

# **BURDEN OF OVERWEIGHT AND OBESITY IN MARYLAND**



**Maryland Department of Health & Mental Hygiene**

**Family Health Administration**

**Center for Preventive Health Services**

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## EXECUTIVE SUMMARY

During the past decade, obesity has reached epidemic proportions. Nationwide, the prevalence of obesity has rapidly increased by 44.3 percent from 15.8 percent in 1995 to 22.8 percent in 2003. Maryland has also experienced a similar increase in the prevalence of obesity. From 1995 to 2003, the prevalence of obesity in Maryland increased by 34 percent, from 16.3 percent in 1995 to 21.9 percent in 2003. In 2003, an estimated 2.3 million or 59 percent of Maryland adults were overweight or obese. Of this—about 838,000 people—were obese.

Studies have shown that a strong link exists between being overweight or obese and having an increased risk of death or disease. Across all populations, children, adolescents and adults who are obese are at greater risk for various chronic health conditions such as coronary heart disease, type-2 diabetes, cancer, stroke, asthma and arthritis. Additionally, these individuals may face social stigmatization, discrimination and poor body image.

While research has shown that even a modest weight loss can reduce the risk factors for some chronic health conditions, there are many contributing factors to obesity. In addition to individual genetic predispositions, obesity is influenced by activity levels, diet, behavioral and environmental factors. Over the years, the result of the changing environment related to inactivity and poor diet has been a major determinant of overweight and obesity.

The intent of this report is to profile the burden of overweight and obesity and its impact on the health of Maryland children, adolescents and adults. In 2003, an estimated \$1.5 billion of adult medical expenditures were attributable to obesity in Maryland, with \$368 million paid for by Medicare and \$391 million by Medicaid. The prevalence of overweight and obesity among Maryland adults varies across demographic groups. More specifically, obesity is more prevalent among African Americans than Whites and Hispanics; African American women have the highest prevalence of obesity; obesity is more prevalent among lower family income and education attainment; and obesity is most prevalent between the ages of 50-64. These findings are consistent with national data.

The Maryland Nutrition and Physical Activity (NPA) Program has developed this document to examine the burden of obesity in Maryland and assist in developing programs to combat the growing obesity trend. The mission of the program is to prolong the length and quality of life of Maryland citizens through healthy eating and increased physical activity. This report also provides the NPA program goals and proposed strategies aimed to reduce the prevalence of overweight and obesity in Maryland.

# OVERWEIGHT AND OBESITY: BACKGROUND

## MEASURING OVERWEIGHT AND OBESITY

**B**ody Mass Index (BMI) is a widely accepted measure for assessing excess body weight in adults and for screening children and adolescents who are at risk of being overweight. While BMI is not the most accurate measure of body fat in that it has the potential to place muscular individuals in high-risk categories, the BMI measurement is easy to use and the recommended measure of body fat.

### Adults

Adult BMI is derived from body weight in relation to height. BMI is calculated by dividing body weight in kilograms by the square of height in meters. To compute BMI using pounds and inches, body weight (pounds) is divided by the square of height (inches<sup>2</sup>), multiplied by 703. BMI can also be estimated using a BMI table (see Appendix A).

The National Heart, Lung, and Blood Institute (NHLBI) *Clinical Guidelines* (1998) defines overweight in adults as a BMI between 25 and 29.9, while obesity in adults is defined as a BMI equal to or greater than 30 (Table 1). These definitions are based on research that shows increases in health risk with BMIs above 25 (NHLBI, 1998). Risk of death increases among overweight and obese adults, although increases tend to be modest until BMI reaches the obese range (NHLBI, 1998).

**Table 1. Classification of Overweight and Obesity by Body Mass Index**

Weight Status	BMI (kg/m <sup>2</sup> )
Underweight	Below 18.5
Normal	18.5-24.9
Overweight	25.0-29.9
Obese	Above 30

Source: Adapted from NHLBI *Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight And Obesity in Adults*.

## Children

BMI is measured and interpreted differently for children and adolescents. For children and adolescents, health professionals use the terms “at risk of overweight” and “overweight” to describe excess body weight. The BMI measurement takes into account age and gender in addition to height and body weight. Experts recommend using BMI-for-age growth charts to screen children and adolescents age 2 to 20 years who are overweight or at risk of overweight (Kuczmarski et al., 2000). The growth charts are used to determine the BMI percentile (see Appendix B). In children and adolescents, a BMI-for-age between the 85th and 95th percentiles is considered at risk of overweight and a BMI-for-age at or above the 95th percentile (Table 2).

**Table 2. BMI-for-Age Percentile Cut-off for Children and Adolescents**

<b>Nutritional Status Indicator</b>	<b>Percentile</b>
Underweight	Below 5th
Normal	5th to 84th
At risk of overweight	85th to 94th
Overweight	Above 95th

*Source: Adapted from NHBLI Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight And Obesity in Adults.*

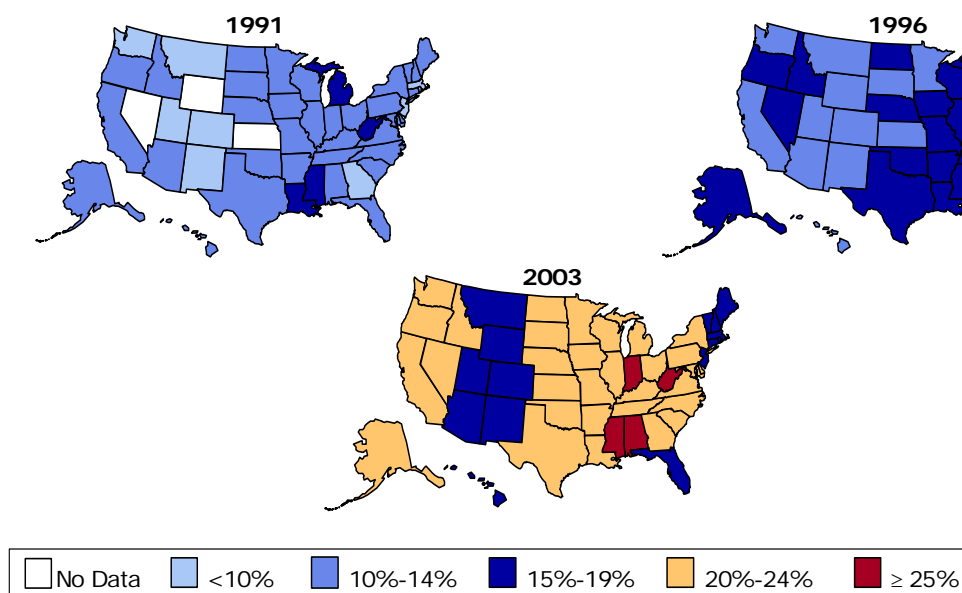
## OVERWEIGHT AND OBESITY IN THE UNITED STATES

### Adults

During the past decade, obesity has reached epidemic proportions in the United States. Results from the Behavioral Risk Factor Surveillance System (BRFSS), using self-reported measures of height and weight, illustrate the rising trend in obesity that impacts every state in the nation (Figure 1). In 1991, few states reported obesity prevalence rates at or above 15 percent, however, by the year 2003, all of the states, District of Columbia, and the three U.S. territories reported obesity prevalence rates at or above 15 percent. In 2003, four states reported obesity rates at or above 25 percent.

Based on clinical height and weight measurements in the 1999-2002 National Health and Nutrition Examination Survey (NHANES), an estimated 65 percent of U.S. adults aged 20 to 74 years were either overweight or obese (National Center for Health Statistics, 2004). Thirty-one percent of U.S. adults aged 20 to 74 years were obese, while 34 percent were overweight. The percentage of adults aged 20 to 74 years who were obese has doubled from an estimated 15 percent during 1976-1980 to 31 percent during 1999-2002 (National Center for Health Statistics, 2004).

**Figure 1. Obesity Trends Among U.S. Adults, 1991, 1995 and 2003**



Source: Mokdad A H, et al. JAMA 1999;282:16, 2001;286:10,2003;289:1.

### Children and Adolescents

Children and adolescents are becoming increasingly overweight at an alarming rate. Since the 1970s, the percentage of children and adolescents classified as overweight has more than doubled as illustrated in Table 3. The most recent data (NHANES 1999-2002) estimated that 16 percent of children and adolescents in the United States were overweight (National Center for Health Statistics, 2004). Overweight that begins in childhood and adolescence is more likely to continue into adulthood (Whitaker et al., 1997).

**Table 3. Prevalence of overweight children and adolescents ages 6-19 in the United States, for selected years 1971-1974 through 1999-2002**

Age (years)*	1971-1974	1976-1980	1988-1994	1999-2002
6-11	4%	7%	11%	16%
12-19	6%	5%	11%	16%

\*Excludes pregnant women

Source: National Center for Health Statistics, National Health and Nutrition Examination Survey

## CONTRIBUTING FACTORS

Overweight and obesity are a result of energy imbalance that occurs when an individual consumes more calories than the body burns. There are many factors that contribute to causing overweight and obesity including genetics, environmental influences, and individual behavior.

### Genetics

It is well established that obesity tends to run in families. Evidence from twin and adoption studies support that genes play a role in obesity.

- Adoption studies have shown a positive correlation between the body mass indexes of adults who were adopted as children and their biological parents. In contrast, there was no correlation in body mass index between the adult adoptees and their adoptive parents (Stunkard et al., 1986a; Sorenson et al., 1992).
- Identical twins, who have the same genetic makeup, were more similar in body weight than fraternal twins, who have different genes (Stunkard et al., 1986b).

Some individuals are genetically susceptible to obesity; however, genetic predisposition does not always predict future health. Environment also strongly influences obesity.

### Environmental and Behavioral Factors

Many experts believe that the rising obesity epidemic is largely due to living in an increasingly ‘obesogenic’ environment—one that promotes obesity by encouraging overconsumption of food and limiting opportunities for physical activity (Swinburn et al., 1999).

- **Changing food consumption:** Americans are increasingly consuming foods prepared away from home, relying heavily on convenience foods such as pre-packaged foods and fast foods (Schwenk, 1995; Harnack and Boutelle, 2000). Frequent consumption of foods away from home is associated with a diet high in fat and calories (Jeffrey, 1998; Zoumas-Morse et al., 2001). During the 1990s, the amount of food consumed outside the home accounted for 47 percent of the food budget, an increase from 34 percent in 1970 (Young and Nestle, 2002).

Portion sizes have also increased substantially at restaurants and among processed foods and beverages. Large portions not only contain more energy but also encourage people to eat more (Rolls et al., 2002).

- **Sedentary lifestyle:** The links between physical inactivity and obesity are well established. According to the Surgeon General’s report on Physical Activity and Health (1996), physical inactivity contributes to increased risk of obesity, and participating in physical activity is good for overall health.

Despite all the benefits of being physically active, most Americans are sedentary. Labor and time saving technologies, such as cars, elevators, televisions, and computers, facilitate sedentary lifestyle.

## HEALTH COMPLICATIONS AND MORTALITY

### Obesity and Mortality

Epidemiologic studies have shown that a strong link exists between being overweight or obese and having an increased risk of death or disease (NHLBI, 1998). Obese adults have up to twice the risk of death than normal weight adults (World Health Organization, 1995; Manson et al., 1987). According to the Surgeon General's report on obesity, an estimated 300,000 deaths is linked to obesity each year.

### Obesity and Comorbid Conditions

Overweight and obesity is associated with increased risk of health conditions, including coronary heart disease, type 2 diabetes, cancer, and arthritis (NHLBI, 1998) (Table 4). Furthermore, overweight and obese individuals can suffer from social stigmatization, discrimination, and poor body image (NHLBI, 1998).

Examples of chronic health conditions that are significantly associated with overweight and obesity include:

- **Cardiovascular Disease:** There are numerous cardiovascular diseases associated with overweight and obese individuals, and the incidence of cardiovascular disease increases in those individuals that carry excess weight (Must et al., 1999). Two major chronic health conditions that are grouped under cardiovascular disease include high blood pressure and high cholesterol.
  - **High Blood Pressure:** The definition of high blood pressure is a mean systolic blood pressure of  $\geq 140$  mm Hg, mean diastolic blood pressure of  $\geq 90$  mm Hg, or currently taking anti-hypertensive medication. One recent study showed that as BMI increases in both men and women, the age-adjusted prevalence of high blood pressure also increases (NHLBI, 1998). High blood pressure is the most common health risk for overweight and obese men and women (Must et al., 1999). It has also been reported that the combination of obesity and hypertension are comorbid risk factors for the development of cardiovascular disease (NHLBI, 1998).
  - **High Cholesterol:** The definition of high total cholesterol is a total cholesterol level of  $\geq 240$  mg/ dL. Although there is continued debate over the prevalence of increased total cholesterol in overweight and obese individuals, there are several longitudinal studies that show that overweight and obesity are linked with increased total cholesterol levels (NHLBI, 1998). There has also been an association made between higher triglyceride levels and lower high-density lipoprotein cholesterol levels for men and women with higher BMIs (NHLBI, 1998).

- **Diabetes:** The incidence of diabetes mellitus increases in individuals that carry excess weight (Must et al., 1999). Furthermore, abdominal obesity has been shown to be a major risk factor for the development of type 2 diabetes (Chan, 1994; Sparrow, 1986).
- **Stroke:** With graded increases in an individual's BMI, the risk of stroke increases (NHLBI, 1998). Kurth and colleagues (2002) reported the risk of stroke is doubled in obese individuals.
- **Arthritis:** Mokdad and colleagues (2003) reported that there is a significant association with overweight and obese individuals and arthritis. The likelihood that one will develop arthritis is increased for overweight and obese individuals (NHLBI, 1998). However, there does not seem to be a link between first developing osteoarthritis and then the development of obesity (NHLBI, 1998).
- **Asthma:** Overweight and obesity is significantly associated with the development of asthma (Mokdad et al., 2003). Camargo and colleagues (1999) found that adult-onset asthma is positively associated with increases in BMI.

**Table 4. Health Complications Associated with Obesity**

<b>Obesity is Associated with an Increased Risk of:</b>	
<ul style="list-style-type: none"> <li>▪ Cancer               <ul style="list-style-type: none"> <li>✓ Colon Cancer</li> <li>✓ Endometrial Cancer</li> <li>✓ Gallbladder Cancer</li> <li>✓ Kidney Cancer</li> <li>✓ Postmenopausal Breast Cancer</li> </ul> </li> <li>▪ Cardiovascular               <ul style="list-style-type: none"> <li>✓ High Blood Pressure</li> <li>✓ High Blood Cholesterol</li> <li>✓ Heart Disease</li> <li>✓ Stroke</li> </ul> </li> <li>▪ Endocrine               <ul style="list-style-type: none"> <li>✓ Type 2 Diabetes</li> <li>✓ Insulin Resistance</li> <li>✓ Impaired Glucose Tolerance</li> <li>✓ Metabolic Syndrome</li> </ul> </li> <li>▪ Orthopedic               <ul style="list-style-type: none"> <li>✓ Osteoarthritis</li> <li>✓ Musculoskeletal Disorders</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ Obstetric/Gynecologic               <ul style="list-style-type: none"> <li>✓ Gestational Diabetes</li> <li>✓ Gestational Hypertension</li> <li>✓ Cesarean Section</li> <li>✓ Overdue Births</li> <li>✓ Induced Labor and Longer Labors</li> <li>✓ Menstrual Irregularities</li> <li>✓ Urinary Incontinence</li> </ul> </li> <li>▪ Psychosocial               <ul style="list-style-type: none"> <li>✓ Social and Professional Discrimination</li> <li>✓ Depression</li> <li>✓ Decreased Productivity</li> </ul> </li> <li>▪ Pulmonary               <ul style="list-style-type: none"> <li>✓ Asthma</li> <li>✓ Sleep Apnea</li> </ul> </li> </ul>

*Source: National Heart, Lung, and Blood Institute. Clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults. 1998; Sept. NIH publication No. 98-4083.*

## **Children and Adolescents**

Adults are not the only age groups that face health consequences with increases in weight – children and adolescents are also at risk. Although morbidities related to obesity arise more often in adults, there is growing concern for overweight children and adolescents that are at greater risk for various health ailments later in life (CDC, 2004). Freedman and colleagues (1999) reported that almost 60% of overweight children have at least one cardiovascular risk factor. Some of the other common medical consequences of overweight children and adolescents include asthma, diabetes, hypertension, and early maturation (CDC, 2004). Similar to overweight and obese adults, overweight children and adolescents can face issues of social discrimination and poor body image (Wadden and Stunkard, 1985). Those children and adolescents may also face parental neglect and behavioral and learning problems (Lissau and Sorenson, 1994; Mellbin and Vuille, 1989).

## **Benefits of Weight Loss**

Research has shown that even modest weight loss reduces the risk factors for some chronic health conditions especially cardiovascular disease (Surgeon General, 2001). This weight reduction has been associated with lower blood pressure, lower blood sugar, and improved lipid levels (Surgeon General, 2001.) At this time, only a few studies have examined the link between weight loss and a reduction in chronic health conditions. However, new studies are currently ongoing to study this link.

# BURDEN OF OVERWEIGHT AND OBESITY IN MARYLAND

The intent of this report is to provide an accurate account of the burden of overweight and obesity in Maryland. However, in the process of identifying data sources for this document, it became apparent that insufficient data exist that may limit the scope of the report. The following gaps have been identified in nutrition and physical activity surveillance:

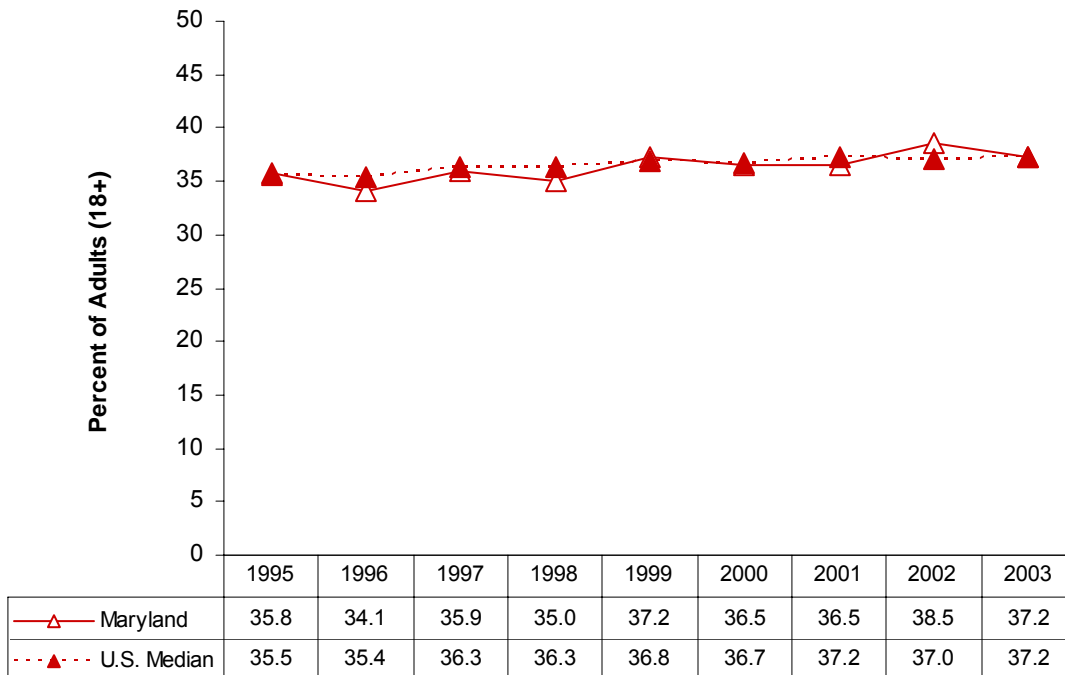
- Jurisdiction. Due to small sample size, annual data on prevalence of health risk factors and chronic diseases are not available for some jurisdictions.
- Race and ethnicity. Due to very small prevalence, data sources in Maryland utilized in this report have insufficient data on Asian or Pacific Islanders, and American Indians.
- Children and adolescents. The CDC's Youth Risk Behavior Surveillance System (YRBSS) that monitors priority health risk behaviors among youth will be implemented in the State of Maryland for the first time in April 2005, providing data needed to accurately assess the problem of overweight in Maryland's children and adolescents.

Data sources utilized in this report include: Behavioral Risk Factor Surveillance System (BRFSS), Maryland Pregnancy Risk Monitoring System, and Maryland Vital Statistics Administration (refer to Appendix C for data sources and Appendix D for survey questions).

## OVERWEIGHT AND OBESITY AMONG MARYLAND ADULTS

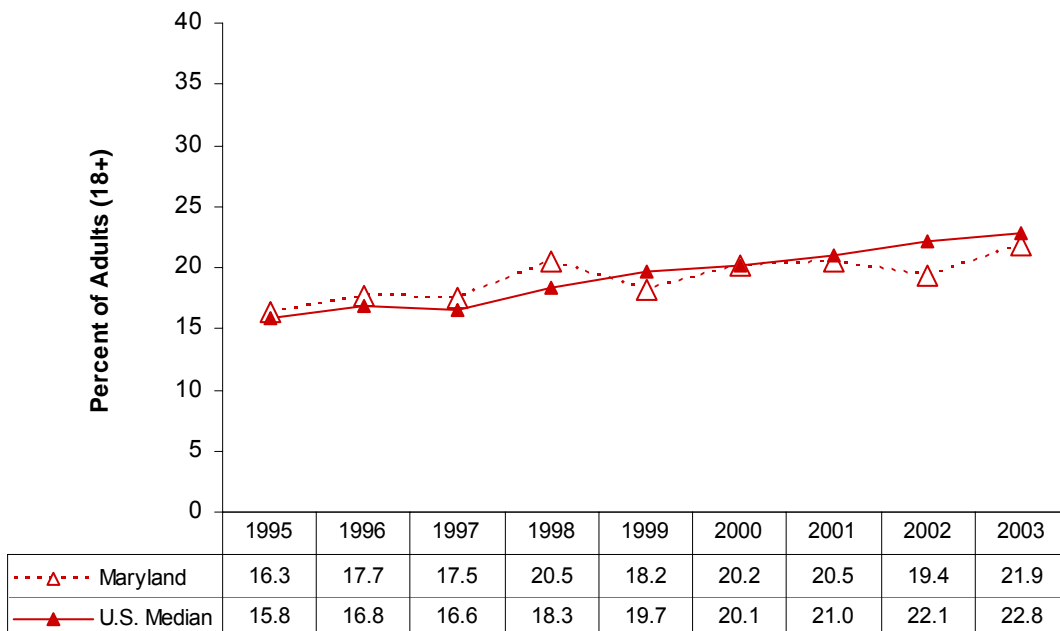
In recent years, overweight and obesity has increased steadily in the United States and Maryland (Figures 2 and 3). In 2003, an estimated 2.3 million (59 percent) of Maryland adults were overweight or obese. Approximately 22 percent of Maryland adults—about 838,000 people—were obese. Of particular concern is that the prevalence of obesity has risen from 16.3 percent in 1995 to 21.9 percent in 2003. This is a relative increase of 34 percent between 1995 and 2003. As in the United States, the obesity trend in Maryland has been rising in recent years rather than getting closer to the national health objective of reducing adult obesity rates to 15 percent or lower by the year 2010. In 2003, 37 percent of Maryland adults were in the normal weight range (excluding underweight), well below the national goal of 60 percent of adults who are at a healthy weight.

**Figure 2. Prevalence of Overweight Adults in Maryland and the United States, 1995-2003**



Source: Maryland BRFSS

**Figure 3. Prevalence of Obese Adults in Maryland and the United States, 1995-2003**



Source: Maryland BRFSS

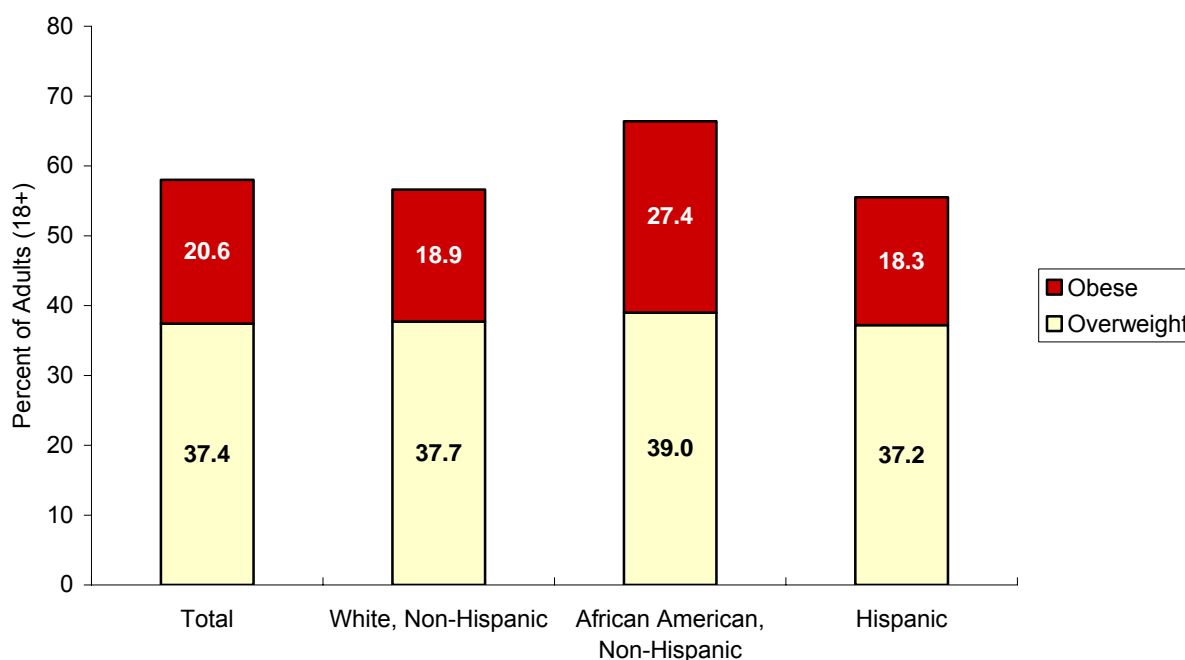
## Variation by Demographic Characteristics

The prevalence of overweight and obesity among Maryland adults varied across demographic groups. This section highlights differences in overweight and obesity based on race and ethnicity, gender, age, education and income levels.

### Race/Ethnicity and Gender

Among racial and ethnic groups, the prevalence of overweight and obesity (BMI  $\geq$  25) was higher for African American adults than for White and Hispanic adults. The prevalence of overweight adults was similar among racial/ethnic groups; however, a higher percentage of African American adults were obese (27.4 percent) than White (18.9 percent) and Hispanic (18.3 percent) adults (Figure 4).

**Figure 4. Prevalence of Overweight and Obese Adults by Race/Ethnicity in Maryland, 2001-2003**

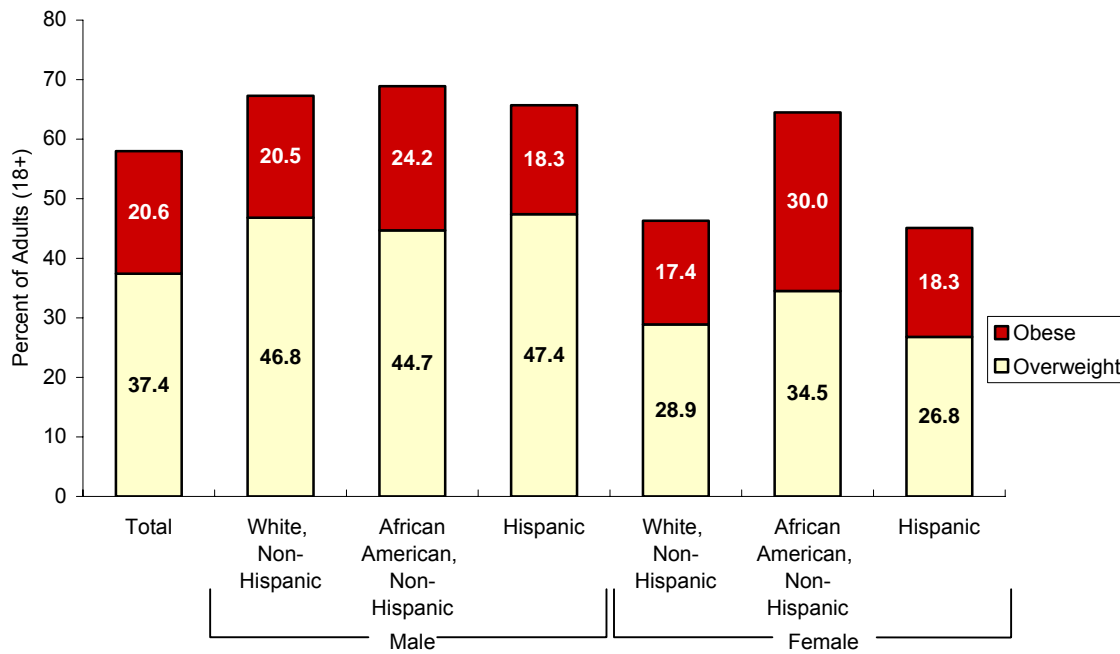


Source: Maryland BRFSS

Overall, the prevalence of overweight and obesity was higher among African American women (34.5 and 30.0 percent, respectively) compared to White (28.9 and 17.4 percent, respectively) and Hispanic (26.8 and 18.3 percent, respectively) women. Among Maryland men, the prevalence of overweight was comparable among racial and ethnic groups; however, obesity prevalence rates were higher among African American men (24.2 percent) than White (20.5 percent) and Hispanic (18.3 percent) men (Figure 5).

Within racial and ethnic groups, more men were overweight than women. The percentage of African American women (30.0 percent) who were obese was higher than African American men (24.2 percent). The prevalence of obesity was slightly higher among White men (20.5 percent) than White women (17.4 percent). The prevalence of obesity was the same in Hispanic men and women (18.3 percent).

**Figure 5. Prevalence of Overweight and Obese Adults by Race/Ethnicity and Gender in Maryland, 2001-2003**

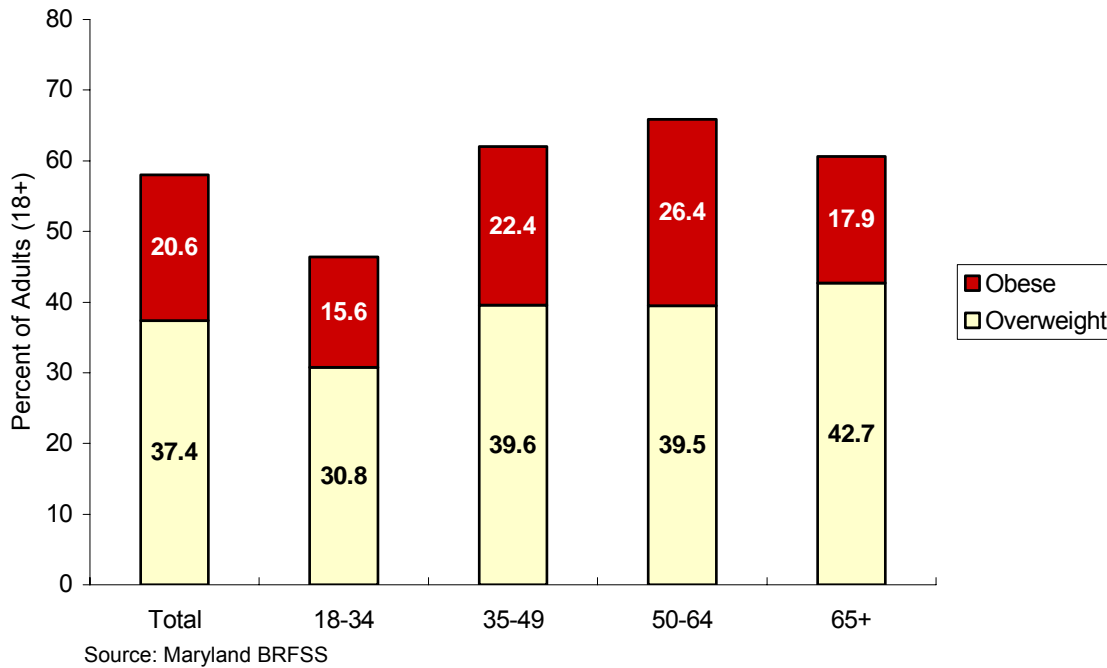


Source: Maryland BRFSS

## Age

In general, overweight and obesity rates increased with age in Maryland. The percentage of obese adults peaked in the 50 to 64 age group. Sixty-six percent of Maryland adults between the ages of 50 and 64 were overweight or obese. This age group represented the highest prevalence of overweight and obesity (BMI  $\geq 25$ ) among Maryland adults (Figure 6).

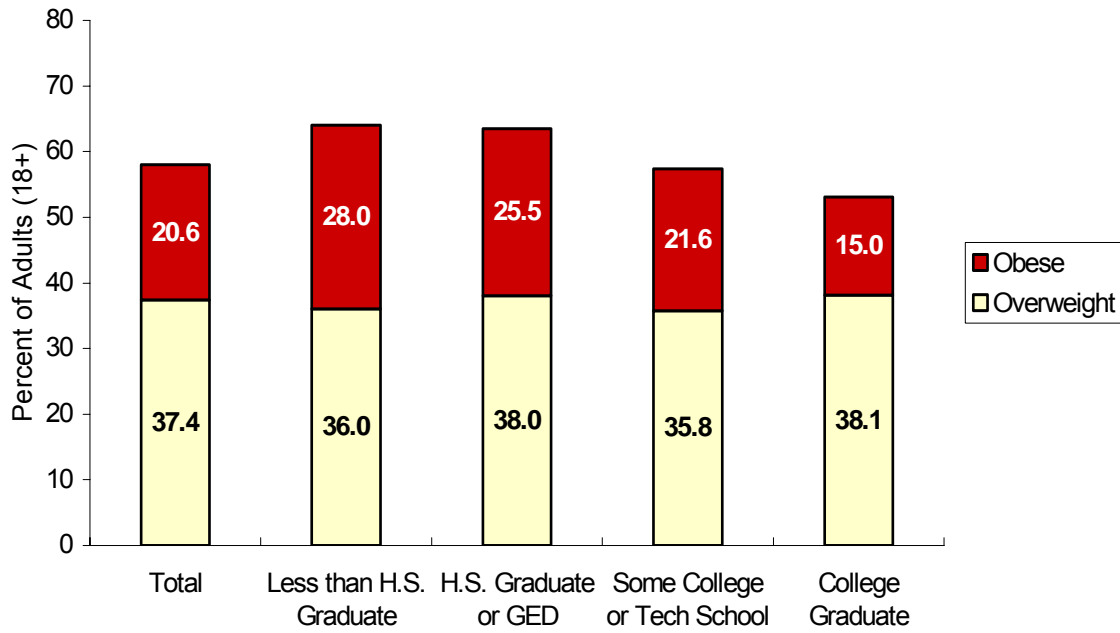
**Figure 6. Prevalence of Overweight and Obese Adults by Age in Maryland, 2001-2003**



### **Education and Income Levels**

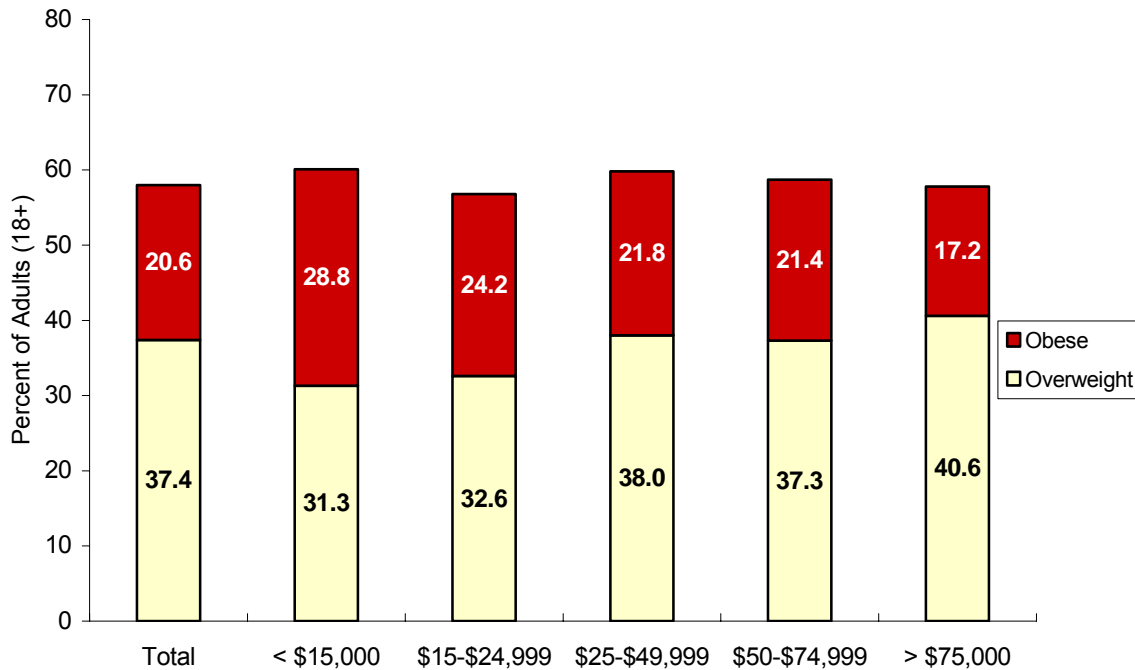
The prevalence of obesity varied by education and household income levels. Obesity was more prevalent in adults with less education (Figure 7). However, the proportion of overweight adults was fairly similar along education levels. As income levels rose, the percentage of obese adults in Maryland decreased (Figure 8). In contrast, overweight rates generally increased with increasing household income.

**Figure 7. Prevalence of Overweight and Obese Adults by Educational Level in Maryland, 2001- 2003**



Source: Maryland BRFSS

**Figure 8. Prevalence of Overweight and Obese Adults by Household Income Level in Maryland, 2001- 2003**



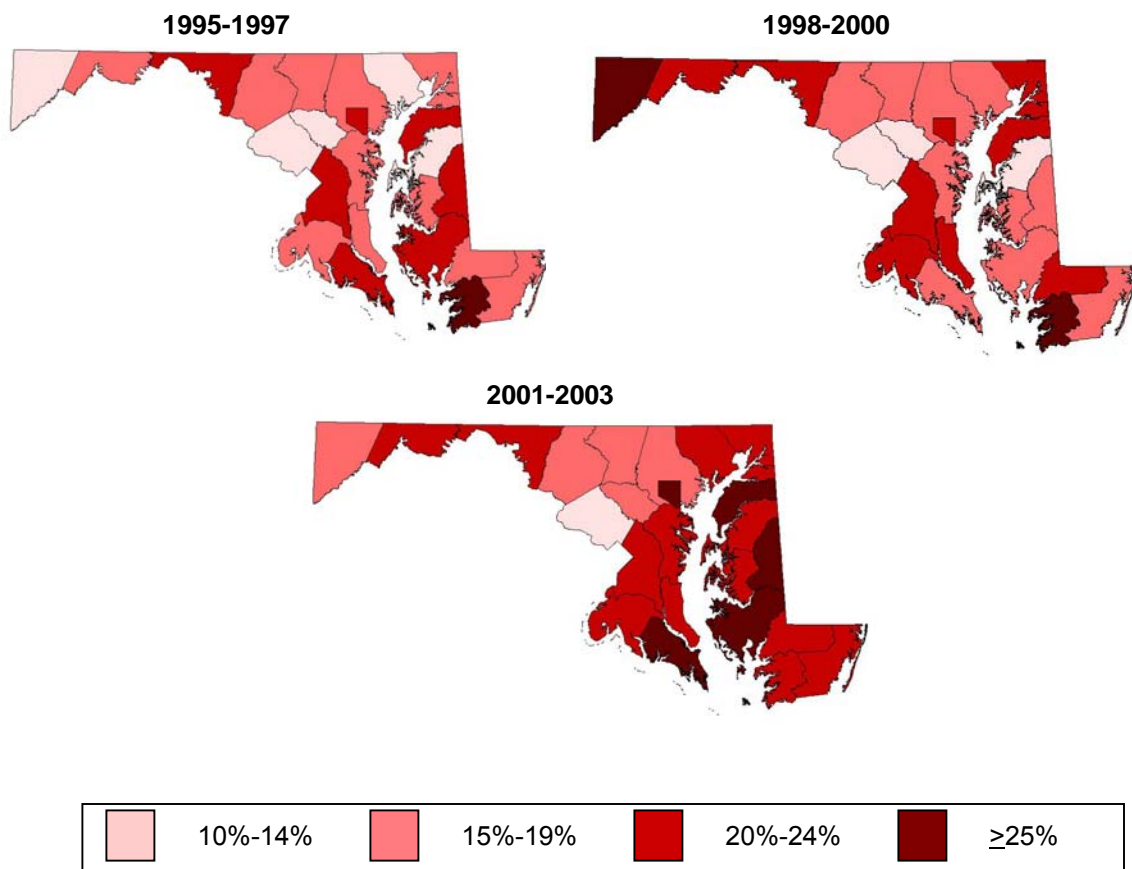
Source: Maryland BRFSS

## Variation by Jurisdiction

Obesity prevalence rates among Maryland jurisdictions have changed considerably in almost a decade. Figure 9 depicts obesity trends from 1995-1997 to 2001-2003. During 1995-1997, eight of 24 Maryland jurisdictions had obesity prevalence rates at or above 20 percent. From 2001-2003, 16 of 24 Maryland jurisdictions had obesity rates at or above 20 percent.

Obesity prevalence rates varied across Maryland jurisdictions, ranging from 14.7 percent in Montgomery County to 31.9 percent in Kent County during 2001-2003. Obesity was most prevalent in some of the eastern shore counties (Kent, Dorchester, Caroline, Worcester, and Queen Anne's), southern counties (St. Mary's and Calvert), and Baltimore City. The lowest obesity rates were mostly concentrated in central counties of the state (Montgomery, Howard, Baltimore, and Carroll).

**Figure 9. Obesity Trends among Maryland Adults, 1995-1997, 1998-2000, and 2001-2003**

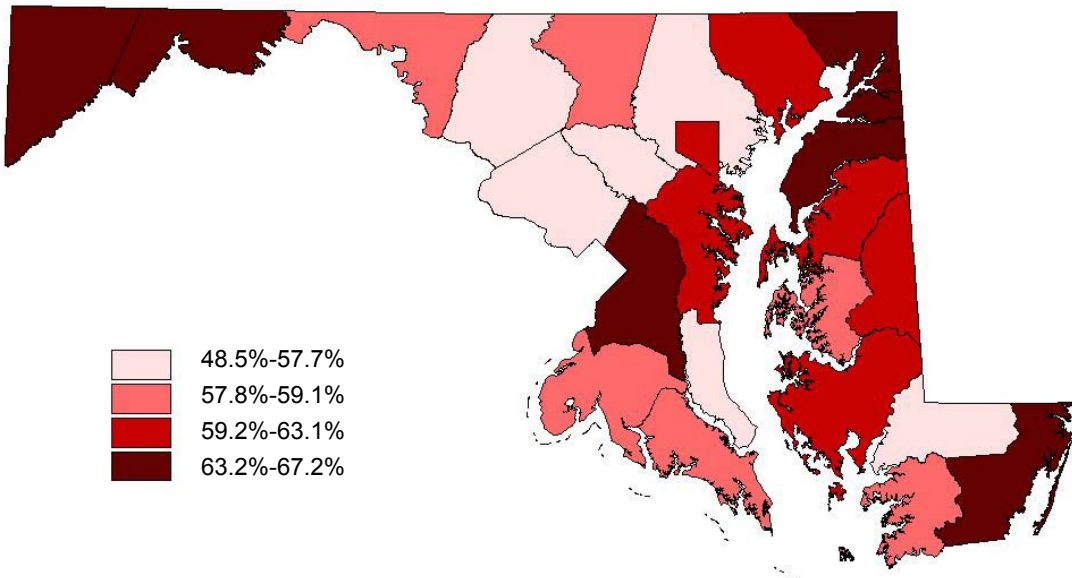


Based on aggregate data for the three year period  
Source: Maryland BRFSS

The prevalence of overweight and obesity combined across Maryland jurisdiction ranged from 48.5 percent in Howard County to 67.2 percent in Allegany County (Figure 10). Several of the eastern shore counties (Cecil, Kent, Worcester, and Queen Anne's) and western counties (Allegany and Garrett) had the highest percentage of adults who were overweight or obese. Central Maryland counties (Howard, Montgomery, Baltimore, and Carroll) generally had the lowest percentage of adults who were overweight or obese.

Overall, overweight and obesity affected every Maryland jurisdiction. No Maryland jurisdiction currently meets the national health goal of 60 percent of adults who are at healthy weight. And all but one Maryland jurisdiction have yet to achieve the national goal of 15 percent of adults who are obese.

**Figure 10. Prevalence of Overweight and Obese Adults by Maryland Jurisdiction, 2001-2003**



Based on aggregate data for the three year period  
Source: Maryland BRFSS

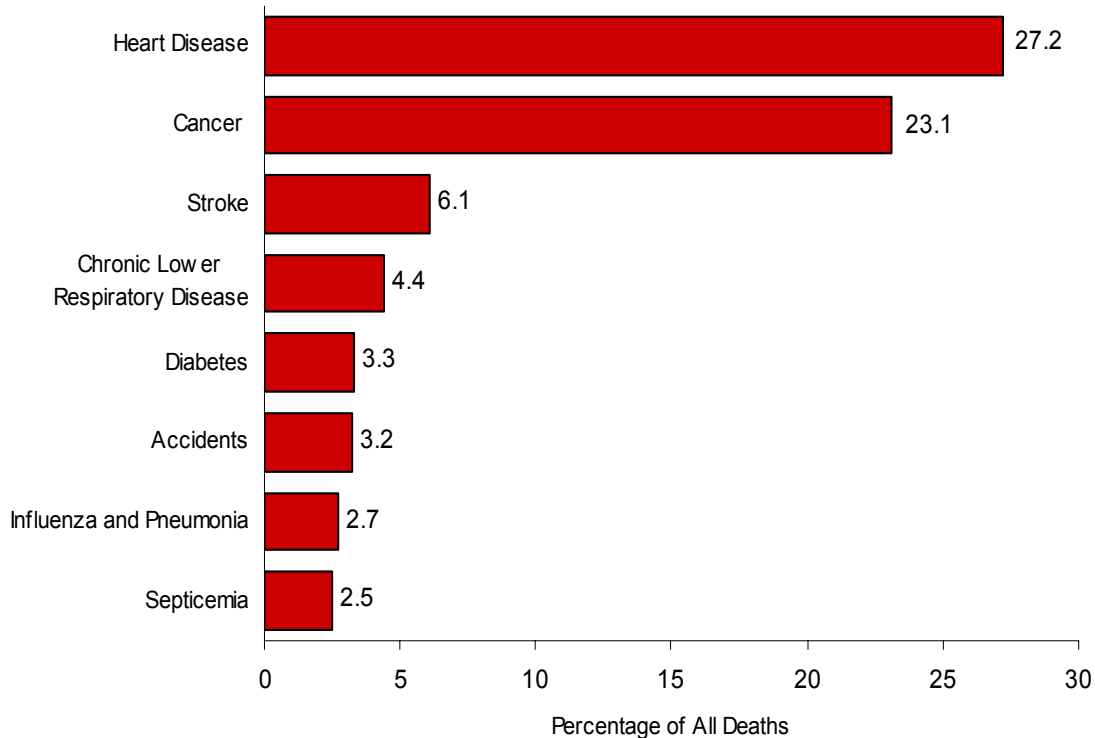
## OVERWEIGHT AND OBESITY AMONG MARYLAND CHILDREN

There is a lack of available data sources on weight status among children in Maryland. However, the Pediatric Nutrition Surveillance System (PedNSS) provides information on low-income children from birth to 5 years in federally-funded maternal and child health programs. In the 2002 PedNSS, the prevalence of overweight in children aged 2 to 5 years was 14.0 percent in Maryland, a substantial increase from 8.2 percent in 1997. Although the PedNSS population is not representative of all children in Maryland aged 2 to 5 years, the increasing trend of overweight children monitored by PedNSS suggests the epidemic is not limited to adults in Maryland.

## HEALTH COMPLICATIONS

Six out of every 10 Marylanders who die each year die of a chronic disease. Obesity-related diseases, such as heart disease, cancer, stroke, and diabetes, were among the top leading causes of death in Maryland (Figure 11). This section examines how overweight and obesity is associated with self-reported health complications, including diabetes, arthritis, asthma, hypertension, and high cholesterol in the general adult population in Maryland.

**Figure 11. Leading Causes of Deaths in Maryland, 2003**

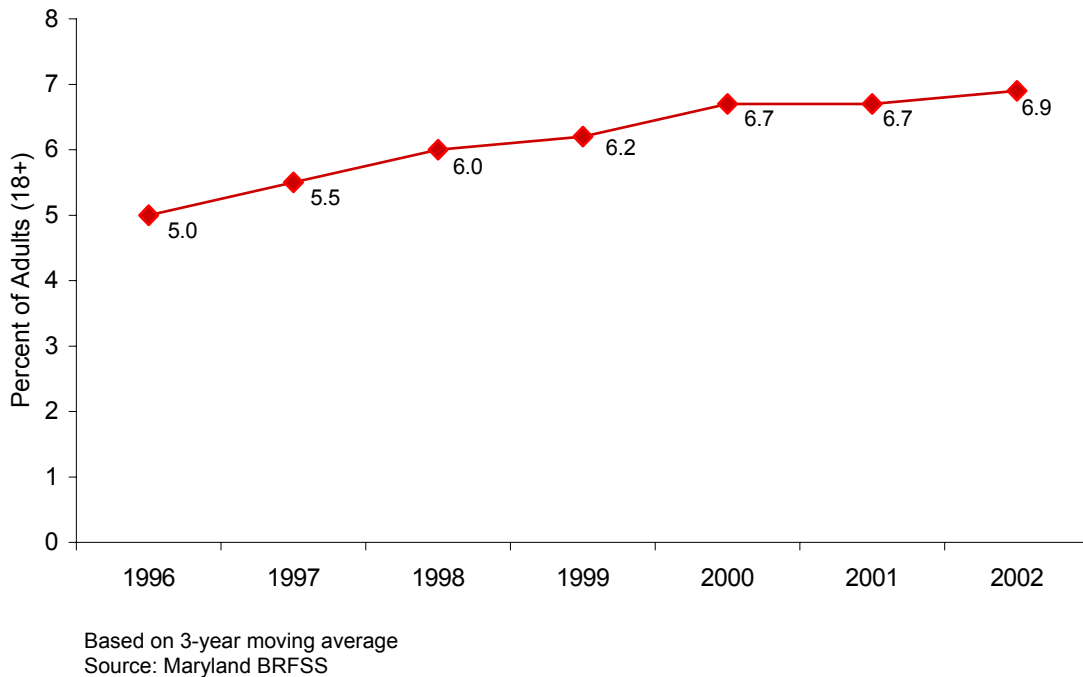


Source: Maryland Vital Statistics, Annual Report 2003

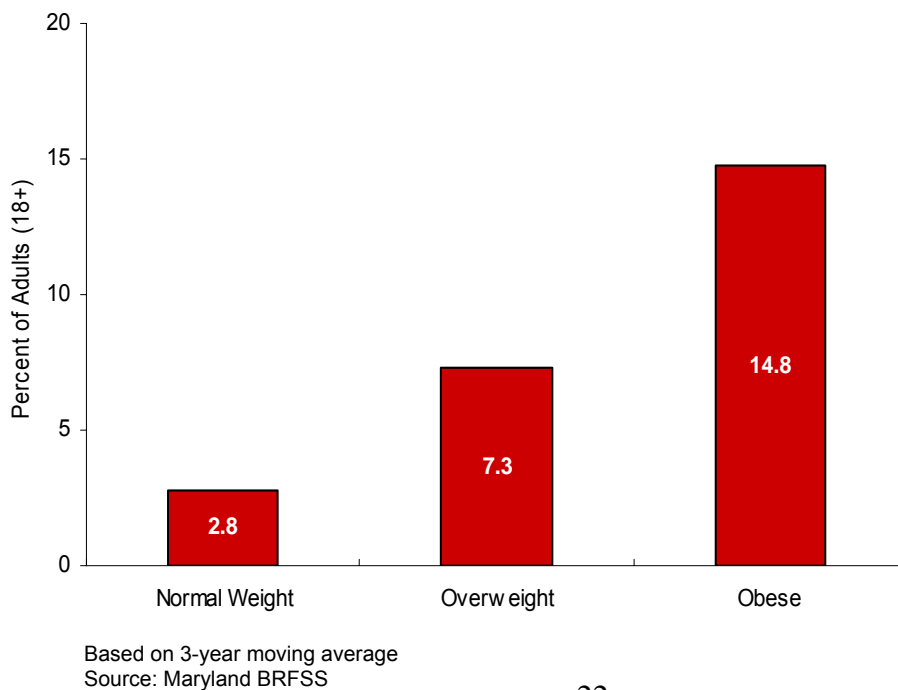
## Diabetes

Between 1996 and 2002, the prevalence rate for diabetes in Maryland adults increased 38 percent from 5.0 percent in 1996 to 6.9 percent in 2002 (Figure 12). The percentage of diagnosed diabetes in 2002 was 6.9 percent. Figure 13 shows the percentage of diagnosed diabetes increases by BMI category. Normal weight adults were least likely to be diagnosed with diabetes at 2.8 percent, but the percentage more than quadruples to 14.8 percent for obese adults.

**Figure 12. Prevalence of Diagnosed Diabetes among Maryland Adults, 1996-2002**



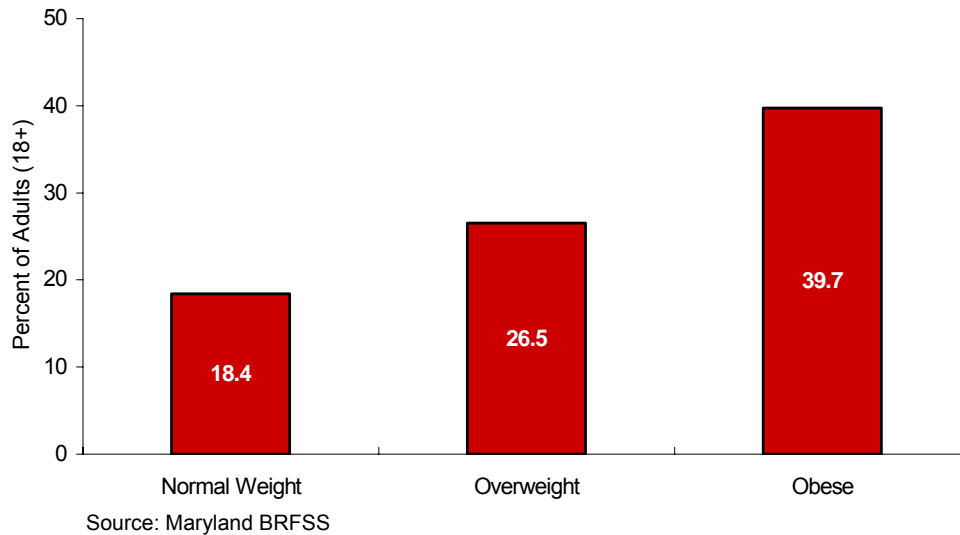
**Figure 13. Percentage of Adults Who Reported Having Diabetes by Weight Status, 2002**



## Arthritis

In 2003, an estimated 26.3 percent of Maryland adults had been diagnosed with arthritis (BRFSS, 2003). The percentage of diagnosed arthritis increased by BMI category, ranging from 18.4 percent of normal weight adults to 39.7 percent of obese adults (Figure 14).

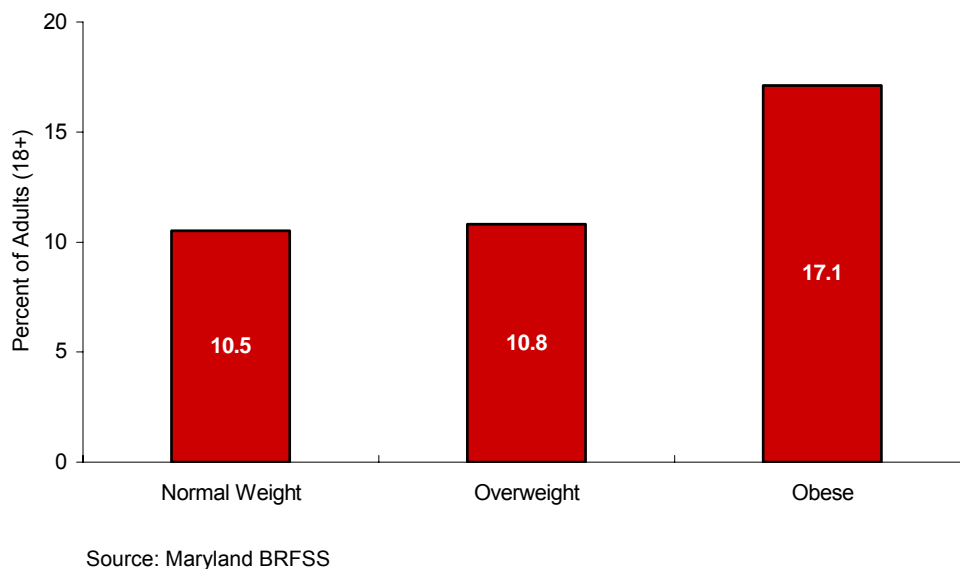
**Figure 14. Percentage of Adults Who Reported Having Arthritis by Weight Status, 2003**



## Asthma

In 2003, approximately 12.3 percent of adults in Maryland had been diagnosed with asthma (BRFSS, 2003). Asthma was most prevalent among obese adults (Figure 15).

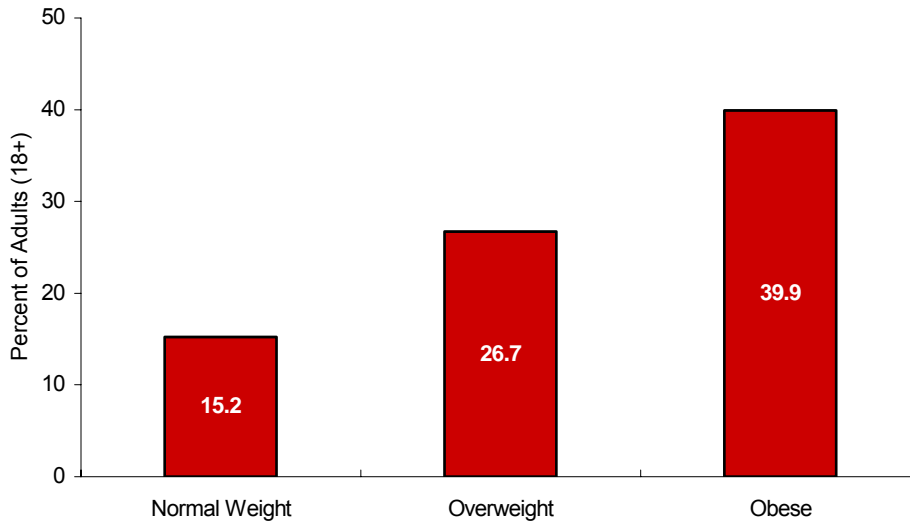
**Figure 15. Percentage of Adults Who Reported Having Asthma by Weight Status, 2003**



## Hypertension

In 2003, an estimated 25 percent of Maryland adults had been diagnosed with high blood pressure (BRFSS, 2003). The percentage of diagnosed high blood pressure substantially increased by BMI category. Obese adults were more than twice as likely to be diagnosed with high blood pressure than normal weight adults (Figure 16).

**Figure 16. Percentage of Adults Who Reported Having High Blood Pressure by Weight Status, 2003**

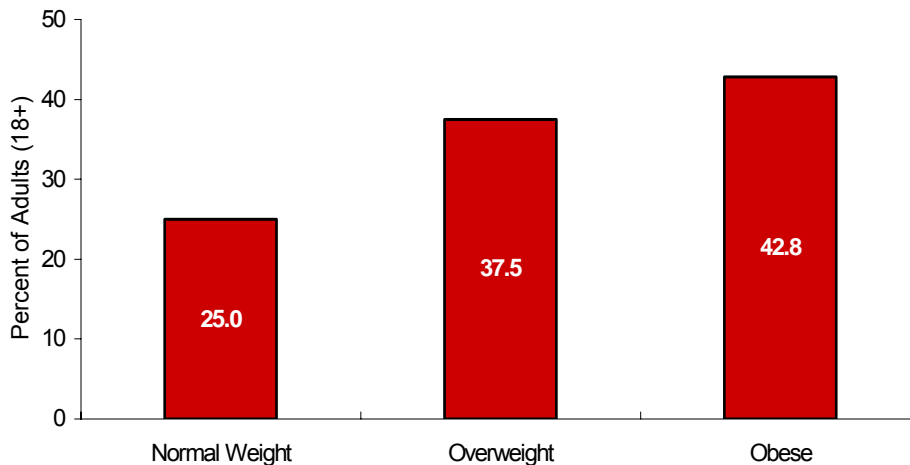


Source: Maryland BRFSS

## High Cholesterol

In 2003, approximately 33.9 percent of adults in Maryland were diagnosed with high cholesterol (BRFSS, 2003). Overweight or obese adults were more likely to have the condition compared to normal weight adults (Figure 17).

**Figure 17. Percentage of Adults Who Reported Having High Cholesterol by Weight Status, 2003**



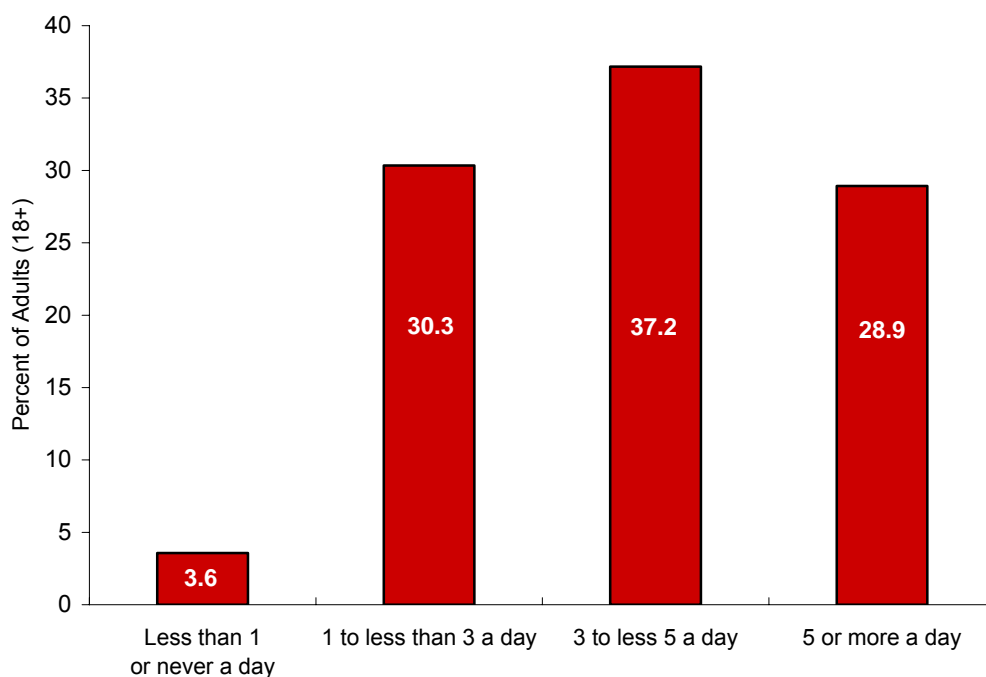
Source: Maryland BRFSS

## NUTRITION

Fruit and vegetable intake is an important determinant of health. Current scientific evidence suggests that dietary patterns with higher intake of fruits and vegetables are associated with reduced risk of diseases and conditions, such as heart disease, stroke, diabetes, and certain cancers (Hyson, 2002; Key, 2004). The *National 5 A Day for Better Health Program* promotes consuming at least five servings of fruits and vegetables a day for good health.

In 2003, 37.2 percent of Maryland adults consumed three to four servings of fruits and vegetables a day, and about 30.3 percent consume one to two servings (Figure 18). Only 28.9 percent of adults in Maryland met the national 5 A Day recommendation of eating five or more servings of fruits and vegetables a day. The national health goals for fruit and vegetable consumption are to increase the proportion of adults who consume at least two daily servings of fruits and three daily servings of vegetables to at least 75 percent and 50 percent respectively.

**Figure 18. Number of Daily Fruits and Vegetables Servings Consumed by Adults in Maryland, 2003**



Source: Maryland BRFSS

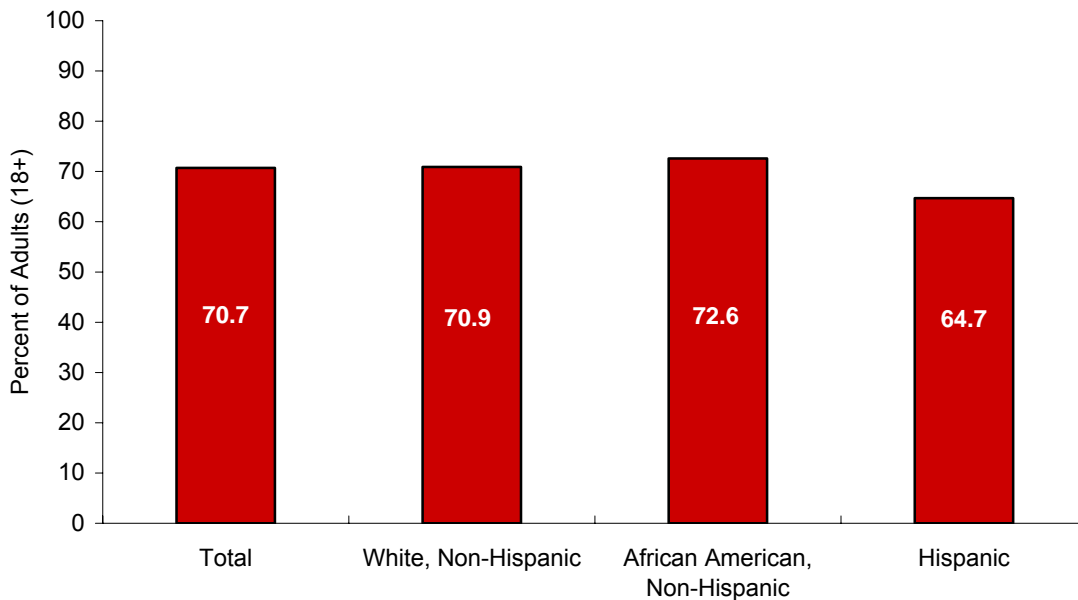
## Variations by Demographic Characteristics

Fruit and vegetable consumption varied across demographic groups in Maryland. This section highlights differences in inadequate fruit and vegetable consumption (consumes less than five servings of fruits and vegetables a day) based on race and ethnicity, gender, age, education and income levels.

### Race /Ethnicity and Gender

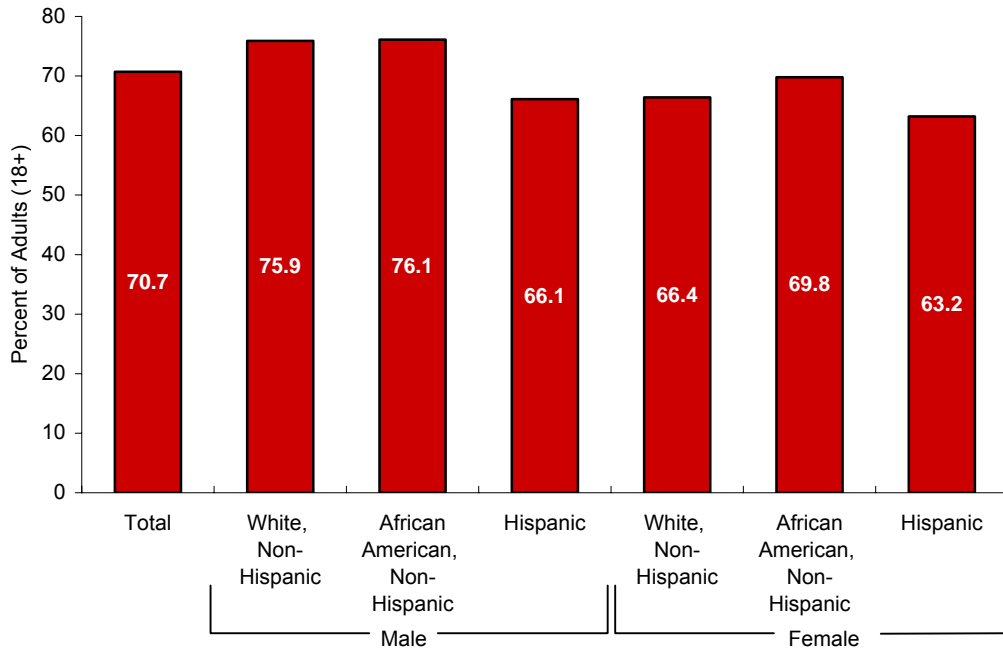
The percentage of adults who eat fewer than five servings of fruits and vegetables a day was higher among African American and White adults (72.6 percent and 70.9 percent, respectively) than Hispanic adults (64.7 percent) (Figure 19). Within racial and ethnic groups, more men fell short of the 5 A Day recommendation than women (Figure 20).

**Figure 19. Percentage of Adults Who Reported Consuming Fewer Than 5 Servings of Daily Fruits and Vegetables by Race/Ethnicity in Maryland, 2002-2003**



Source: Maryland BRFSS

**Figure 20. Percentage of Adults Who Reported Consuming Fewer Than 5 Servings of Daily Fruits and Vegetables by Race/Ethnicity and Gender in Maryland, 2002-2003**

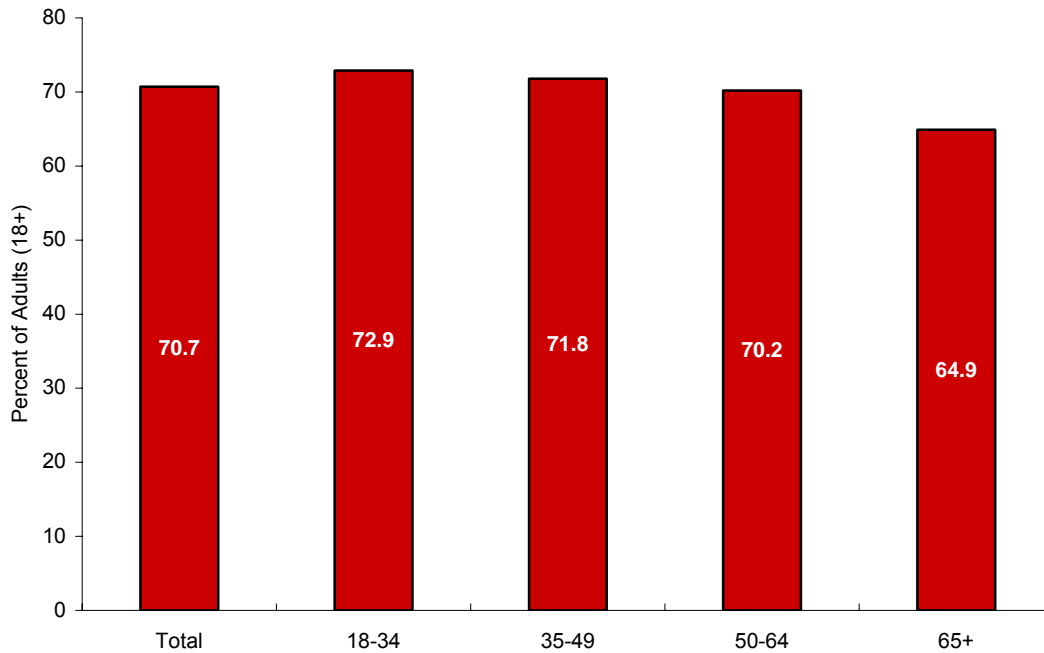


Source: Maryland BRFSS

### Age

Older adults were more likely to meet the 5 A Day recommendation than younger adults in Maryland. Levels of inadequate consumption of fruits and vegetables ranged from a high of 72.9 percent among adults aged 18-34 to a low of 64.9 percent among adults aged 65 and older (Figure 21).

**Figure 21. Percentage of Adults Who Reported Consuming Fewer Than 5 Servings of Daily Fruits and Vegetables by Age in Maryland, 2002-2003**

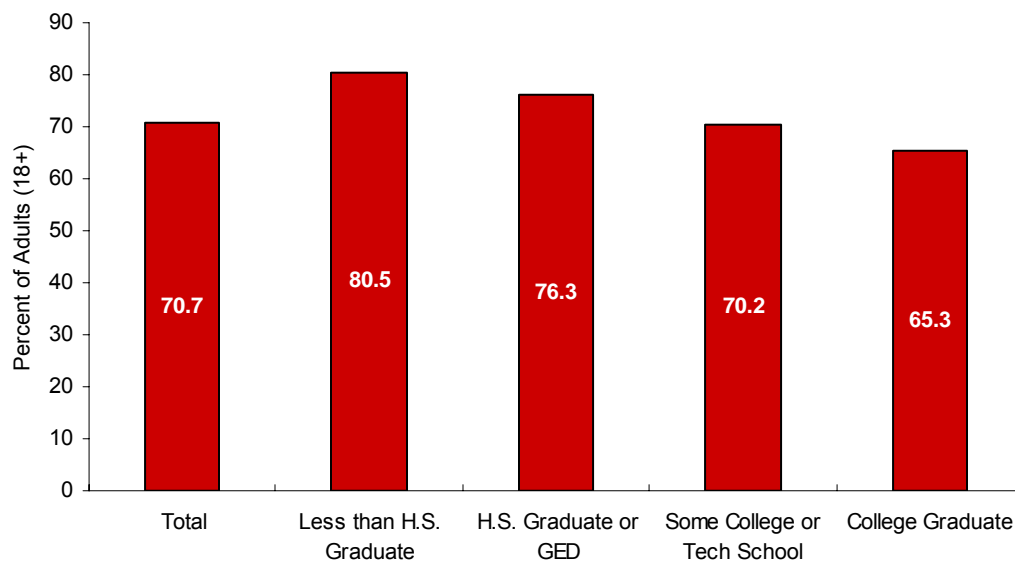


Source: Maryland BRFSS

### Education and Income Levels

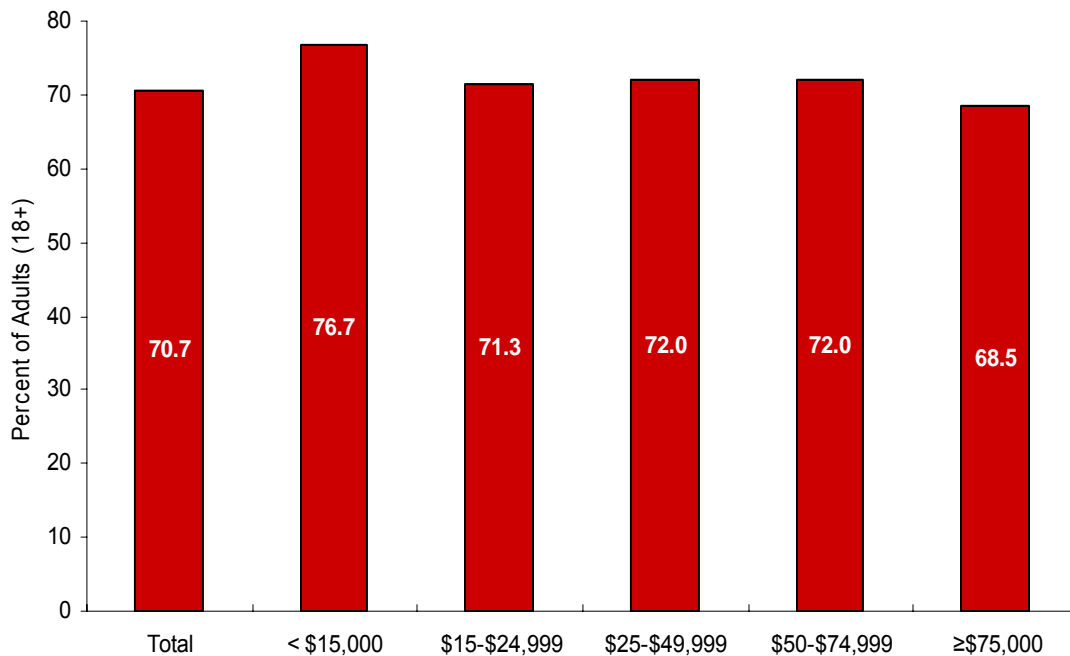
Consumption of fruits and vegetables also differed by education and income levels. Maryland adults with lower education and household income tended to eat fewer than five servings of fruits and vegetables a day (Figures 22 and 23).

**Figure 22. Percentage of Adults Who Reported Consuming Fewer Than 5 Servings of Daily Fruits and Vegetables by Education Level in Maryland, 2002-2003**



Source: Maryland BRFSS

**Figure 23. Percentage of Adults Who Reported Consuming Fewer Than 5 Servings of Daily Fruits and Vegetables by Household Income Level in Maryland, 2002-2003**

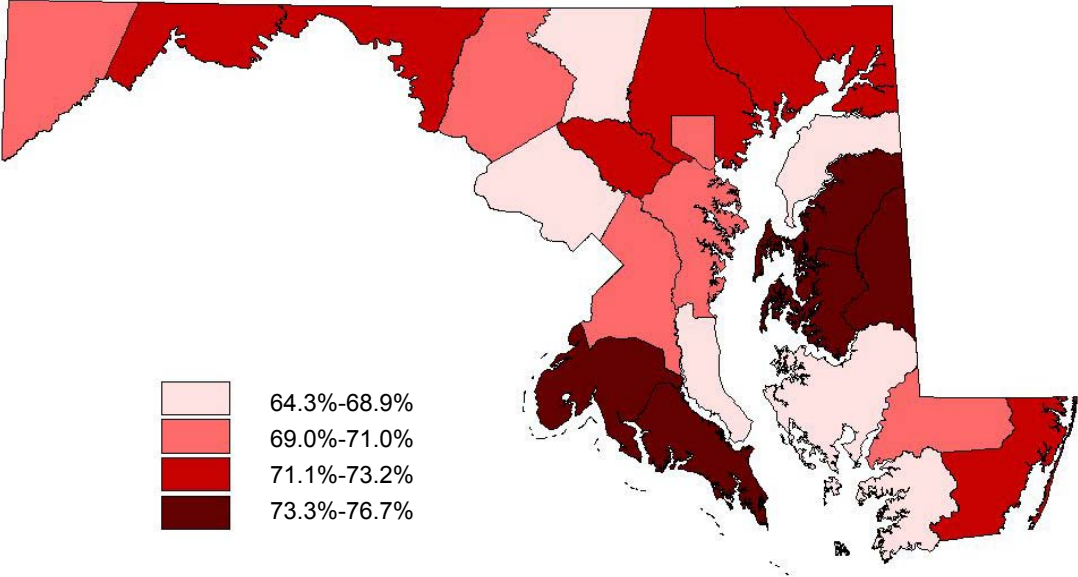


Source: Maryland BRFSS

### **Variations by Jurisdiction**

Variations in fruit and vegetable consumption occurred across jurisdictions. Levels of inadequate fruit and vegetable consumption ranged from a high of 76.7 percent in Charles County to a low of 64.3 percent in Kent County (Figure 24). Bordering southern counties of the state (Charles and St. Mary's) and neighboring eastern shore counties (Talbot, Queen Anne's, and Caroline) had relatively high rates of inadequate fruit and vegetable consumption. Rates of inadequate fruit and vegetable consumption were relatively low in some eastern shore counties (Kent, Dorchester, Somerset, and Wicomico) and some central counties (Montgomery and Carroll).

**Figure 24. Percentage of Adults Who Reported Consuming Fewer than 5 Servings of Daily Fruits and Vegetables by Maryland Jurisdiction, 2002-2003**

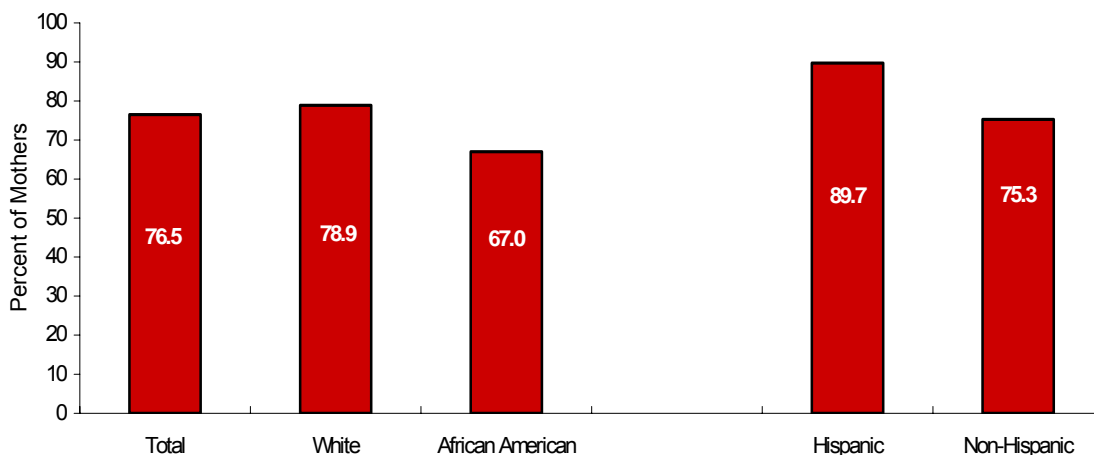


Based on aggregate data for the three year period  
Source: Maryland BRFSS

## BREASTFEEDING

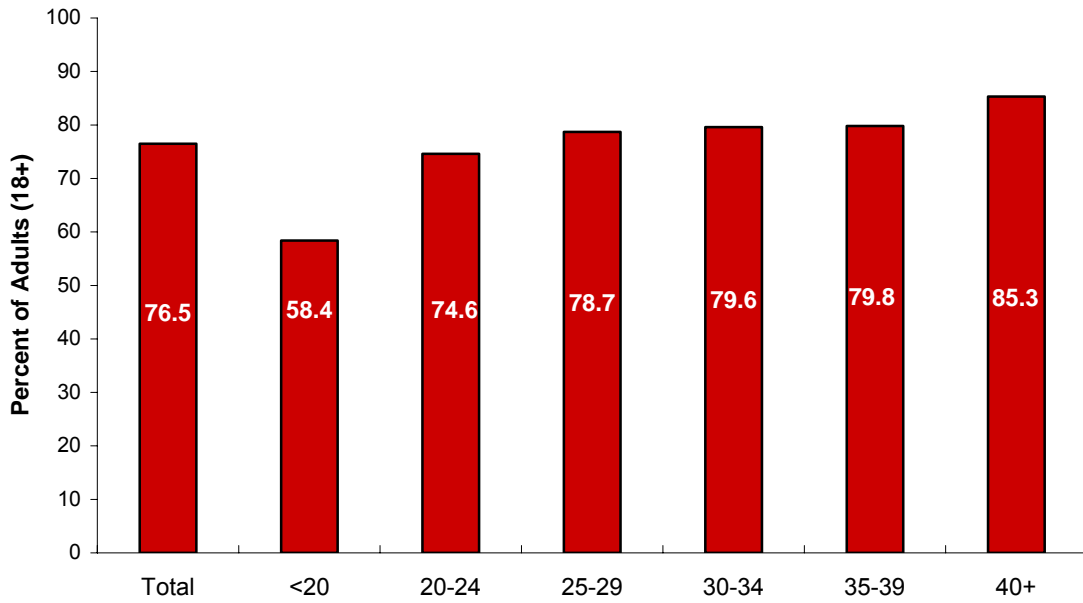
Studies have suggested that breastfeeding is protective against overweight in children (Grummer-Strawn and Mei, 2004; Bergmann et al., 2003). In 2001, 76.5 percent of infants in Maryland were breastfed (Figure 25). Maryland met the national health goal of increasing the proportion of mothers initiating breastfeeding to 75 percent. However, African American infants (67.0 percent) had the lowest prevalence of breastfeeding in 2001. Figure 26 illustrates that the prevalence of infants ever breastfed increased with maternal age, ranging from the lowest prevalence in mothers younger than age 20 (58.4 percent) to the highest prevalence in mothers older than age 40 (85.3 percent). The prevalence of mothers ever breastfeeding also varied among educational levels. Mothers with a high-school degree or less education were less likely to breastfeed their infants than their more educated peers (Figure 27).

**Figure 25. Percentage of Mothers Who Reported Ever Breastfeeding Their Infants by Race and Ethnicity in Maryland, 2001**



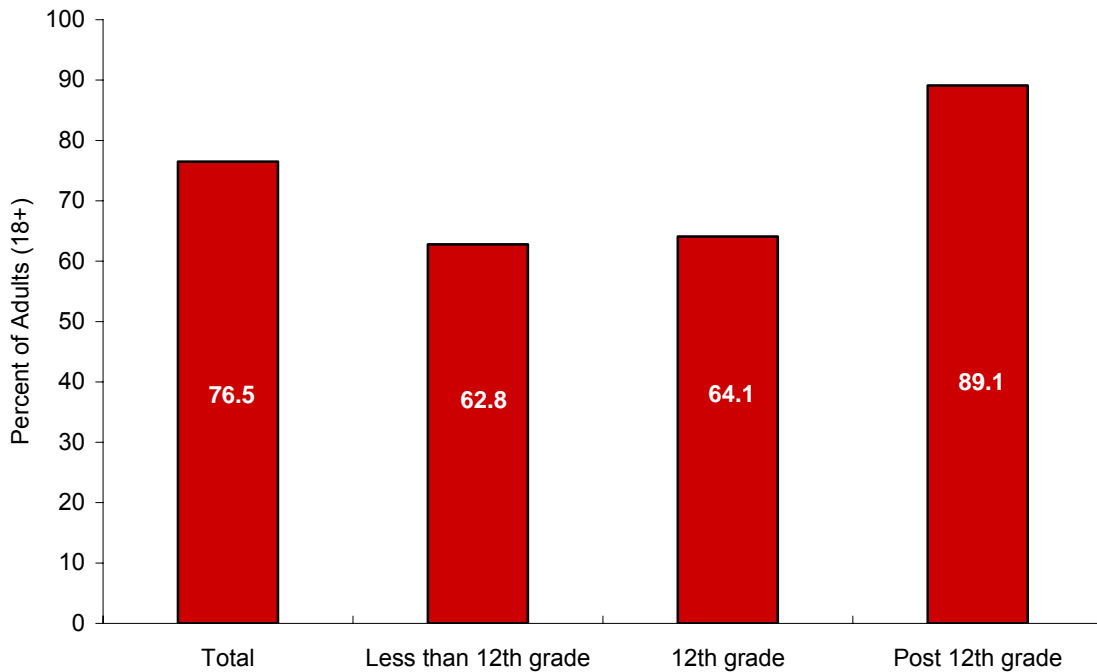
Includes only mothers ages 20 and above  
Persons of Hispanic origin may be any race  
Source: Maryland PRAMS

**Figure 26. Percentage of Mothers Who Reported Ever Breastfeeding Their Infants by Age in Maryland, 2001**



Includes only mothers ages 20 and above  
Source: Maryland PRAMS

**Figure 27. Percentage of Mothers Who Reported Ever Breastfeeding Their Infants by Education in Maryland, 2001**



Includes only mothers ages 20 and above  
Source: Maryland PRAMS

## PHYSICAL ACTIVITY

Sedentary lifestyle increases risk of obesity, heart disease, hypertension, diabetes, and other chronic diseases and conditions (DHHS, 1996). Experts recommend engaging in moderate physical activity for at least 30 minutes, five or more days per week or vigorous physical activity for at least 20 minutes, three or more days per week for health benefits (DHHS, 1996). Despite the proven benefits of physical activity, 49.1 percent of Maryland adults reported engaging in recommended levels of physical activity in 2003 (Maryland, BRFSS, 2003). Maryland met the national health objective to increase the percentage of adults who engage in moderate or vigorous physical activity to at least 30 percent by 2010. However, 21.3 percent of Maryland adults are not active at all in their leisure time (Maryland BRFSS, 2003), slightly worse than the national health objective of at least 20 percent.

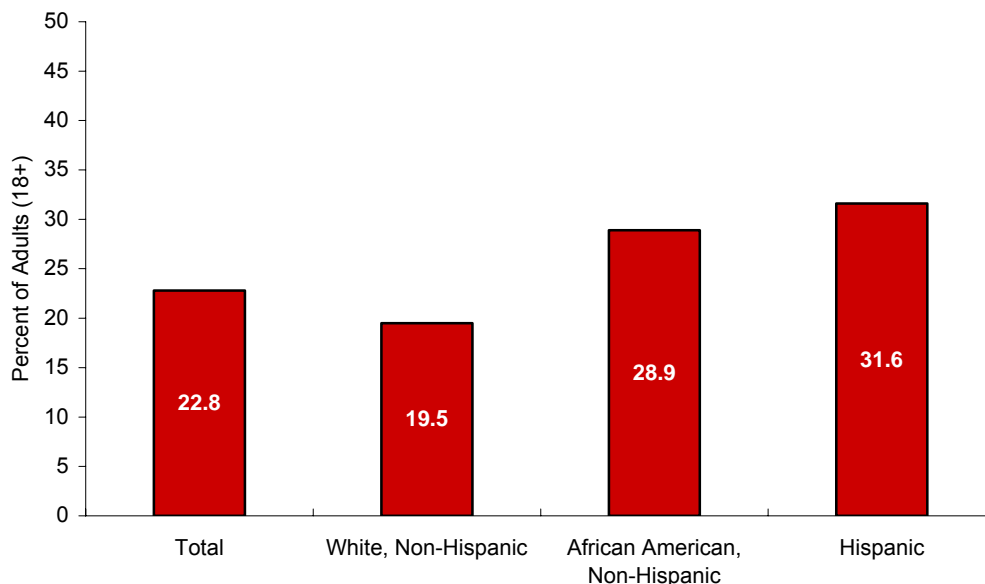
### Variations by Demographic Characteristics

Physical activity varied across demographic groups in Maryland. This section highlights differences in physical inactivity (no leisure-time physical activity) based on race and ethnicity, gender, age, education and income levels.

#### Race/Ethnicity and Gender

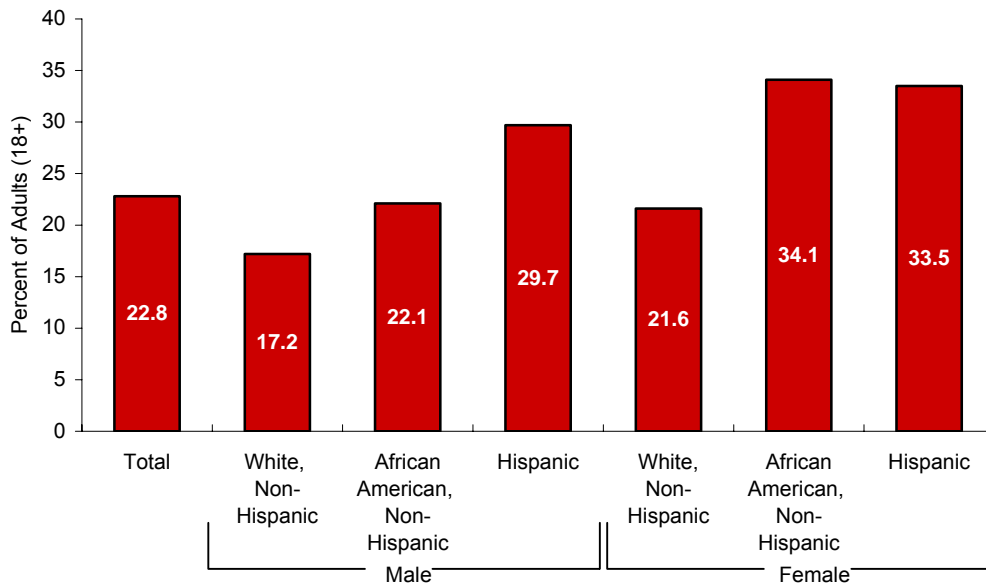
A higher percentage of Hispanic (31.6 percent) and African American adults (28.9 percent) was less physically active than White (19.5 percent) (Figure 28). Among men, more Hispanics (29.7 percent) were physically inactive than African Americans (22.1 percent) or Whites (17.2 percent) (Figure 29). The proportion of women who were physically inactive was higher among African American (34.1 percent) and Hispanic (33.5 percent) women than White (21.6 percent) women. Within racial and ethnic groups, more women were physically inactive than men.

**Figure 28. Percentage of Adults Who Reported No Leisure-Time Physical Activity by Race/Ethnicity in Maryland, 2001-2003**



Source: Maryland BRFSS

**Figure 29. Percentage of Adults Who Reported No Leisure-Time Physical Activity by Race/Ethnicity and Gender in Maryland, 2001-2003**

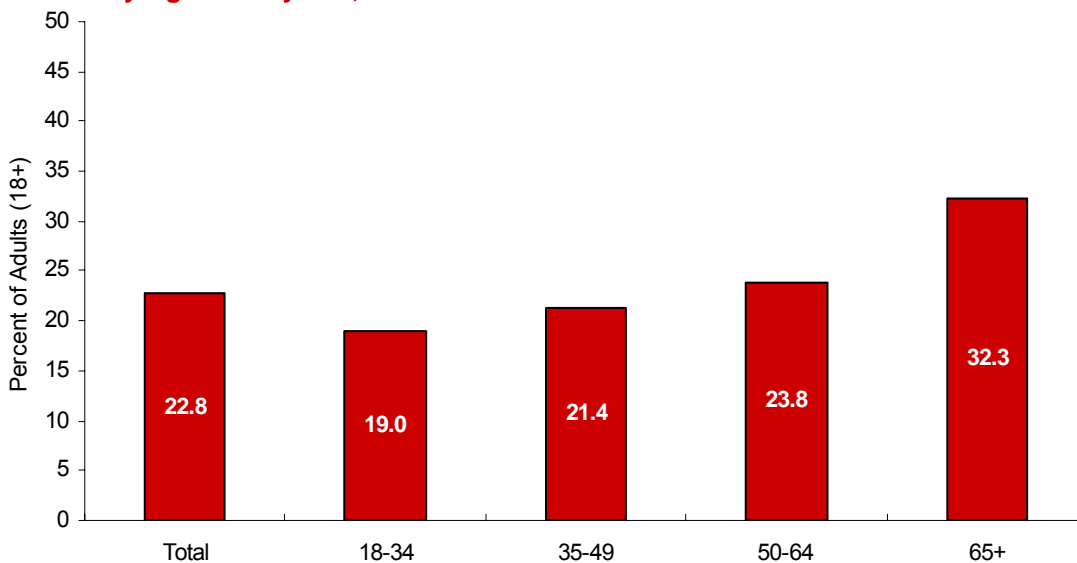


Source: Maryland BRFSS

### Age

Older adults tend to be less physically active than younger adults (Figure 30). Levels of physical inactivity ranged from 19.0 percent among adults age 18-34 to 32.3 percent among adults age 65 and older.

**Figure 30. Percentage of Adults Who Reported No Leisure-Time Physical Activity by Age in Maryland, 2001-2003**

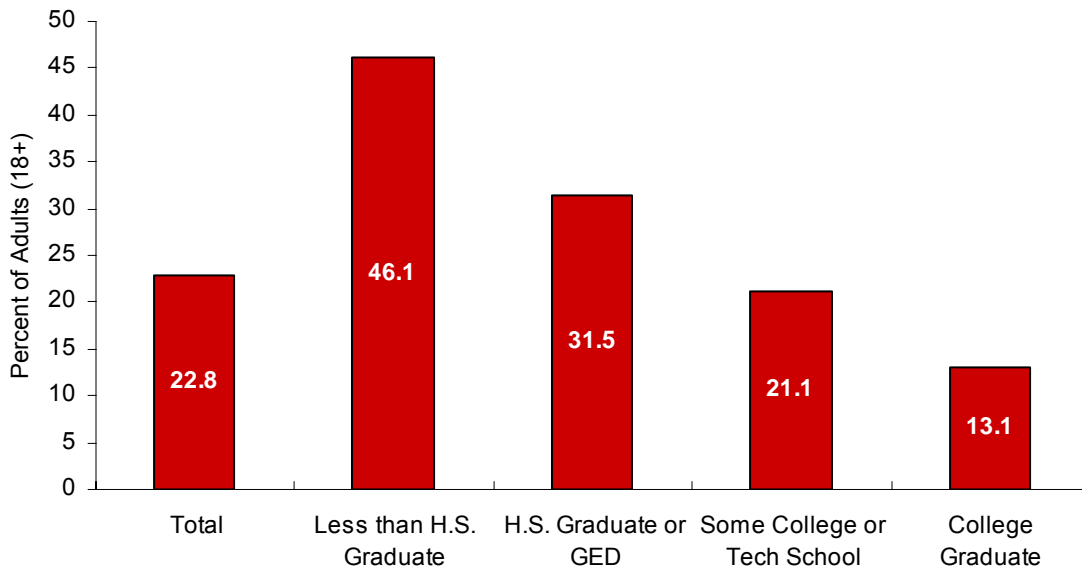


Source: Maryland BRFSS

## Education and Income Levels

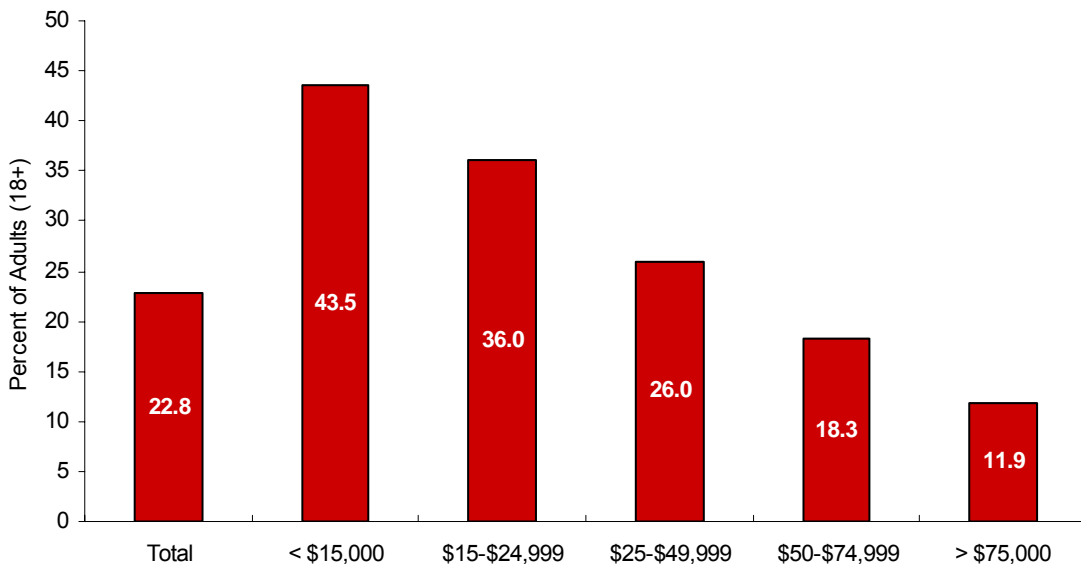
Physical inactivity also varied by education and income levels. Maryland adults with lower education and household income tended to not engage in leisure time physical activity (Figures 31 and 32).

**Figure 31. Percentage of Adults Who Reported No Leisure-Time Physical Activity by Educational Level in Maryland, 2001-2003**



Source: Maryland BRFSS

**Figure 32. Percentage of Adults Who Reported No Leisure-Time Activity by Household Income Level in Maryland, 2001-2003**



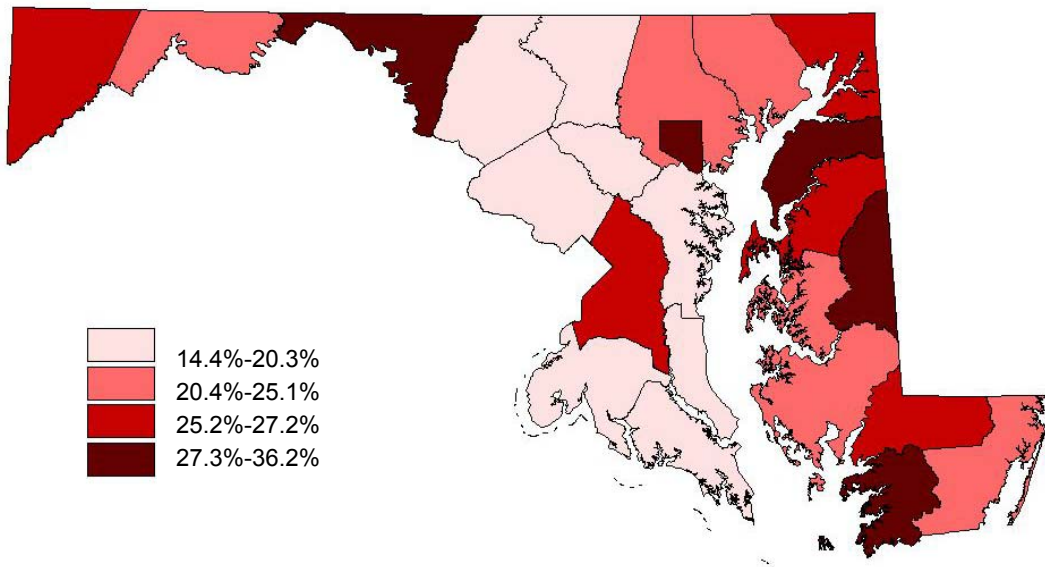
Source: Maryland BRFSS

## Variations by Jurisdiction

Physical inactivity rates varied across Maryland jurisdictions. Levels of physical inactivity ranged from a high of 36.2 percent in Somerset County to a low of 14.4 percent in Howard County (Figure 33). Physical inactivity was most prevalent in some of the eastern shore counties (Somerset, Caroline, Kent, and Cecil), western counties (Washington and Garrett), and Baltimore City. The lowest rates of physical inactivity were mostly concentrated in some of the central counties (Howard and Montgomery) and southern counties (Charles, Calvert, and St. Mary's).

In all but five counties, more than 20 percent of the population was physically inactive. One of the national health objectives is to reduce the proportion of adults who engage in no leisure-time physical activity to 20 percent.

**Figure 33. Percentage of Adults Who Reported No Leisure-Time Physical Activity by Maryland Jurisdiction, 2001-2003**

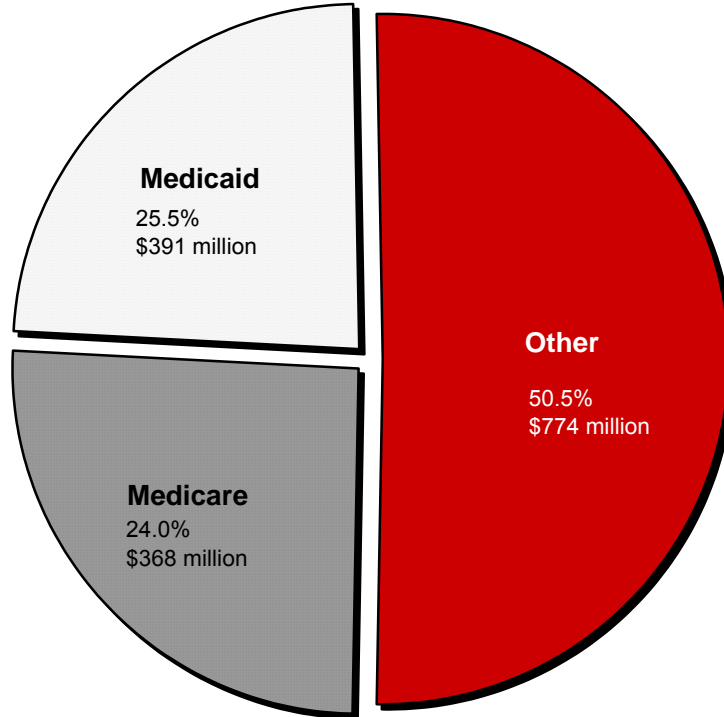


Based on aggregate data for the three year period  
Source: Maryland BRFSS

## ECONOMIC COSTS ASSOCIATED WITH OVERWEIGHT AND OBESITY

The economic consequences of overweight and obesity and their associated health complications are substantial. Nationwide, in 2003, an estimated \$75 billion of adult medical expenditures were attributable to obesity, with \$17.7 billion paid for by Medicare and \$21.3 billion by Medicaid. In Maryland, an estimated \$1.5 billion of adult medical expenditures were attributable to obesity, with \$368 million paid for by Medicare and \$391 million by Medicaid (Figure 34).

**Figure 34. Adult medical expenditures attributable to obesity by payer among Maryland Adults, 2003**



Source: Finkelstein, Fiebelkorn, and Wang, 2004

# HEALTHY MARYLAND

Developed by the U.S. Department of Health and Human Services, *Healthy People 2010* is the nation's agenda for health promotion and disease prevention. The *Healthy People 2010* outlines a set of health objectives for the nation to achieve over the first decade of the 21st century. Overweight and obesity has been identified as a major health issue for the nation. Table 5 describes how Maryland compares to the national *Healthy People 2010 Objectives* related to overweight and obesity.

**Table 5. Tracking Maryland's Progress Towards Healthy People 2010 Objectives Related to Overweight and Obesity**

WEIGHT STATUS		
Healthy People 2010 Objective	Healthy People 2010 Target for Adults	Maryland BRFSS 2003
<b>Objective 19.1.</b> Increase the proportion of adults who are at a healthy weight (a BMI of 18.5-24.9) to 60%.	60%	37.3%
<b>Objective 19.2.</b> Reduce the proportion of adults who meet the criteria for obese (a BMI of 30+) to 15%.	15%	21.9%
NUTRITION		
Healthy People 2010 Objective	Healthy People 2010 Target for Adults	Maryland BRFSS 2003
<b>Objective 19-5.</b> Increase the proportion of adults who consume at least two daily servings of fruit to 75%.	75%	28.9%*
<b>Objective 19-6.</b> Increase the proportion of adults who consume at least three daily servings of vegetables, with at least one-third being dark green or orange vegetables, to 50%.	50%	*consumed five or more daily servings of fruits and vegetables
PHYSICAL ACTIVITY		
Healthy People 2010 Objective	Healthy People 2010 Target for Adults	Maryland BRFSS 2003
<b>Objective 22-1.</b> Reduce the proportion of adults who engage in no leisure-time physical activity to 20%.	20%	21.3%
<b>Objective 22-2 and 22.3.</b> Increase the proportion of adults who engage in moderate or vigorous physical activity to 30%.	30%	49.1%
BREASTFEEDING		
Healthy People 2010 Objective	Healthy People 2010 Target for Mothers	Maryland PRAMS 2001
<b>Objective 16-19.</b> Increase the proportion of mothers who breastfeed their babies to 75% in early postpartum (16-19a), 50% at 6 months (16-19b), and 25% at 1 year (16-19c).	16-19a. 75%	76.5%
	16-19b. 50%	No data
	16-19c. 25%	No data

Source: U.S. Department of Health and Human Services. *Healthy People 2010: 2<sup>nd</sup> ed. With Understanding and Improving Health and Objectives for Improving Health*. 2 vols. Washington, DC: U.S. Government Printing Office; 2000. Available from: URL [www.health.gov/healthypeople](http://www.health.gov/healthypeople)

# SUMMARY AND IMPLICATIONS

Obesity in Maryland is a rising epidemic. Obesity prevalence rates have increased by 34 percent from 16.3 percent in 1995 to 21.9 percent in 2003. Nearly 60 percent of Maryland adults were overweight or obese in 2003. The public health impact of overweight and obesity is substantial, both in terms of disease burden and cost. Obesity was linked to higher prevalence rates of chronic diseases and conditions, including hypertension, high cholesterol, diabetes, arthritis, and asthma in Maryland. In 2003, an estimated \$1.5 billion of adult medical expenditures were attributable to obesity, with more than half paid for by Medicare and Medicaid in Maryland.

Unhealthy diet and physical inactivity play an important role in overweight and obesity and its associated health conditions. Only 29 percent of Maryland adults eat the recommended five or more servings of fruits and vegetables each day. Despite the proven benefits of physical activity, half of Maryland adults did not get enough physical activity to provide health benefits and one in five adults were physically inactive.

## SPECIAL POPULATIONS

Obesity affects certain segments of the population disproportionately, based on race and ethnicity, gender, age, and education and income levels:

- Obesity is more prevalent among African Americans than Whites and Hispanics.
- Among Maryland adults, African American women have the highest prevalence of obesity.
- Obesity is most prevalent between the ages of 50-64 and represents the highest prevalence of excess weight among Maryland adults.
- Obesity is more prevalent among those with lower household income and education.

Disparities in physical inactivity and inadequate fruit and vegetable consumption also exist among population groups:

- Within racial and ethnic groups, more men consume less than five servings of fruits and vegetables than women.
- Maryland adults with lower education and household income tend to eat fewer than five servings of fruits and vegetables a day.
- Within racial and ethnic groups, more women are physically inactive than men.
- Racial and ethnic minorities tend to be more physically inactive than Whites.
- Older adults tend to be more physically inactive than younger adults.
- Physical inactivity is more prevalent among those with lower household income and education.

Combating the obesity epidemic in Maryland will require a multifaceted public health approach. The Maryland Nutrition and Physical Activity (NPA) Program is committed to prolonging the length and quality of life of Maryland citizens through healthy eating and increased activity.

## **MARYLAND NUTRITION AND PHYSICAL ACTIVITY PROGRAM**

The Maryland Nutrition and Physical Activity Program will use the report findings to develop a statewide nutrition and physical activity plan and implement targeted interventions. The program goals are:

- To decrease levels of obesity or reduce the rate of growth of obesity in communities reached through interventions.
- To increase physical activity and improve dietary behaviors in communities reached through interventions.
- To increase the number of state and community nutrition and physical activity policies, environmental support and legislative actions that are planned, initiated or modified for preventing or controlling obesity and other chronic diseases.
- To increase the number of effective obesity interventions for nutrition and physical activity that are implemented and evaluated.
- To increase the number of communities that implement a nutrition and physical activity plan for preventing and controlling obesity and other chronic disease.

The NPA will achieve the abovementioned goals through the implementation of the following program strategies:

- Preventing and controlling obesity through caloric intake and expenditure
- Improving nutrition including increased breastfeeding and increased consumption of fruits and vegetables
- Increasing physical activity
- Reducing television time

Additional information is available to interested persons through the Center for Preventive Health Services website: <http://www.fha.state.md.us/cphs/>.

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# APPENDIX A

## ADULT BODY MASS INDEX (BMI)

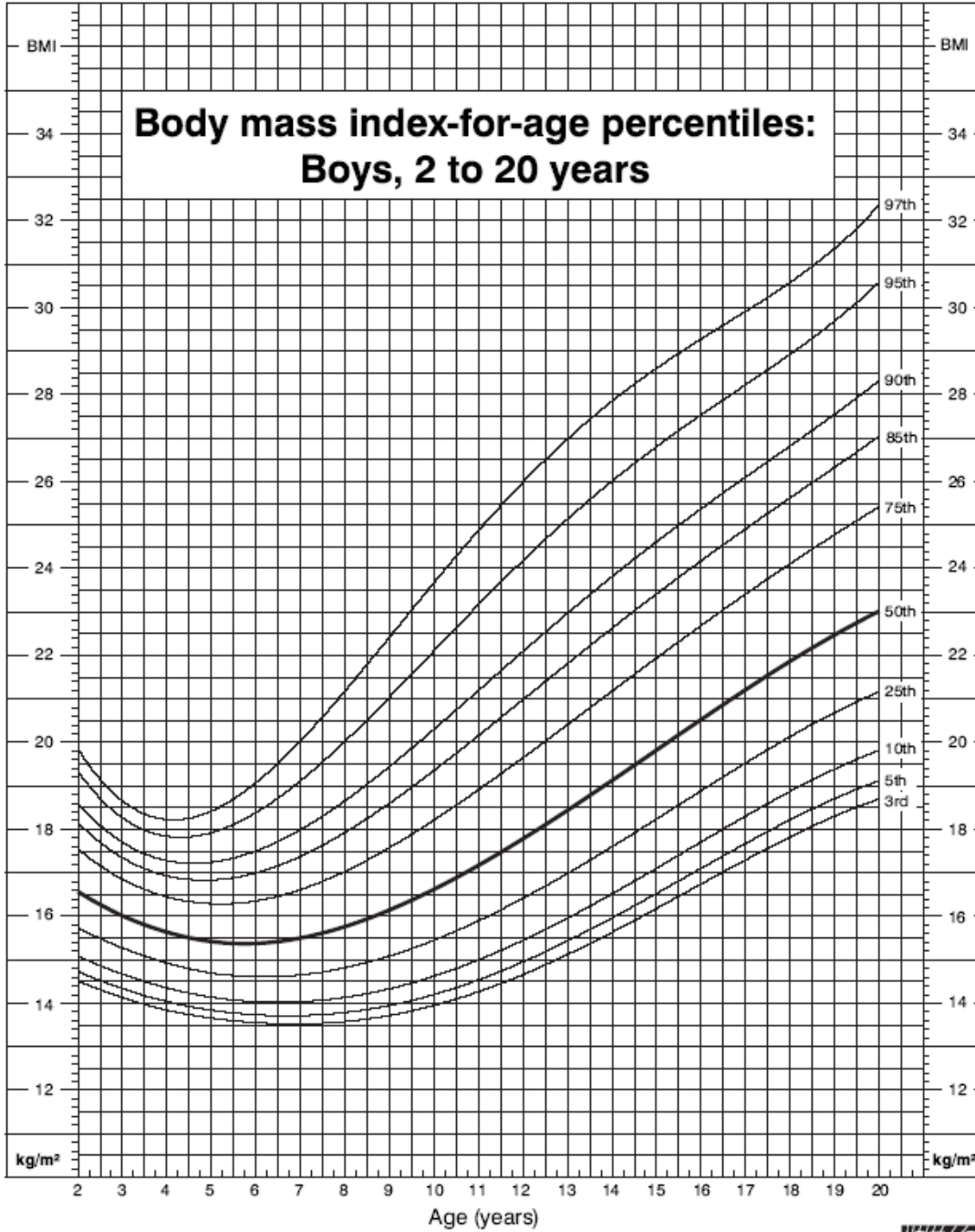
$$\text{BMI} = \left( \frac{\text{WEIGHT (pounds)}}{\text{HEIGHT (inches)}^2} \right) \times 703$$

		Weight in pounds													
		120	130	140	150	160	170	180	190	200	210	220	230	240	250
Height in feet and inches	4'6	29	31	34	36	39	41	43	46	48	51	53	56	58	60
	4'8	27	29	31	34	36	38	40	43	45	47	49	52	54	56
	4'10	25	27	29	31	34	36	38	40	42	44	46	48	50	52
	5'0	23	25	27	29	31	33	35	37	39	41	43	45	47	49
	5'2	22	24	26	27	29	31	33	35	37	38	40	42	44	46
	5'4	21	22	24	26	28	29	31	33	34	36	38	40	41	43
	5'6	19	21	23	24	26	27	29	31	32	34	36	37	39	40
	5'8	18	20	21	23	24	26	27	29	30	32	34	35	37	38
	5'10	17	19	20	22	23	24	26	27	29	30	32	33	35	36
	6'0	16	18	19	20	22	23	24	26	27	28	30	31	33	34
6'2	15	17	18	19	21	22	23	24	26	27	28	30	31	32	
6'4	15	16	17	18	20	21	22	23	24	26	27	28	29	30	
6'6	14	15	16	17	19	20	21	22	23	24	25	27	28	29	
6'8	13	14	15	17	18	19	20	21	22	23	24	25	26	28	

Underweight
  Normal
  Overweight
  Obese

# APPENDIX B

## BODY MASS INDEX (BMI)-FOR-AGE GROWTH CHARTS

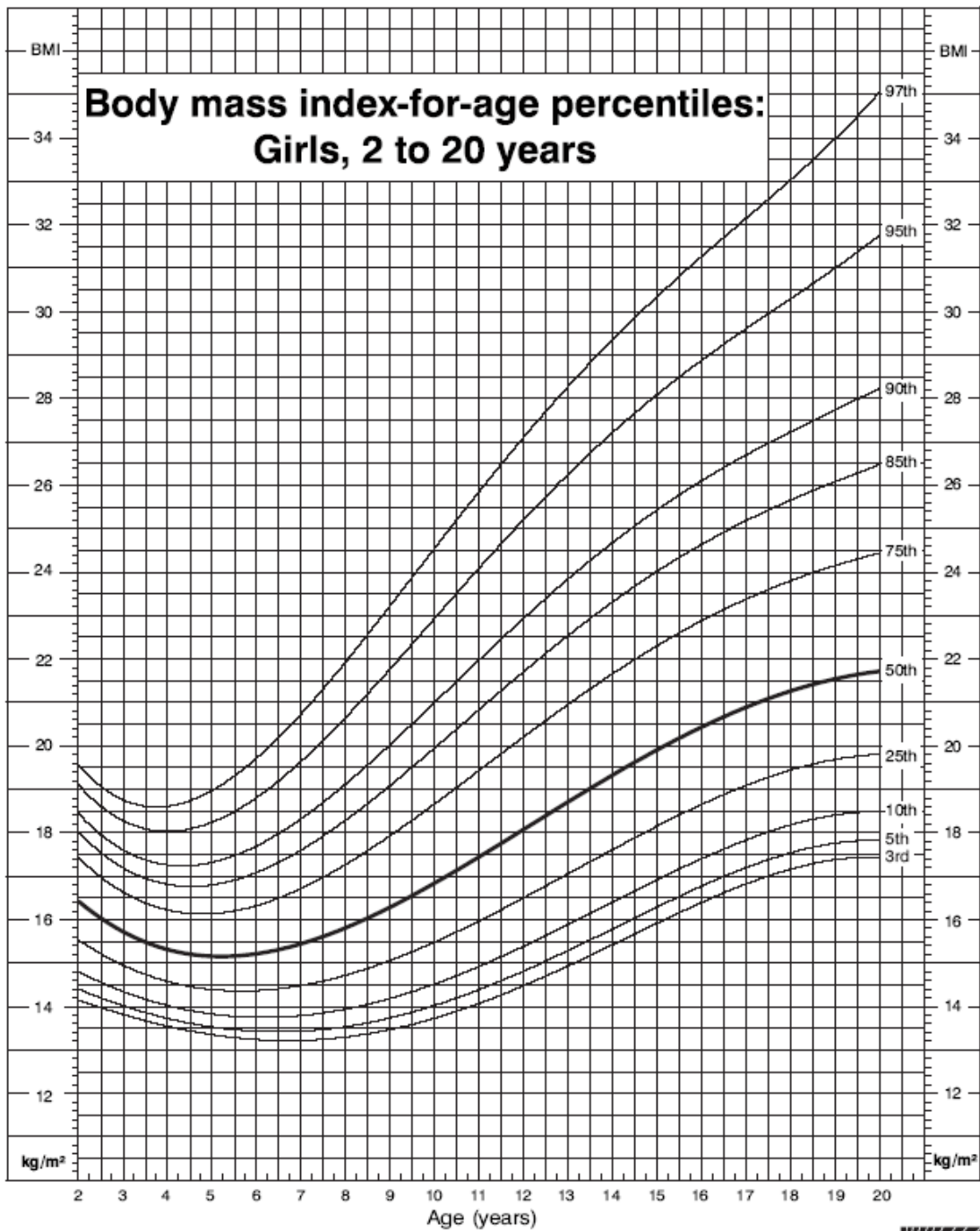


Published May 30, 2000.

SOURCE: Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (2000).



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Published May 30, 2000.  
 SOURCE: Developed by the National Center for Health Statistics in collaboration with  
 the National Center for Chronic Disease Prevention and Health Promotion (2000).



# APPENDIX C

## DATA SOURCES

DATA SOURCE	DESCRIPTION
<p><b>MD Behavioral Risk Factor Surveillance System (BRFSS)</b></p>	<p>The Maryland BRFSS is an ongoing telephone surveillance program designed to collect data on the behaviors and conditions that place Marylanders at risk for chronic diseases, injuries, and preventable infectious diseases.</p> <p>The typical sample size each year is 4,400 households with an adult respondent 18 years of age or older. The data in this report are based on the weighted data. The weighting method involved adjustments of the sample proportions of selected demographic characteristics so that they equal the sample proportions in the population and also adjustments of the sample surveyed so that it represents the State population.</p> <p>Refer to <a href="http://www.marylandbrfss.org">www.marylandbrfss.org</a> for more information on Maryland BRFSS.</p> <p>National BRFSS data can be downloaded from <a href="http://www.cdc.gov/brfss">www.cdc.gov/brfss</a></p>
<p><b>MD Pregnancy Risk Monitoring System (PRAMS)</b></p>	<p>PRAMS collects information from women who have recently delivered a baby to find out their attitudes and experiences immediately before, during and following their pregnancy.</p> <p>Each month, approximately one out of every 35 Maryland mothers is picked randomly to participate in PRAMS.</p> <p>Refer to <a href="http://www.fha.state.md.us/mch/html/prams_fs.html">http://www.fha.state.md.us/mch/html/prams_fs.html</a> for more information on Maryland PRAMS.</p>
<p><b>MD Vital Statistics Administration</b></p>	<p>The Maryland Vital Statistics Administration is charged with registering all births, deaths, and fetal deaths occurring in the State of Maryland; issuing certified copies of birth, death, and marriage certificates and providing divorce verifications; compiling and analyzing vital statistics data; preparing annual estimates of the population of Maryland by political subdivision, age, race, and sex; preparing mandated vital statistics and population reports; and supplying vital statistics and population data to users in the public and private sectors.</p> <p>Refer to <a href="http://www.vsa.state.md.us/">http://www.vsa.state.md.us/</a> for more information on Maryland Vital Statistics Administration.</p>

# APPENDIX D

## SURVEY QUESTIONS

VARIABLE	SURVEY QUESTION
<b><i>Maryland Behavioral Risk Factor Surveillance System (BRFSS)</i></b>	
Arthritis	<ul style="list-style-type: none"> <li>Have you been told by a doctor, nurse or other health professional that you have some form of arthritis, rheumatoid arthritis, gout, lupus, or fibromyalgia?</li> </ul>
Asthma	<ul style="list-style-type: none"> <li>Have you been told by a doctor, nurse or other professional that you had asthma?</li> </ul>
Body Mass Index	<ul style="list-style-type: none"> <li>About how tall are you without shoes?</li> <li>About how much do you weight without shoes?</li> </ul>
Diabetes	<ul style="list-style-type: none"> <li>Have you ever been told by a doctor that you have diabetes?</li> </ul>
Fruit and Vegetable	<ul style="list-style-type: none"> <li>How often do you drink fruit juices such as orange, grapefruit, or tomato?</li> <li>Not counting juice, how often do you eat fruit?</li> <li>How often do you eat green salad?</li> <li>How often do you eat potatoes not including french fries, fried potatoes, or potato chips?</li> <li>How often do you eat carrots?</li> <li>Not counting carrots, potatoes, or salad, how many servings of vegetables do you usually eat?</li> </ul>
High blood pressure	<ul style="list-style-type: none"> <li>Have you ever been told by a doctor, nurse, or other health professional that you have high blood pressure?</li> </ul>
High cholesterol	<ul style="list-style-type: none"> <li>Have you been told by a doctor, nurse, or other health professional that your blood cholesterol is high?</li> </ul>
Physically inactive	<ul style="list-style-type: none"> <li>During the past month, other than your regular job, did you participate in any physical activities or exercises such as running, calisthenics, golf, gardening or walking for exercise?</li> </ul>
Recommended level of physical activity	<ul style="list-style-type: none"> <li>Reported moderate-intensity activities (i.e. brisk walking, bicycling, vacuuming, gardening, or anything else that causes small increases in breathing or heart rate) for <math>\geq 30</math> minutes per day or vigorous-intensity activities (i.e. running, aerobics, heavy yard work, or anything else that causes large increases in breathing or heart rate) for <math>\geq 20</math> minutes per day, <math>&gt; 3</math> days per week.</li> </ul>
<b><i>Maryland Pregnancy Risk Assessment Monitoring System (PRAMS)</i></b>	
Breastfeeding Initiation	<ul style="list-style-type: none"> <li>Did you ever breastfeed or pump breast milk to feed your new baby after delivery?</li> </ul>

**Discrimination Policy:**

The services and facilities of the Maryland Department of Health and Mental Hygiene (DHMH) are operated on a non-discriminatory basis. This policy prohibits discrimination on the basis of race, color, sex or national origin and applies to the provisions of employment and granting of advantages, privileges, and accommodations. The Department, in compliance with the Americans With Disabilities Act, ensures that qualified individuals with disabilities are given an opportunity to participate in and benefit from DHMH services, programs, benefits, and employment opportunities.