source: National Health and Nutrition Examination Surveys

^a Non-HDL cholesterol=Serum total cholesterol-HDL cholesterol.

^b Low density lipoprotein cholesterol is calculated by the Friedewald Equation as follows: LDL=Serum total cholesterol-HDL-serum triglyceride/5. This equation is valid only if serum triglyceride<=400 mg/dL.

^c Analyses for LDL cholesterol and triglyceride include only youth 12-19 years

^d Adjusted for age, race/ethnicity, and weight status