

## Youth and Cardiovascular Diseases--- Statistics 2008 Update

### Youth and Cardiovascular Diseases — Statistics

#### Out of Hospital Cardiac Arrest

- The reported incidences of out-of-hospital pediatric cardiac arrest vary widely (from 2.6 to 19.7 annual cases per 100,000). (Donoghue A, Nadkarni V, Berg RA, Osmond MH, Wells GA, Nesbitt L, Stiell IG, CanAm Pediatric Cardiac Arrest Investigators. *Out-of-hospital pediatric cardiac arrest: an epidemiologic review and assessment of current knowledge. Ann Emerg Med.* 2005; 46: 512–522.) Because there are 72,293,812 individuals under age 18 in the United States (*Monthly Postcensal Resident Population (8/1/2005): U.S. Census data. Available at: <http://www.census.gov>. Accessed October 19, 2005*), this implies that there are 1,900 to 14,200 pediatric out-of-hospital cardiac arrests annually from all causes (including trauma, sudden infant death syndrome, respiratory causes, cardiovascular causes, and submersion).
- In 2004, 5,891 people died from unintentional choking or suffocation. Of these, 725 were under age 1. (NCHS)
- Ventricular fibrillation is an uncommon cause of cardiac arrest in children, but it is observed in approximately 5 percent to 15 percent of children with out-of-hospital cardiac arrest. (Mogayzel C, Quan L, Graves JR, Tiedeman D, Fahrenbruch C, Herndon P. *Out-of-hospital ventricular fibrillation in children and adolescents: causes and outcomes. Ann Emerg Med.* 1995; 25: 484–491.)
- Studies that document voluntary reports of deaths among high school athletes suggest that the incidence of out-of-hospital cardiac arrest ranges from 0.28 to 1.0 deaths per 100,000 high school athletes annually nationwide. (Luckstead EF, Patel DR. *Catastrophic pediatric sports injuries. Pediatr Clin North Am.* 2002; 49: 581–591; Maron BJ, Gohman TE, Aeppli D. *Prevalence of sudden cardiac death during competitive sports activities in Minnesota high school athletes. J Am Coll Cardiol.* 1998; 32: 1881–1884.) Although incomplete, these numbers provide a basis for estimating the number of deaths in this age range.
- The reported average survival to discharge after pediatric out-of-hospital cardiac arrest is 6.7 percent. (Donoghue A, Nadkarni V, Berg RA, Osmond MH, Wells GA, Nesbitt L, Stiell IG, CanAm Pediatric Cardiac Arrest Investigators. *Out-of-hospital pediatric cardiac arrest: an epidemiologic review and assessment of current knowledge. (Ann Emerg Med.* 2005; 46: 512–522.)
- The rates of survival to discharge after in-hospital cardiac arrest are 27 percent among children and 18 percent among adults. (Nadkarni VM, Larkin GL, Peberdy MA, Carey SM, Kaye W, Mancini ME, Nichol G, Lane-Truitt T, Potts J, Ornato JP, Berg RA, National Registry of Cardiopulmonary Resuscitation Investigators. *First documented rhythm and clinical outcomes from in-hospital cardiac arrest among children and adults. JAMA.* 2006; 295: 50–57.)
- A report based on King County, Washington, describes the incidence of non-traumatic pediatric cardiac arrest (among students ages 3–18) occurring in schools and estimates rates (per 100,000 person school years) for elementary, middle and high schools to be 0.18, 0.19 and 0.15, respectively (based on the time frame from Jan. 1, 1990 to Dec. 31, 2005.) (Lofti et al. *Cardiac Arrest in Schools. Circulation.* 2007; 116:1341-1343.)

#### Stroke in Children

- Stroke in children peaks in the perinatal period. In the NHDS from 1980–98, the rate of stroke for infants less than 30 days old (per 100,000 live births per year) was 26.4, with rates of 6.7 for hemorrhagic stroke and 17.8 for ischemic stroke. (Lynch JK, Hirtz DG, DeVeber G, Nelson KB. *Report of the National Institute of Neurological Disorders and Stroke workshop on perinatal and childhood stroke. Pediatrics.* 2002; 109: 116–123.)
- A history of infertility, preeclampsia, prolonged rupture of membranes, and chorioamnionitis were found to be independent risk factors for radiologically confirmed perinatal arterial ischemic stroke in the Kaiser Permanente Medical Care Program. The risk of perinatal stroke increased approximately 25-fold, with an absolute risk of one per 200

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deliveries when three or more of the following antenatally determined risk factors were present: infertility, preeclampsia, chorioamnionitis, prolonged rupture of membranes, primiparity, oligohydramnios, decreased fetal movement, prolonged second stage of labor, and fetal heart rate abnormalities. (Lee J, Croen LA, Backstrand KH, Yoshida CK, Henning LH, Lindan C, Ferriero DM, Fullerton HJ, Barkovich AJ, Wu YW. *Maternal and infant characteristics associated with perinatal arterial stroke in the infant. JAMA. 2005; 293: 723–729.* Broderick J, Talbot GT, Prenger E, Leach A, Brott T. *Stroke in children within a major metropolitan area: the surprising importance of intracerebral hemorrhage. J Child Neurol. 1993; 8: 250–255.*)

- The overall incidence rate of all strokes in children <15 years was 6.4/100,000 in 1999, a nonsignificant increase when compare to 1988. The 30-day case fatality rates were 18 percent in 1988–89, 9 percent in 1993–94 and 9 percent in 1999. The incidence of stroke in children has been stable over the past 10 years. The previously reported nationwide decrease in overall stroke mortality in children might be due to decreasing case fatality after stroke and not decreasing stroke incidence. It is conservatively estimated that approximately 3,000 children <20 years would have a stroke in the United States 2004. (Kleindorfer D, Khoury J, Kissela B, Alwell K, Woo D, Miller R, Schneider A, Moomaw C, Broderick JP. *Temporal trends in the incidence and case fatality of stroke in children and adolescents. J Child Neurol. 2006 May;21[5]:415-8.*)
- Stroke in childhood and young adulthood has a disproportionate impact on the affected patients, their families, and society, as compared with stroke at older ages. Outcome of childhood stroke was a moderate or severe deficit in 42 percent of cases. (deVeber GA, MacGregor D, Curtis R, Mayank S. *Neurologic outcome in survivors of childhood arterial ischemic stroke and sinovenous thrombosis. J Child Neurol. 2000; 15: 316–324.*)
- Compared with the stroke risk of white children, black children have a higher RR of 2.12, Hispanics have a lower RR of 0.76, and Asians have a similar risk. Boys have a 1.28-fold higher risk of stroke than girls. There are no ethnic differences in stroke severity or case-fatality, but boys have a higher case-fatality rate for ischemic stroke. The increased risk among blacks is not fully explained by the presence of sickle cell disease, nor is the excess risk among boys fully explained by trauma. (Fullerton HJ, Wu YW, Zhao S, Johnston SC. *Risk of stroke in children: ethnic and gender disparities. Neurology. 2003; 61: 189–194.*)
- Despite current treatment, one of 10 children with ischemic stroke will have a recurrence within five years. (Strater R, Becker S, von Eckardstein A, Heinecke A, Gutsche S, Junker R, Kurnik K, Schobess R, Nowak-Gottl U. *Prospective assessment of risk factors for recurrent stroke during childhood: a 5-year follow-up study. Lancet. 2002; 360: 1540–1545.*)
- Cerebrovascular disorders are among the top 10 causes of death in children, with rates highest in the first year of life. Stroke mortality in children under age 1 has remained the same over the past 40 years. (Lynch JK, Hirtz DG, DeVeber G, Nelson KB. *Report of the National Institute of Neurological Disorders and Stroke workshop on perinatal and childhood stroke. Pediatrics. 2002; 109: 116–123.*)
- From 1979–98 in the United States, childhood mortality from stroke declined by 58 percent overall, with reductions in all major subtypes. (Fullerton HJ, Chetkovich DM, Wu YW, Smith WS, Johnston SC. *Deaths from stroke in U.S. children, 1979 to 1998. Neurology. 2002; 59: 34–39.*)
  - Ischemic stroke decreased by 19 percent, subarachnoid hemorrhage by 79 percent, and intracerebral hemorrhage by 54 percent.
  - Black ethnicity was a risk factor for death from all stroke types.
  - Male sex was a risk factor for death from subarachnoid hemorrhage and intracerebral hemorrhage, but not from ischemic stroke.
- Sickle cell disease is the most important cause of ischemic stroke among African-American children. The Stroke Prevention Trial in Sickle Cell Anemia (STOP) demonstrated the efficacy of blood transfusions for primary stroke prevention in high-risk children with

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sickle cell disease in 1998. First-admission rates for stroke in California among persons under age 20 with sickle cell disease showed a dramatic decline subsequent to the publication of the STOP study. For the study years 1991–98, 93 children with sickle cell disease were admitted to California hospitals with a first stroke; 92.5 percent were ischemic, and 7.5 percent were hemorrhagic. The first-stroke rate was 0.88 per 100 person-years during 1991–98, compared with 0.50 in 1999 and 0.17 in 2000 ( $P < 0.005$  for trend). (Fullerton HJ, Adams RJ, Zhao S, Johnston SC. Declining stroke rates in Californian children with sickle cell disease. *Blood*. 2004; 104: 336–339.)

### High Blood Pressure in Children and Adolescents

- Analysis of NHES, HHANES, and NHANES surveys of the NCHS (1963–2002), found the BP, pre-HBP and HBP trends in children and adolescents ages 8–17, were downward from 1963–88 and upward thereafter. Pre-HBP and HBP increased 2.3 percent and 1 percent respectively, between 1988 and 1999. Obesity increase partially explained the HBP and pre-HBP 1988–99 rise, more so abdominal than general obesity. Blood pressure and HBP reversed their downward trends 10 years after the increase in the prevalence of obesity. Also an ethnic and gender gap appeared in 1988 for pre-HBP and 1999 for HBP; non-Hispanic blacks and Mexican-Americans had a greater prevalence of HBP and pre-HBP than non-Hispanic whites, and males greater than females. (Din-Dzietham R, Liu Y, Bielo M-V, Shamsa F. High Blood pressure trended in children and adolescents in national surveys, 1963-2002. *Circulation*. In Press)
- A study of over 14,000 children and adolescents ages 3–18 in northeast Ohio, observed for at least three times for well-child care between 1999 and 2006, found that 3.6 percent had hypertension. Of these, 26 percent had been diagnosed and 74 percent were undiagnosed. In addition, 3 percent of those with hypertension had stage 2 hypertension and 41 percent of those with stage 2 were undiagnosed. Criteria for prehypertension were met by 485 children. Of these 11 percent were diagnosed. (Hansen, ML, Gunn, PW, Kaelber DC. Underdiagnosis of hypertension in children and adolescents. *JAMA*. 2007;298[8]:874-879.)
- A study from 1988–94 to 1999–2000 of children and adolescents ages 8–17 showed that among non-Hispanic blacks, mean systolic BP levels increased 1.6 mm Hg among girls and 2.9 mm Hg among boys when compared with non-Hispanic whites. Among Mexican Americans, girls' systolic BP increased 1.0 mm Hg and boys' increased 2.7 mm Hg when compared with non-Hispanic whites. (Muntner P, He J, Cutler JA, Wildman RP, Whelton PK. Trends in blood pressure among children and adolescents. *JAMA*. 2004;291:2107-2113.)

### Congenital Cardiovascular Defects (ICD/10 codes Q20-Q28) (ICD/9 codes 745-747)

#### Prevalence

- As of 2002, the prevalence of congenital cardiovascular disease in the United States was estimated to range from 650,000 to 1.3 million. (Lloyd-Jones DM, et al. Lifetime risk for developing congestive heart failure: the Framingham Heart Study. *Circulation*. 2002;106:3068-72.) Almost as many people are under age 25 as over that age, but the proportions differ among disease types. Using available data to estimate the expected numbers of infants with each type of congenital cardiovascular disease at birth, the authors estimate their survival to 2002 assuming no treatment (the low estimate) and full treatment (the high estimate) of prevalence. Of the 1.3 million, 750,000 are simple lesions, 400,000 are moderate and 180,000 are complex. There are an estimated 3 million more people with bicuspid aortic valve (BAV); 2 million adults and 1 million children. Based on the tabulations in Hoffman et al., prevalence was calculated by type of lesion excluding BAV. We assumed that prevalence is two-thirds of the way between the estimated high and low ranges, representing a total of about 1 million persons with congenital heart disease. The most common types are: ventricular septal defect, 199,000 people; atrial septal defect, 187,000

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people; patent ductus arteriosus, 144,000 people; and valvular pulmonary stenosis, 134,000 people. (Hoffman JE, et al. *Prevalence of congenital heart disease. Am Heart J.* 2004;147:425-439.)

### Incidence

Major defects are usually apparent in the neonatal period, but minor defects may not be detected until adulthood. Thus, true measures of incidence for congenital heart disease would need to record new cases of defects presenting anytime in fetal life through adulthood. However, estimates are only available for new cases detected between birth and 30 days of life, known as birth prevalence, or as new cases detected in the first year of life only. Both of these are typically reported as cases per 1,000 live births per year, and do not distinguish between tiny defects that resolve without treatment and major malformations. To distinguish more serious defects, some studies also report new cases of sufficient severity to undergo an invasive procedure or result in death within the first year of life. Despite the absence of true incidence figures, some data are available, as shown in the table below.

- According to the CDC, one in every 110 babies in the metropolitan Atlanta area was born with a congenital heart defect, including some infants with tiny defects that resolved without treatment. Some defects occur more commonly in males or females, or in whites or blacks. (Botto LD, et al. *Racial and Temporal Variations in the Prevalence of Heart Defects. Pediatrics* 2001;107(3):E32)
- 9.0 defects per 1,000 live births are expected, or 36,000 babies per year in the United States. Of these, several studies suggest that 9,200, or 2.3 per 1,000 live births, require invasive treatment or result in death in the first year of life. (*Prevalance and incidence of cardiac malformations. In: Moller JH, ed. Surgery of Congenital Heart Disease Pediatric Cardiac Care Consortium 1984-1995. Armonk, NY: Futura Publishing Company, 1998:20. Vol. 6.*)
- Some studies suggest that as many as 5 percent of newborns, or 200,000 per year, are born with tiny muscular ventricular septal defects, almost all of which close spontaneously. (Roguin N, et al. *High prevalence of muscular ventricular septal defect in neonates. JACC* 1995;26:1545-8; Sands AJ, et al. *Incidence and risk factors for ventricular septal defect in "low-risk" neonates. Arch Dis Child Fetal Neonatal Ed* 1999;81(1):F61-F63). These defects nearly never require treatment, so they aren't included in the following table.

### Annual Incidence of Congenital Cardiovascular Defects

Type of Presentation	Rate per 1,000 Live Births	Number
Fetal loss	Unknown	Unknown
Invasive procedure during first year	2.3	9,200
Detected during first year *	9.0	36,000
Bicuspid aortic valve	13.7	54,800
Other defects detected after first year	Unknown	Unknown
Total	Unknown	Unknown

- \* Includes stillbirths and pregnancy termination less than 20 weeks gestation; includes some defects that resolve spontaneously or don't require treatment.

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### Cardiomyopathy (ICD/10 code I42) (ICD/9 code 425)

- 58 percent of deaths from congenital cardiovascular defects in 2003 occurred in children under age 15. In 2004, crude infant death rates (under 1 year) were 38.3 for white babies and 56.0 for black babies.
- Since 1996, the NHLBI's Pediatric Cardiomyopathy Registry has collected data on all children with newly diagnosed cardiomyopathy in New England and the Central Southwest (Texas, Oklahoma and Arkansas). (*Lipshultz et al. The incidence of pediatric cardiomyopathy in two regions of the United States. N Engl J Med 2003;348-1647-55.*)
  - The overall incidence of cardiomyopathy is 1.13 cases per 100,000 in children under age 18.
  - In children under 1 year of age, the incidence is 8.34 and in children ages 1–18 it's 0.70 per 100,000.
  - The annual incidence is lower in white than in black children; higher in boys than in girls; and higher in New England (1.44 per 100,000) than in the Central Southwest (0.98 per 100,000).
- Studies show that 36 percent of young athletes who die suddenly have probable or definite hypertrophic cardiomyopathy (HCM). (*Maron BJ, et al. Sudden death in young competitive athletes. JAMA 1996;276:199-204.*)
- HCM is the leading cause of sudden cardiac death in young people, including trained athletes. HCM is the most common inherited heart defect, occurring in one of 500 individuals. In the United States, some 500,000 people have HCM, yet most are unaware they are affected.

### Kawasaki Disease (ICD/10 M30.3) (ICD/9 code 446.1)

- An estimated 5,300 cases of Kawasaki disease were diagnosed in 2003. Kawasaki disease occurs more often among boys (63 percent) and among those of Asian ancestry. (*Analysis of the 2003 Kids' Inpatient Database (KID); <http://www.hcup-us.ahrq.gov/kidoverview.jsp>. Personal communication with Jane W. Newburger and Kimberlee Gauvreau of Children's Hospital of Boston.*)
- An estimated 4,248 hospitalizations for Kawasaki disease (KD) occurred in the United States in 2000, with a median age of 2 years. Race-specific incidence rates indicate that KD is most common among Americans of Asian and Pacific Island decent (32.5/100,000 children <5 years old), intermediate in non-Hispanic African Americans (16.9/ 100,000 children <5 years old), and Hispanics (11.1/ 100,000 children <5 years old), and lowest in whites (9.1/ 100,000 children <5 years old).<sup>19</sup> In the United States, Kawasaki disease is more common during the winter and early spring months; boys outnumber girls by approximately 1.5 to 1.7:1; and 76 percent of children are less than 5 years old.
- The incidence of Kawasaki disease in the United States did not increase between 1988 and 1997. (*Chang RK. The incidence of Kawasaki disease in the United States did not increase between 1988 and 1997. Pediatr. 2003;111:1124-1125.*)

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### Tobacco

- From 1980–2005, the percentage of high school seniors who reported smoking in the previous month decreased 24 percent. This decreased by 7.5 percent in males, 38 percent in females, 11 percent in whites, and 57.5 percent in blacks or African Americans. (*National Center for Health Statistics. Health, United States, 20052006. With Chartbook on Trends in the Health of Americans. Hyattsville, Md: National Center for Health Statistics; 20052006. Available at: <http://www.cdc.gov/nchs/hus.htm>. <http://www.cdc.gov/nchs/data/hus/hus05.pdf>. Accessed October 25, 2006.* February 23, 2007.)
- Each year, 150,000 to 300,000 children younger than 18 months of age have respiratory tract infections because of exposure to secondhand smoke. ([www.cdc.gov/tobacco/research\\_data/environmental/ets-fact.htm](http://www.cdc.gov/tobacco/research_data/environmental/ets-fact.htm))
- Children's exposure to secondhand smoke, as indicated by cotinine levels, decreased between 1988–94 and 1999–2002. Overall, 59 percent of those age 4 to 11 were exposed in 1999–2002, compared to 88 percent in 1988–94. From 1999–2002, 84 percent of non-Hispanic black children between the ages of 4 and 11 were exposed, compared with 58 percent of non-Hispanic white children and 47 percent of Mexican-American children. The percentage of homes with children under age 7 in which someone regularly smokes decreased from 29 percent in 1994 to 11 percent in 2003. (*Federal Interagency Forum on Child and Family Statistics. America's Children: Key National Indicators of Well-Being, 2005. Washington, D.C.: US Government Printing Office; 2005.*)
- Among youths ages 12 to 17 in 2005, 3.3 million (13.1 percent) used a tobacco product in the past month, and 2.7 million (10.8 percent) used cigarettes. The rate of cigarette use in the past month declined from 13.0 percent in 2002 to 10.8 percent in 2005. Cigar use in the past month declined to 4.2 percent in 2005 from 4.8 percent in 2004. Smokeless tobacco use was reported by 2.1 percent of youths in 2005, similar to estimates since 2002. (*Office of Applied Studies, Substance Abuse and Mental Health Services Administration. Results From the 2004 2005 National Survey on Drug Use and Health: National Findings. Rockville, Md: Substance Abuse and Mental Health Services Administration; 20052006. NSDUH Series H-30, DHHS Publication No.SMA 06-4194.*)

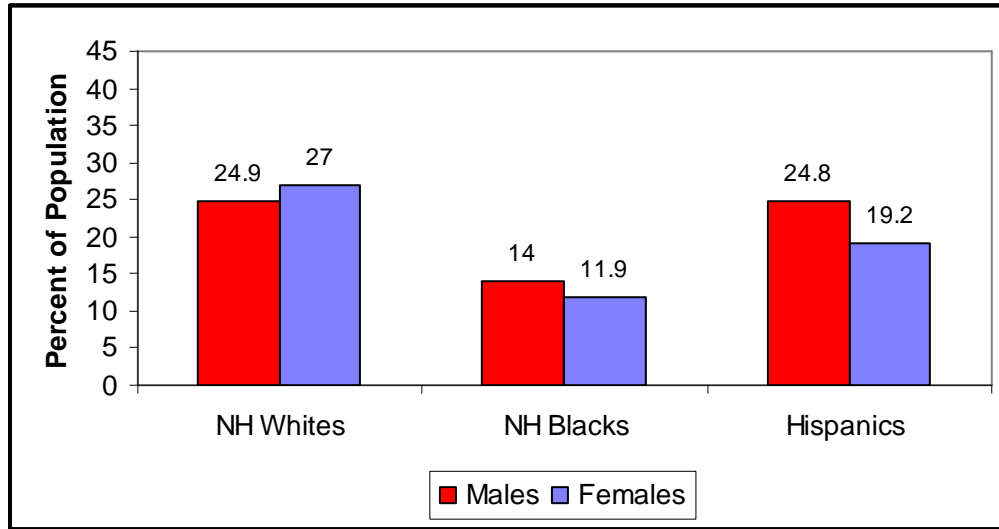
### Secondhand Smoke

- The Global Youth Tobacco Survey (2000–07), among students 13-15 years who had never smoked, showed that nearly half were exposed to SHS at home (46.8 percent), and a similar percentage in places other than home (47.8 percent). Those exposed to SHS were more likely to initiate smoking than those not exposed (1.4–2.1 fold increase for those exposed to SHS at home and those not exposed 1.3-1.8 fold increase or those exposed to SHS elsewhere). (*Centers for Disease Control and Prevention (CDC). Exposure to Secondhand Smoke Among Students Aged 13-15 Years – Worldwide, 2000-2007. MMWR 2007; 56: 497–500.*)
- Data from the tobacco Use Supplement to the Current Population Survey from 1992–2003 found that the national prevalence of households with smoke-free home rules increased from 43.2 percent during 1992–93 to 72.2 percent in 2003. During this period, the prevalence of such rules increased from 9.6 percent to 31.8 percent among households with at least one smoker and from 56.8 percent to 83.5 percent among households with no smokers. Approximately 126 million children and nonsmoking adults were still exposed to SHS in the United States as of 1999–2002. (*Centers for Disease Control and Prevention (CDC). State-Specific Prevalence of Smoke-Free Home Rules – United States, 1992-2003. MMWR 2007; 56: 501–504.*)
- An estimated 21 percent of all adults, 45 million, smoke cigarettes. More than 126 million nonsmoking people in the United States continue to be exposed to secondhand smoke. Almost 60 percent of children in the United States ages 3–11 or almost 22 million, are exposed to secondhand smoke. ([www.cdc.gov/DataStatistics/features.html](http://www.cdc.gov/DataStatistics/features.html))

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### Prevalence of High School Students Reporting Current Cigarette Use within the Last 30 Days by Race/Ethnicity and Sex

YRBS, United States: 2005



Source: Centers for Disease Control and Prevention. Youth Risk Behavior Surveillance – United States, 2005. Surveillance Summaries, June 9, 2006. MMWR Morb Mortal Wkly Rep. 2006;55(SS-5):1-108, 2006.

### Smokeless Tobacco

- In 2005, an estimated 7.7 million (3.2 percent) Americans age 12 or older used smokeless tobacco. (Office of Applied Studies, Substance Abuse and Mental Health Services Administration. Results From the 2004 2005 National Survey on Drug Use and Health: National Findings. Rockville, Md: Substance Abuse and Mental Health Services Administration; 20052006. NSDUH Series H-30, DHHS Publication No.SMA 06-4194.)
- Data from the CDC Smoking & Tobacco Fact Sheet, Smokeless (Oral) Tobacco ([http://www.cdc.gov/tobacco/data\\_statistics/Factsheets/smokeless\\_tobacco.htm](http://www.cdc.gov/tobacco/data_statistics/Factsheets/smokeless_tobacco.htm)), indicate that:
  - 8 percent of high school students are current smokeless tobacco users. Smokeless tobacco is more common among males (13.6 percent) than female high school students (2.2). Estimates by race/ethnicity are 10.2 percent white, 5.1 percent for Hispanic and 1.7 percent for African-Americans.
  - An estimated 3 percent of middle school students are current smokeless tobacco users, Smokeless tobacco is more common among male (4 percent) than female (2 percent) middle school students. Estimates by race/ethnicity are 3 percent for white, 1 percent for Asian, 2 percent for African-American, and 4 percent for Hispanic middle school students.

### High Blood Cholesterol

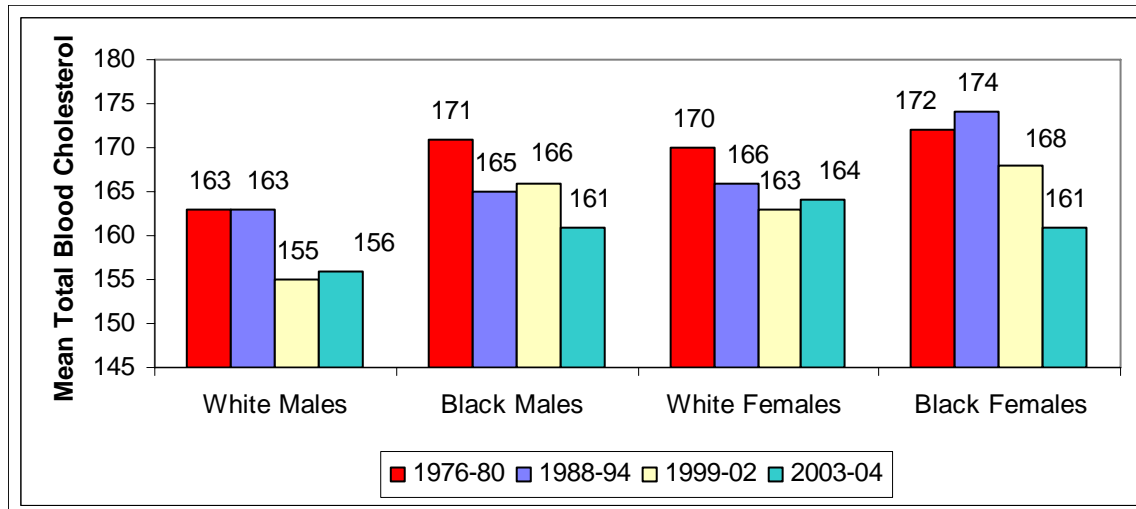
- Among children between the ages of 4 and 11, the mean total blood cholesterol level is 164.5mg/dL. For boys, it is 163.9 mg/dL, and for girls, 165 mg/dL. The racial/ethnic breakdown is as follows (NHANES 2003-2004, NCHS):
  - For non-Hispanic whites, 163.9 mg/dL for boys and 166.2 mg/dL for girls.
  - For non-Hispanic blacks, 165.0 mg/dL for boys and 164.8 mg/dL for girls.
  - For Mexican Americans, 161.3 mg/dL for boys and 164. 2 mg/dL for girls.
- Among adolescents between the ages of 12 and 19, the mean total blood cholesterol level is 161.7 mg/dL. For boys, it is 158.3 mg/dL, and for girls, 165.4 mg/dL. The racial/ethnic breakdown is as follows (NHANES 2003–04, NCHS):

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- For non-Hispanic whites, 157.1 mg/dL for boys and 167.5 mg/dL for girls.
- For non-Hispanic blacks, 161.3 mg/dL for boys and 162.7 mg/dL for girls.
- For Mexican Americans, 159.6 mg/dL for boys and 161.4 mg/dL for girls.
- About 10.8 percent of adolescents between the ages of 12 and 19 have total cholesterol levels exceeding 200 mg/dL (*NHANES 2003–04, NCHS*).

### Trends in Mean Total Serum Cholesterol Among Adolescents Ages 12–17 by Sex and Survey

NHANES: 1976–80, 1988–94, 1999–02 and 2003–04



Source: NCHS and NHLBI

### LDL (Bad) Cholesterol

- Among adolescents between the ages of 12 and 19, the mean LDL cholesterol level is 90.5 mg/dL. For boys, it is 89.6 mg/dL, and for girls, 91.4 mg/dL. The racial/ethnic breakdown is as follows: (*NHANES 2003–04, NCHS*):
  - Among non-Hispanic whites, 90.3 mg/dL for boys and 91.5 mg/dL for girls.
  - Among non-Hispanic blacks, 87.9 mg/dL for boys and 91.4 mg/dL for girls.
  - Among Mexican Americans, 89.9 mg/dL for boys and 92 mg/dL for girls.

### HDL (Good) Cholesterol

- Among children between the ages of 4 and 11, the mean HDL cholesterol level is 55.2 mg/dL. For boys, it is 56.2 mg/dL, and for girls, 54.2 mg/dL. The racial/ethnic breakdown is as follows: (*NHANES 2003–04, NCHS*):
  - Among non-Hispanic whites, 54.7 mg/dL for boys and 53.3 mg/dL for girls.
  - Among non-Hispanic blacks, 59.7 mg/dL for boys and 57.1 mg/dL for girls.
  - Among Mexican Americans, 54.5 mg/dL for boys and 53.7 mg/dL for girls.
- Among adolescents between the ages of 12 and 19, the mean HDL cholesterol level is 52.6 mg/dL. For boys, it is 49.9 mg/dL, and for girls, 56.5 mg/dL. The racial/ethnic breakdown is as follows: (*NHANES 2003–04, NCHS*):
  - Among non-Hispanic whites, 47.0 mg/dL for boys and 56.5 mg/dL for girls.
  - Among non-Hispanic blacks, 54.4 mg/dL for boys and 57.6 mg/dL for girls.
  - Among Mexican Americans, 49.4 mg/dL for boys and 53.7 mg/dL for girls.

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### Triglycerides

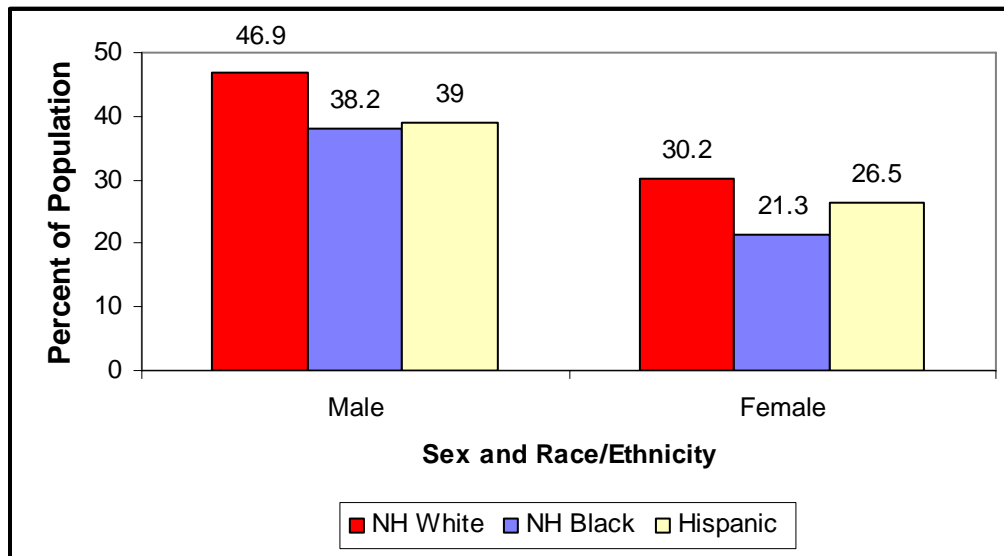
- Among adolescents between the ages of 12 and 19, the mean triglyceride level is 94.2 mg/dL. For boys, it is 96.7 mg/dL, and for girls, 91.6 mg/dL. The racial/ethnic breakdown is as follows: (*NHANES 2003–04, NCHS*):
  - Among non-Hispanic whites, 102.9 mg/dL for boys and 96.4 mg/dL for girls.
  - Among non-Hispanic blacks, 71.2 mg/dL for boys and 69.6 mg/dL for girls.
  - Among Mexican Americans, 98.7 mg/dL for boys and 99.9 mg/dL for girls

### Physical Activity

- Among children between the ages of 9 and 13, 61.5 percent do not participate in any organized PA during their nonschool hours, and 22.6 percent do not engage in any free-time PA, according to 2002 data from the Youth Media Campaign Longitudinal Study (YMCLS) of the CDC. Non-Hispanic black and Hispanic children are significantly less likely than non-Hispanic white children to report involvement in organized activities, as are children whose parents have lower incomes and education levels. (*Centers for Disease Control and Prevention (CDC). Physical activity levels among children aged 9–13 years: United States, 2002. MMWR Morb Mortal Wkly Rep. 2003; 52 (33): 785–788.*)
- By the age of 16 or 17, 31 percent of white girls and 56 percent of black girls report no habitual leisure-time PA. (*Kimm SY, Glynn NW, Kriska AM, Barton BA, Kronsberg SS, Daniels SR, Crawford PB, Sabry ZI, Liu K. Decline in physical activity in black girls and white girls during adolescence. N Engl J Med. 2002; 347: 709–715.*)
  - Lower levels of parental education are associated with greater decline in PA for white girls at both younger and older ages. For black girls, this association is seen only at older ages.
  - Cigarette smoking is associated with decline in PA among white girls. Pregnancy is associated with decline in PA among black girls but not among white girls.
  - A higher BMI is associated with greater decline in PA among girls of both races.
- The prevalence of high school students who played video or computer games or used a computer for something that was not schoolwork for 3 or more hours a day was 21.1 percent, according to data from the CDC's YRBS 2005 survey. The prevalence of computer use was higher among male (27.4 percent) than female (14.8 percent) students; specifically, it was higher among non-Hispanic white male (25.4 percent), non-Hispanic black male (34.9 percent), and Hispanic male (24.4 percent) than non-Hispanic white female (13.7 percent), non-Hispanic black female (16.1 percent), and Hispanic female (14.9 percent) students, respectively. (*Centers for Disease Control and Prevention. Youth Risk Behavior Surveillance – Selected Steps Communities, 2005. Surveillance Summaries, Feb. 23, 2007. MMWR 2007;56[SS-2].*)
- According to data from the CDC's YRBS 2005 survey, 37.2 percent of students watched television three or more hours on an average school day. The prevalence was higher among non-Hispanic black (64.1 percent) than non-Hispanic white (29.2 percent) and Hispanic (45.8 percent) students; higher among Hispanic (45.8 percent) than non-Hispanic white (29.2 percent) students; higher among non-Hispanic black female (64.5 percent) than non-Hispanic white female (28.1 percent) and Hispanic female (45.8 percent) students; higher among Hispanic females (45.8 percent) than non-Hispanic white female (28.1 percent) students; higher among non-Hispanic black male (63.5 percent) than non-Hispanic white male (30.2 percent) and Hispanic male (45.8 percent) students; and higher among Hispanic male (45.8 percent) than non-Hispanic white male (30.2 percent) students. (*Centers for Disease Control and Prevention. Youth Risk Behavior Surveillance – Selected Steps Communities, 2005. Surveillance Summaries, Feb. 23, 2007. MMWR 2007;56[SS-2].*)

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### Prevalence of Students in Grades 9–12 Who Met Currently Recommended Levels of Physical Activity During the Past 7 Days by Race/Ethnicity and Sex YRBS, 2005



Note: "Currently recommended levels" is defined as activity that increased their heart rate and made them breathe hard for a total of at least 60 minutes/day on 5 or more of the 7 days preceding the survey."

Source: *MMWR*, Vol. 55, No. SS-5, June 6, 2006. CDC.

## Overweight and Obesity

- More than 9 million children and adolescents between the ages of 6 and 19 are considered overweight on the basis of being in the 95th percentile or higher of BMI values in the 2000 CDC growth chart for the United States. (*NHANES [2003-2004]*, *NCHS*)
- On the basis of data from NHANES, the prevalence of overweight in children between the ages of 6 and 11 increased from 4.0 percent in 1971–1974 to 17.5 percent in 2001–04. The prevalence of overweight in adolescents between the ages of 12 and 19 increased from 6.1 percent to 17.0 percent. (*Health, United States, 2006*, *NCHS*)
- Among infants and children less than 2 years of age, the prevalence of overweight was 10.6 percent in 1999–2000 and 9.5 percent in 2003–04 (birth to 23 months). Among those age 6 months to 23 months, the prevalence was 7.2 in 1976–80 and 11.5 percent in 2003–04. (*NHANES*, *NCHS*)
- Nearly 14 percent of preschool children between the ages of 2 and 5 were overweight in 2003–04, up from 10.3 percent in 1999–2000. (*Ogden CL, Carroll MD, Curtin LR, McDowell MA, Tabak CJ, Flegal KM. Prevalence of overweight and obesity in the United States, 1999-2004. JAMA. 2006;295:1549-1555.*)
  - Among preschool children, the following are overweight: 11.5 percent of non-Hispanic whites, 13.0 percent of non-Hispanic blacks, and 19.2 percent of Mexican Americans.
  - Among children between the ages of 6 and 11, the following are overweight: 17.7 percent of non-Hispanic whites, 22.0 percent of non-Hispanic blacks, and 22.5 percent of Mexican Americans.
  - Among adolescents between the ages of 12 and 19, the following are overweight: 17.3 percent of non-Hispanic whites, 21.8 percent of non-Hispanic blacks, and 16.3 percent of Mexican Americans.

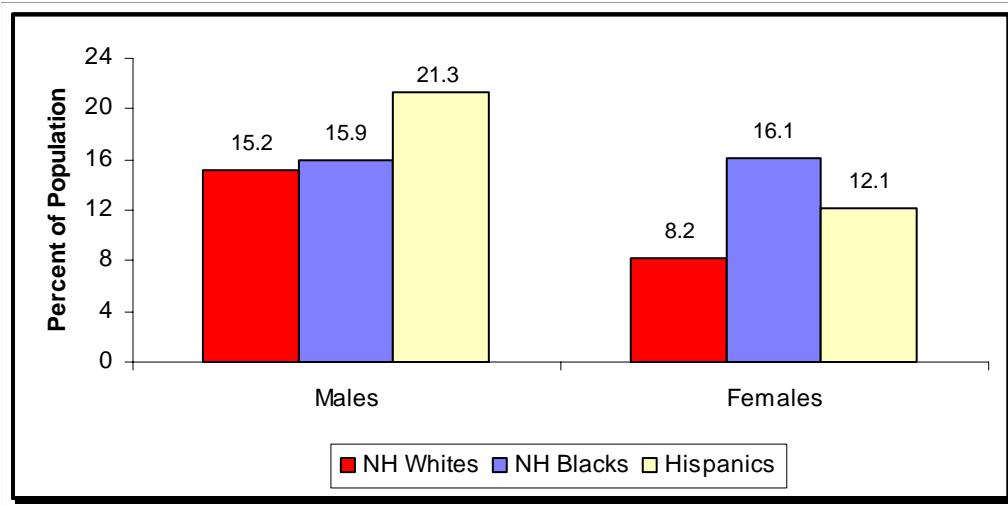
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- In addition, the data show that another 16.5 percent of children and teens between the ages of 2 and 19 are considered at risk of being overweight (BMI from the 85th to 95th percentile).
- Overweight adolescents have a 70 percent chance of becoming overweight adults. This increases to 80 percent if one or both parents are overweight or obese. (*USDHHS; The Surgeon General's Call To Action to Prevent and Decrease Overweight and Obesity. Overweight in children and Adolescents.; www.surgeongeneral.gov/topics/obesity/calltoaction/fact\_adolescents.htm*)
- Data from the CDC's YRBS 2005 survey showed that the prevalence of being overweight was higher among non-Hispanic black (16.0 percent) and Hispanic (16.8 percent) than non-Hispanic white (11.8 percent) students; higher among non-Hispanic black female (16.1 percent) and Hispanic female (12.1 percent) than non-Hispanic white female (8.2 percent) students; and higher among non-Hispanic black male (15.9 percent) and Hispanic male (21.3 percent) than non-Hispanic white male (15.2 percent) students. The prevalence of being at risk for overweight was higher among non-Hispanic black (19.8 percent) and Hispanic (16.7 percent) than non-Hispanic white (14.5 percent) students; higher among non-Hispanic black female (22.6 percent) than non-Hispanic white female (13.8 percent) and Hispanic female (16.8 percent) students; and higher among Hispanic male (16.5 percent) and non-Hispanic black male (16.7 percent) than non-Hispanic white male (15.2 percent) students. (*Centers for Disease Control and Prevention. Youth Risk Factor Surveillance: United States, 2005. Surveillance Summaries. June 9, 2006. MMWR Morb Mortal Wkly Rep. 2006;55:1-108.*)
- In 2005, in 15 Steps communities of the YRBS, in grades 9–12, 9.6 percent to 20.5 percent of male students and 6.1 percent to 21.7 percent of female students were at risk for becoming overweight (BMI percentile 85 to 94). (*Centers for Disease Control and Prevention. Youth Risk Behavior Surveillance – selected Steps Communities, 2005. Surveillance Summaries, Feb. 23, 2007. MMWR 2007;56[No. SS-2]*).
- Data from NHANES 1999–2002 showed that among all overweight children and teens between the ages of 2 and 19 (or their parents), 36.7 percent reported ever having been told by a doctor or healthcare professional that they were overweight. For those between the ages of 2 and 5, this percentage was 17.4 percent; for those between the ages of 6 and 11, 32.6 percent; for those between the ages of 12 and 15, 39.6 percent; and for those between the ages of 16 and 19, 51.6 percent. Similar trends were seen for males and females. Among racial/ethnic populations, overweight non-Hispanic black females were significantly more likely to be told that they were overweight than were non-Hispanic white females (47.4 percent versus 31.0 percent). Among those informed of overweight status, 39 percent of non-Hispanic black females were severely overweight (BMI  $\geq$ 99th percentile for age and sex), compared with 17 percent of non-Hispanic white females. (*Centers for Disease Control and Prevention (CDC). Children and teens told by doctors that they were overweight: United States, 1999-2002. MMWR Morb Mortal Wkly Rep. 2005;54:848-849.*)
- In 2005 the estimated prevalence of overweight in children ages 6–11 was 4.2 million, 17.5 percent of the population. For boys the prevalence was 18.7 percent and for girls it was 16.3 percent. (*NHANES 2001–04*)
- For adolescents ages 12–19 the estimated prevalence in 2005 was 5.7 million or 17.0 percent of the population. For boys the prevalence was 3.1 million or 17.0 percent and for girls it was 2.6 million or 16.0 percent. (*NHANES 2001–04*)

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### Prevalence of Overweight Among Students in Grades 9–12 by Sex and Race/Ethnicity

YRBS: 2005



Note: Overweight is defined as BMI 95<sup>th</sup> percentile or higher by age and sex of the CDC 2000 growth chart.

Source: BMI 95<sup>th</sup> percentile or higher by age and sex of the CDC 2000 growth chart. MMWR, Vol. 55, No. SS-5, June 6, 2006. CDC.

### Diabetes

- In the SEARCH for Diabetes in Youth Study the prevalence of diabetes mellitus in youth <20 years of age in 2001 in the United States was 1.82 cases per 1,000 youth (0.79 /1,000 among youth 0–9 years of age and 2.80 /1,000 among youth 10–19 years of age). Non-Hispanic white youth had the highest prevalence (1.06 / 1,000) in the younger group. Among 10- to 19-year-old youth, black youth (3.22 / 1,000) and non-Hispanic white youth (3.18 / 1,000) had the highest rates, followed by American Indian youth (2.28 / 1,000), Hispanic youth (2.18 / 1,000), and Asian/Pacific Islander youth (1.34 / 1,000). Among younger children, type 1 diabetes accounted for  $\geq 80$  percent of diabetes; among older youth, the proportion of type 2 diabetes ranged from 6 percent (0.19 / 1,000 for non-Hispanic white youth) to 76 percent (1.74 / 1,000 for American Indian youth). This translates to 154,369 youth with physician-diagnosed diabetes in 2001 in the United States, for an overall prevalence estimate for diabetes in children and adolescents of about 0.18 percent. (Liese AD, D'Agostino RB, Jr., Hamman RF, et al. *The burden of diabetes mellitus among US youth: prevalence estimates from the SEARCH for Diabetes in Youth Study. Pediatrics. Oct 2006;118(4):1510-1518.*)
- In the In the SEARCH for Diabetes in Youth Study the incidence of DM in youth overall was 24.3 per 100,000 person-years. Among children younger than 10 years, most had type 1 DM, regardless of race/ethnicity. The highest rates of incident type 1 DM were observed in non-Hispanic white youth (18.6, 28.1, and 32.9 / 100,000 person-years for age groups 0–4, 5-9, and 10-14 years, respectively). Overall, type 2 DM was relatively infrequent, with the highest rates (17.0 to 49.4 per 100,000 person-years) seen among 15-to-19-year-old minority groups. (Dabelea D, Bell RA, D'Agostino RB, Jr., et al. *Incidence of diabetes in youth in the United States. Jama. Jun 27 2007;297(24):2716-2724.*)

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### End-Stage Renal Disease (ICD/10 code N18.0)

- Children with pediatric ESRD have high transplantation rates. Time to first transplant appears to be increasing. During 1996–2000, 75 percent of children age 10 or younger and 90 percent of those older than age 10 received a transplant within five years of initiation; during 2001–05, those figures fell to 70 and 79 percent, respectively. (2007 USRDS Annual Data Report; [http://www.usrds.org/2007/pdf/08\\_peds\\_07.pdf](http://www.usrds.org/2007/pdf/08_peds_07.pdf))

### Metabolic Syndrome

- Using a pediatric definition based closely on Adult Treatment Panel III (ATP III), an estimated one in 10 (9.2 percent) U.S. adolescents between the ages of 12 and 19 years has MetS. The prevalence for boys is 9.5 percent, and for girls it is 8.9 percent. (De Ferranti SD, Gauvreau K, Ludwig DS, Neufeld EJ, Newburger JW, Rifai N. Prevalence of the metabolic syndrome in American adolescents. *Circulation*. 2004;110:2494-2497.)
  - Among overweight or obese adolescents, one in three has MetS. Two thirds of all adolescents have at least one metabolic abnormality.
- MetS categorization in adolescents is not stable. Approximately half of 1098 adolescent participants in the Princeton School District Study diagnosed with pediatric ATP III MetS lost the diagnosis over three years of follow-up. (Goodman E, Daniels SR, Meigs JB, et al. Instability in the diagnosis of metabolic syndrome in adolescents. *Circulation*. May 1 2007;115(17):2316-2322.)
- Youth who do not gain weight with age do not develop MetS. Analysis of data from the CARDIA study found that young adults who maintained stable BMI over time had minimal progression of risk factors and lower incidence of MetS regardless of baseline BMI. (Lloyd-Jones DM, Liu K, Colangelo LA, Yan LL, Klein L, Loria CM, Lewis CE, Savage P. Consistently Stable or Decreased Body Mass Index in Young Adulthood and Longitudinal Changes in Metabolic Syndrome Components: the Coronary Artery Risk Development in Young Adults Study. *Circulation*. 2007;115:1004-1011.)

### Nutrition

- In 1999–2000, among children between the ages of 2 and 6, 20 percent had a good diet, 74 percent had a diet that needed improvement, and 6 percent had a poor diet. For those between the ages of 7 and 12, 8 percent had a good diet, 79 percent had a diet that needed improvement, and 13 percent had a poor diet. (Federal Interagency Forum on Child and Family Statistics. *America's Children: Key National Indicators of Well-Being*. Washington, DC: Federal Interagency Forum on Child and Family Statistics; 2003. Available at: <http://www.childstats.gov/pubs.asp#ac2003>. Accessed November 1, 2006.)
- Mean energy intake for children between the ages of 1 and 19 changed little from the surveys in the 1970s to 1999–2000, except for an increase among adolescent females. (Federal Interagency Forum on Child and Family Statistics. *America's Children: Key National Indicators of Well-Being*. Washington, DC: Federal Interagency Forum on Child and Family Statistics; 2003. Available at: <http://www.childstats.gov/pubs.asp#ac2003>. Accessed November 1, 2006.)
- One third of 19–24 month old children consume no fruit, whereas 60 percent consume baked desserts, 20 percent candy, and 44 percent sweetened beverages on a given day. (Fox MK, Pac S, Devaney B, Jankowski L. Feeding infants and toddlers study: What foods are infants and toddlers eating? *J Am Diet Assoc*. 2004;104[9 suppl 1]:s22-s30.)
- From 1994–96, only 14 percent of children between the ages of 6 and 19 met then-current U.S. Department of Agriculture Food Pyramid recommendations for daily fruit intake (2 to 4 servings per day). Only 20 percent got enough vegetables (3 to 5 servings per day). (Gleason PM, Suitor CW. *Children's Diets in the Mid-1990s*. Alexandria, Va: US Department of Agriculture; 2001.)

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- In 1980, about 50 percent of high school seniors reported eating green vegetables "nearly every day or more." By 2003 that figure had dropped to about 30 percent. (*YES Occasional Papers. Ann Arbor, Mich: Institute for Social Research, May 2003. Paper 3.*)

### **Surgery**

- An estimated 200,000 cardiovascular procedures were performed on people age 15 and younger in 2005. (*NHDS, NCHS*)

#### **Abbreviations Used:**

BMI – body mass index.

CARDIA – The Coronary Artery Risk Development in Young Adults Study

ESRD – end stage renal disease.

GCKSS – Greater Cincinnati Northern Kentucky Stroke Study

GYTS – Global Youth Tobacco Survey

HCUP – Healthcare Cost Utilization Project

HHANES – Hispanic Health and Nutrition Examination Survey

KID – Kids Inpatient Database

MetS – metabolic syndrome

mg/dL – milligrams per deciliter

NCHS – National Center for Health Statistics

NH – non-Hispanic

NHANES – National Health and Nutrition Examination Survey, NCHS

NHDS – National hospital discharge survey

NHES – National health examination survey

NHLBI – National Heart, Lung, and Blood Institute

SEARCH – For Diabetes in Youth Study

STOP – Stroke Prevention Trial in Sickle Cell Anemia

YMCLS – Youth Media Campaign Longitudinal Study.

YRBS – Youth Risk Behavior Surveillance, CDC

**For additional information see the Heart Disease and Stroke Statistics – 2008 Update, published in Circulation, also available on our Web site.**