

EXTENT AND CONSEQUENCES OF CHILDHOOD OBESITY

HESC 470 CHAPTER 2



HOW MUCH DO WE REALLY KNOW ABOUT THIS UNFOLDING EPIDEMIC?

- Which population groups are most affected?
- What does the available evidence tell us about how to address this problem?
- What are the potential consequences of inaction with respect to:
 - social,
 - developmental,
 - health outcomes and
 - the associated health-care system costs?

PREVALENCE AND TIME TRENDS

- Direct measures of body fat not feasible, therefore BMI used as surrogate measure.
- The prevalence of childhood and adolescent obesity is equated to the proportion of those who are in the upper end of the BMI distribution—specifically, at or above the age- and gender-specific 95th percentile of the CDC's BMI charts for children and youth aged 2 through 19.
- Limit of BMI distributions
- The CDC therefore developed a revised growth reference in 2000 that established the age- and gender-specific 95th percentile of BMI.

OVERALL BURDEN

- The term “epidemic” suggests a condition that is occurring more frequently and extensively among individuals in a community or population than is expected.
- This clearly appears to apply to childhood obesity.
- In 2000, obesity was two to three times more common in children and youth than in a reference period in the early 1970s (this increase has been particularly striking since the late 1970s).
- The obesity epidemic affects both boys and girls and has occurred in all age, race, and ethnic groups throughout the United States.

HIGH-RISK POPULATION SUBGROUPS

- No demographic group in the US has remained untouched by the childhood obesity epidemic.
- However, some subgroups have been affected more than others.
 - Ethnic minorities
 - Children in low SES families
 - Children living in the southern region of the US

ETHNIC MINORITIES

- According to data from NHANES, Hispanic, non-Hispanic black, and Native-American children and adolescents are disproportionately affected by obesity when compared to the general population.
- Examining both boys and girls combined, up to 24 percent of non-Hispanic black and Mexican-American adolescents are above the 95th percentile.
- Among boys, the highest prevalence of obesity is observed in Mexican Americans.
- Among girls, the highest prevalence is observed in non-Hispanic blacks.
- See page 59 for graphs

ETHNIC MINORITIES

- Looking at figure 2-4 on page 59 not only do we see higher rates of obesity for non-Hispanic black and Mexican-American children, we also see accelerated rates of increase in obesity prevalence children of both sexes, creating a greater disparity in obesity prevalence between non-Hispanic white and black children (particularly among girls).
- According to longitudinal data, between 1986 and 1998, the prevalence of obesity increased 120% among African Americans and Hispanics while it increased 50% among non-Hispanic whites.

ETHNIC MINORITIES

- The prevalence of obesity in 7-year-old American-Indian children has been estimated recently at nearly 30 percent, representing twice the current estimated prevalence among all U.S. children of that age.

SOCIOECONOMIC STATUS

- According to NHANES III, an increase in obesity prevalence among African Americans appears greatest for those at the lowest income levels.
- However, these disparities are not the same across ethnic groups and they do not emerge at comparable times during childhood.
- Also, there is almost no consensus, despite many theories, about the mechanisms by which these disparities occur.

SOCIOECONOMIC STATUS

- Additional data from 1988-1994 NHANES indicates that the prevalence of obesity in white adolescents is higher among those in low-income families.
- However, there is no clear relationship between family income and obesity in other age or ethnic subgroups.
- Longitudinal data have suggested that family socioeconomic status is inversely related to obesity prevalence in children and that the effects of socioeconomic status and race or ethnicity were independent of other variables.

SOCIOECONOMIC STATUS

- Insurance status is a possible explanation for the link between SES and childhood obesity; the uninsured may face barriers to accessing health care.
- Insurance coverage has been associated with the prevalence of obesity in youth.
- An analysis of the 1996 Medical Expenditure Panel Survey Household Component found that a combination of lacking health insurance and having public insurance (Medicaid, Medicare, or other public hospital coverage) were directly associated with obesity among adolescents.

REGIONAL DIFFERENCES

- Regional differences in the prevalence of U.S. childhood obesity was apparent in 1998 based on NLSY data - 10.8 percent in western states and 17.1 percent in southern states.
- However, most data available for regional differences are for adults.
- In 1998, adult obesity prevalence exceeded 20 percent in several states:
 - Alabama 20.7%
 - Alaska 20.7%
 - Louisiana 21.3%
 - South Carolina 20.2%
 - West Virginia 22.9%
- By 2002, BRFSS data revealed that seven states had adult obesity prevalence rates greater than 25 percent: Alabama, Louisiana, Michigan, Mississippi, South Carolina, Texas, and West Virginia
- This type of systematic data reflecting regional differences in obesity prevalence for children and youth are currently not available.

SHIFTS IN BMI DISTRIBUTIONS

- Changes in the nature of the obesity epidemic are monitored by comparing the BMI distribution curves derived from population-based surveys and noting shifts in any particular distribution over time.
- A shift toward higher BMIs over the entire distribution would indicate that virtually everyone is becoming heavier, with lean individuals gradually moving into the overweight range, overweight individuals moving into the obese range, and the number of obese individuals becoming more severely obese.

SHIFTS IN BMI DISTRIBUTIONS

- In general, the greatest shift is occurring at the upper end of the distribution, reflected by the heaviest subgroups becoming heavier (this is slightly higher in adults vs. children and adolescents – figure 2-5 p. 62).
- These changes in BMI distributions have an effect on the population's health.
- How so?

CONSEQUENCES OF BMI SHIFTS

- Children at the highest levels of BMI are generally at the greatest risk of adverse health outcomes.
- Elevated blood pressure and insulin were both observed to be **twice** as common in children with BMIs above the 97th percentile as in children within the 95th to 97th percentile
- But the prevalence of these health outcomes is low between the 25th and 75th BMI percentiles, increasing modestly, if at all, across that span.
- Thus, with the childhood obesity epidemic characterized by a disproportionate number of children at the extreme ranges of BMI, there are likely to be higher obesity-related morbidity rates in children than if the epidemic mostly resulted from an upward shift in BMI across their entire population.

RELATIONSHIP BETWEEN CHILDHOOD AND ADULT OBESITY

- The obesity epidemic that began in the early 1970s and escalated after 1980 for children and youth has progressed similarly in adults over the same time period.
- Adult BMI at or above 30 kg/m²—more than doubled (from 14.5 percent to 30.5 percent) among 60 million U.S. adults from 1971 to 2000.
- This parallel between childhood and youth obesity prevalence and adult obesity prevalence, suggests that the epidemics may be linked.

RELATIONSHIP BETWEEN CHILDHOOD AND ADULT OBESITY

- Many of the same sociocultural factors that have contributed to the adult obesity epidemic have likely contributed to the childhood obesity epidemic.
- The average parents today are twice as likely to be obese as 30 years ago, even though their genetic susceptibility and that of their child has not changed over this period.
- Parental obesity more than doubles the risk of adult obesity among both obese and non obese children under 10 years of age.

RELATIONSHIP BETWEEN CHILDHOOD AND ADULT OBESITY

- Potential mechanisms:
 - Children can inherit obesity susceptibility genes from an obese parent or parents.
 - Children can be exposed, after birth, to diet and activity patterns that promote obesity.
 - Recent research suggests that an altered intrauterine environment may be a third mechanism.
- Obese mothers are more likely to experience diabetes in pregnancy, and some evidence suggests that the offspring of mothers who have diabetes in pregnancy may have an increased risk of developing obesity later in life
- What does this tell us about the focus of our childhood obesity prevention efforts?

THE COSTS FOR CHILDREN & SOCIETY

- Failing to reverse the trend in childhood obesity means that many obese children, over their lifetimes, could experience significant impairments in multiple domains of functioning.
 - Social and emotional health
 - Physical health
 - Health care costs (direct and indirect)

PHYSICAL HEALTH

- Childhood obesity is associated with a wide array of disorders that affect multiple organ systems.
- These disorders include: hypertension, dyslipidemia, glucose intolerance/insulin resistance, hepatic steatosis (fatty liver), cholelithiasis (gallstone disease), sleep apnea, menstrual abnormalities, impaired balance, and orthopedic problems.
- Some of these conditions produce clinical symptoms in obese children, while others do not; however, the metabolic and physiologic changes associated with childhood obesity, along with the obesity itself, tend to track into adult life and eventually enhance the risks of disease, disability, and death.

PHYSICAL HEALTH

- Of the multiple health correlates of the childhood obesity epidemic, perhaps the one that has received greatest attention is the increased prevalence of type 2 diabetes in children.
- One study found that for each adolescent diagnosed with type 2 diabetes, there are 5 others with impaired fasting glucose, an indicator of insulin resistance below the diagnostic threshold for type 2 diabetes.
- The degree of insulin resistance in children increases with the severity of body fatness, as it does in adults
- Therefore, the combination of more obese children and the increased severity of obesity suggests that larger numbers of children will reach the diagnostic threshold for type 2 diabetes.

PHYSICAL HEALTH

- The development of all of the major complications of diabetes, including retinopathy, nephropathy, and neuropathy, are related to the duration of the disease.
- Therefore, those who develop diabetes earlier in life generally will develop costly complications earlier with the potential for premature mortality.

PHYSICAL HEALTH

- A potentially even more important complication of childhood obesity may be the metabolic syndrome, diagnosed when a person has at least three of five metabolic abnormalities:
 1. glucose intolerance,
 2. abdominal obesity,
 3. hypertriglyceridemia,
 4. low high-density lipoprotein (HDL) cholesterol, and
 5. high blood pressure.
- The metabolic syndrome is now present in approximately one-quarter of all U.S. adults and in nearly 30 percent of U.S. children and youth who are obese.

PHYSICAL HEALTH

- Among adults, the metabolic syndrome is associated not only with type 2 diabetes but also with cardiovascular disease and a higher mortality rate.
- Even among those obese youth who do not yet have clinical diabetes, components of the metabolic syndrome appear to contribute to the development of atherosclerosis (a hardening of the cardiovascular arteries).
- Additionally, risk factors for cancer in obese adults, such as hormone alterations, may be present in obese children and contribute to a higher incidence of certain types of cancer later in life.

SOCIAL & EMOTIONAL HEALTH

- While childhood obesity may not result in recognized clinical symptoms until later in life, the social and emotional correlates often have immediate effects on children's lives.
- Much research has been dedicated to this area and the collective data clearly indicates that obese children and youth are stigmatized, and subject to negative stereotyping and discrimination by their peers.

SOCIAL & EMOTIONAL HEALTH

- This type of treatment is thought to produce adverse emotional consequences such as low self-esteem, negative body image, and depressive symptoms for obese children.
- Sadly, the treatment is not limited to peers; it may also come from adults, including parents, teachers, and health-care providers.
- Even though obesity in children has become more common, such negative treatment has not diminished.

SOCIAL & EMOTIONAL HEALTH

- Studies on the emotional well-being of obese children are difficult to succinctly summarize, due to various study designs; however there are a few general statements that can be made.
- Associations between obesity and low self-esteem appear to emerge by early adolescence and were strongest in Hispanic and white adolescent girls.
- The emotional consequences are:
 - stronger in girls than in boys (slightly),
 - increase with age, and
 - may be greater in those obese children who seek treatment.

SOCIAL & EMOTIONAL HEALTH

- Having concerns about being obese, regardless of actual body weight, appears to be a primary factor associated with depressive symptoms among preadolescent girls.
- The social and emotional impacts of obesity can also be long term.
 - In a longitudinal U.S. cohort with a seven-year follow-up, women 16 to 24 years of age at baseline who had been overweight completed **fewer years of school, earned less money, and were less likely to be married.**

INTEGRATED VIEW OF CONSEQUENCES

- When examining the correlates of childhood obesity, discussions of the physical impacts and of the social and emotional impacts are often separate.
- But are they separate?
- The brain plays a central role in the regulation of energy balance and obesity. It is also the central organ for integrating social stimuli, regulating emotion, and executing social interaction.
- Cues that affect both eating and activity behaviors are often social in nature, ranging from sadness to anxiety to boredom.
- Social and emotional factors must therefore be recognized not only as potential consequences of obesity but also as potential causes.

INTEGRATED VIEW OF CONSEQUENCES

- The brain's response to stress may alter the hormonal function in a way that promotes central fat deposition and insulin resistance in adults.
- Because children also experience stress, the part of the brain that regulates emotion may not only influence whether a child overeats, but also the processing and storage of that excess energy.
- Failure to recognize this connection between social or emotional health and physical health could result in prevention strategies that are poorly developed, and underscores the need to consider the broadest possible definition of health to include the physical, mental, and emotional aspects. The foundations of all three develop during childhood and are interconnected.

HEALTH CARE COSTS

- Recent computations of national health-care expenditures related to obesity and overweight in adults showed large lifetime external costs related to these conditions.
- Annual medical expenditures in the United States related to obesity are estimated at \$75 billion (in 2003 dollars) with approximately half of the expenditures financed by Medicaid and Medicare.
- The direct health-care costs of physical inactivity, which contributes to the obesity epidemic, have been estimated to exceed \$77 billion annually.

NEXT WEEK

- We will discuss the specifics of developing an action plan to address childhood obesity.

HEALTH CARE COSTS

- The national investment in preventing disease and promoting health is estimated to be only 5 percent of the total annual health-care costs.
- This imbalance underscores the need for the health-care systems in the United States to establish a greater preventive orientation, particularly for childhood obesity, a largely preventable condition that has been shown to be a major determinant of healthcare costs.