Section Two
OBESITY IN WEST VIRGINIA

The prevalence of obesity as measured by the Behavioral Risk Factor Surveillance System (BRFSS)[4] has increased both nationally and statewide over the past decade, at an average annual rate of 5.9% in the U.S. and 5.2% in West Virginia, with the state's rate consistently higher than the national rate over the years. In 1990, the West Virginia rate was 15.0%, compared with the U.S. rate of 11.6%. By 2000, the West Virginia rate was 23.2%, compared with 20.1% for the nation as a whole.

Figure 1
Prevalence of Obesity (BMI 30+)
West Virginia and United States, 1990-2000

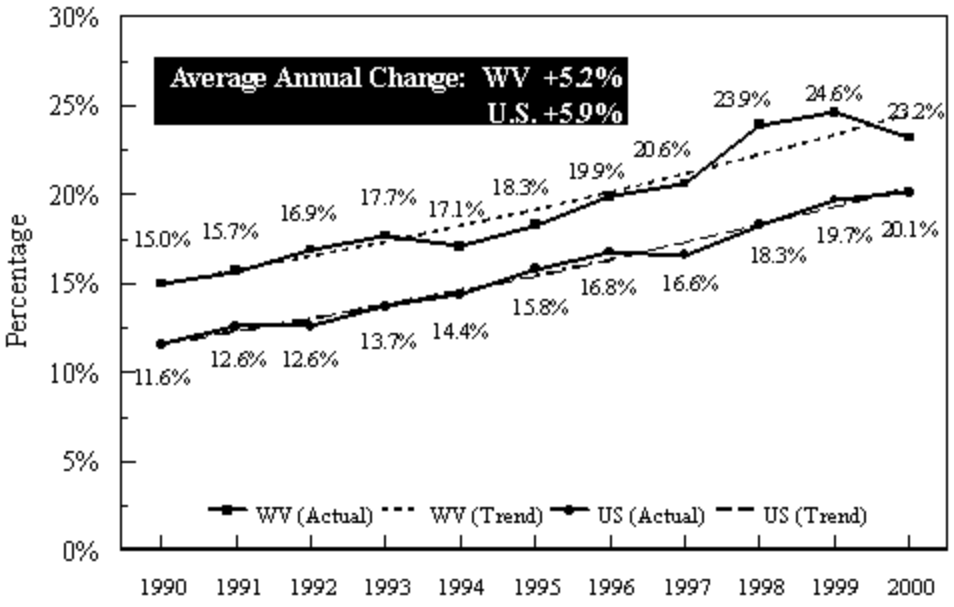
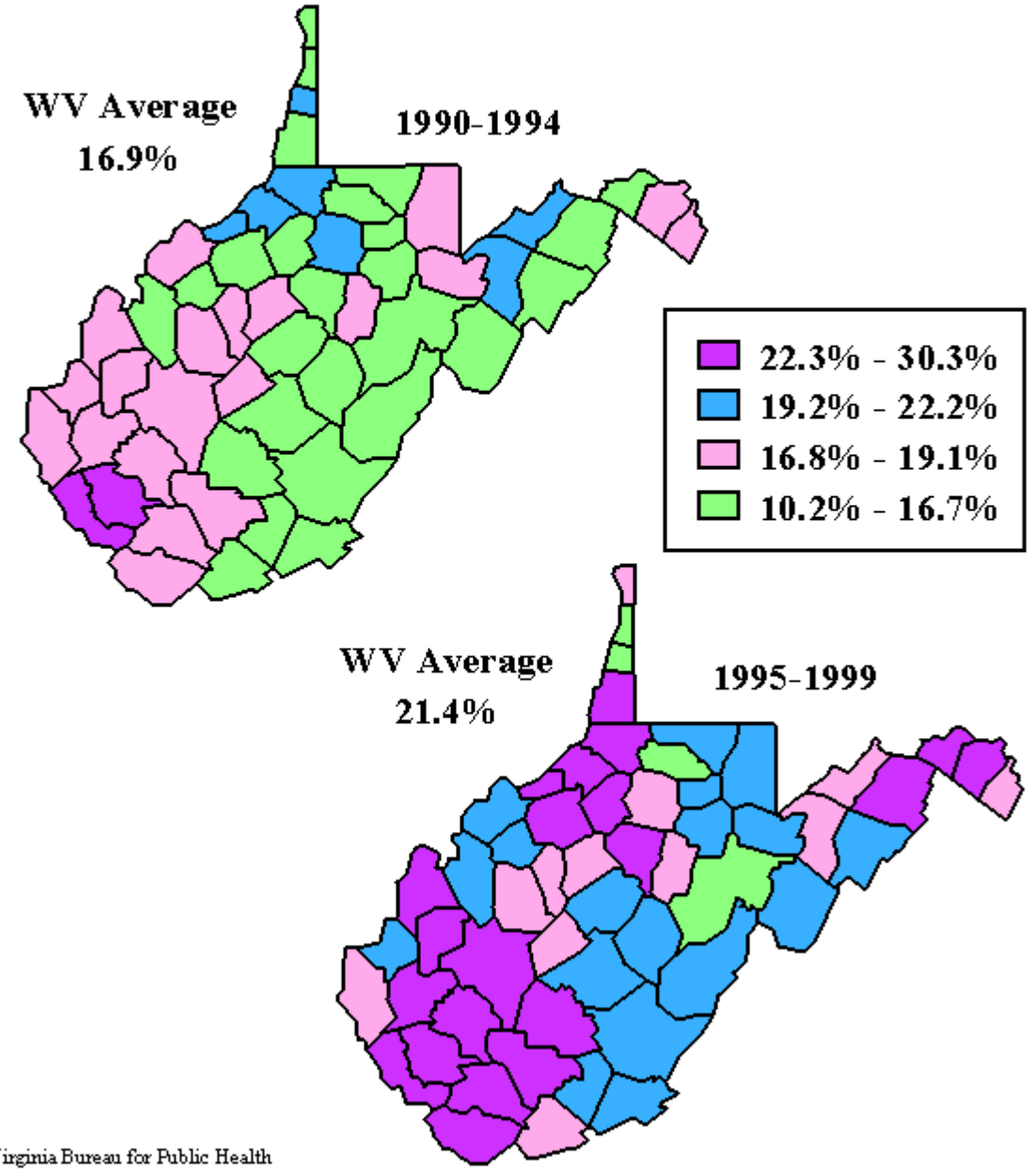


Figure 2 depicts changes in obesity prevalence on the county level, comparing aggregated data from 1990-94 with that from 1995-99[5]. As the maps show, obesity has increased in virtually all

[4]See page 4 for a description of the BRFSS.

[5]In order to provide risk factor data on a substate level, county BRFSS data were combined into five-year aggregates. For the prevalence data presented in this report, 24 counties had aggregated sample sizes large enough to yield individual prevalence calculations. Samples from the 31 counties that had sample sizes too small to stand alone were combined with samples from other less-populated, contiguous counties into 12 groupings, or multicounty regions. A single prevalence was then calculated for each grouping; this rate was then used as the prevalence for each county within that grouping.

Figure 2
Prevalence of Obesity by County
West Virginia BRFSS, 1990-1994 and 1995-1999



West Virginia Bureau for Public Health
Health Statistics Center, 2002

of West Virginia's 55 counties, with the highest prevalences found in the southern and western portions of the state, as well as the Eastern Panhandle. (Individual county rates are found in Appendix 1.)

Tracking the average weight in pounds for men and women from 1984 through 2000 has shown steady year-to-year increases for both sexes, with few exceptions over the 16-year period (Table 1). In 1984, the average weight of adult males in West Virginia was 177.2 pounds; by 2000, this had increased to 194.0 pounds. A similar increase was charted for the state's women, from an average weight of 142.0 pounds in 1984 to 154.9 pounds in 2000.

Table 1
Average Weight in Pounds for Men and Women Aged 18+
WVBRFSS, 1984-2000

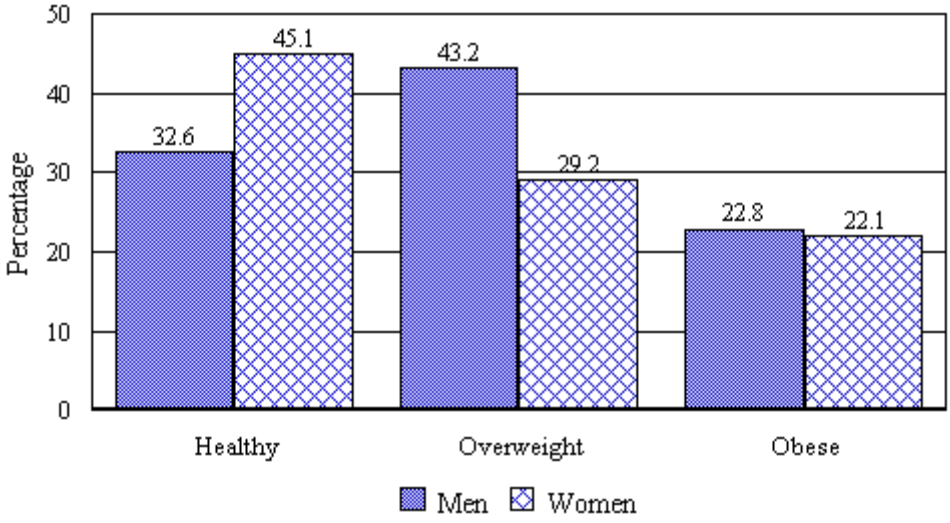
Year	Men	Women
1984	177.2	142.0
1985	176.6	143.4
1986	176.3	143.3
1987	178.6	142.3
1988	182.4	142.2
1989	179.1	144.7
1990	182.2	145.0
1991	184.2	146.8
1992	185.0	147.1
1993	184.1	150.3
1994	186.3	149.7
1995	185.8	150.8
1996	186.9	153.1
1997	188.8	152.6
1998	191.0	154.2
1999	193.3	157.2
2000	194.0	154.9

Weight Category Prevalences. To chart changes in weight among the state's adults, the four weight categories defined by the National Institutes of Health were used, i.e., *underweight* (BMI <18.5); *healthy, or normal, weight* (BMI 18.5-24.9); *overweight* (BMI 25.0-29.9), and *obesity* (BMI 30.0+). To fully understand the upward trend in the prevalence of obesity, it is necessary to examine the trends of the other three weight categories. Figure 3 illustrates the course over time of all four weight categories in West Virginia.

Using a moving three-year average to eliminate yearly aberrations or spikes in prevalence, the graphs clearly indicate that the greatest changes have occurred in the categories of underweight, with an average annual decrease of 2.7%, and obesity, with an average annual increase of 6.1%. The prevalence of healthy weight has decreased approximately 1.8% per year, while that of overweight has changed very little, with only a 0.4% increase annually from 1987 through 2000. By far, the most dramatic change has been in the prevalence of obesity.

BRFSS data were aggregated from 1996 through 2000 in order to examine the prevalence of obesity, as well as overweight and healthy weight[6], by selected characteristics. As shown in Figure 4, little difference was found in obesity prevalence among men and women. However, men were nearly half again as likely as women to be overweight; conversely, women were 38% more likely to report a healthy weight.

Figure 4
Prevalence of Weight Categories by Sex
WVBRFSS, 1996-2000

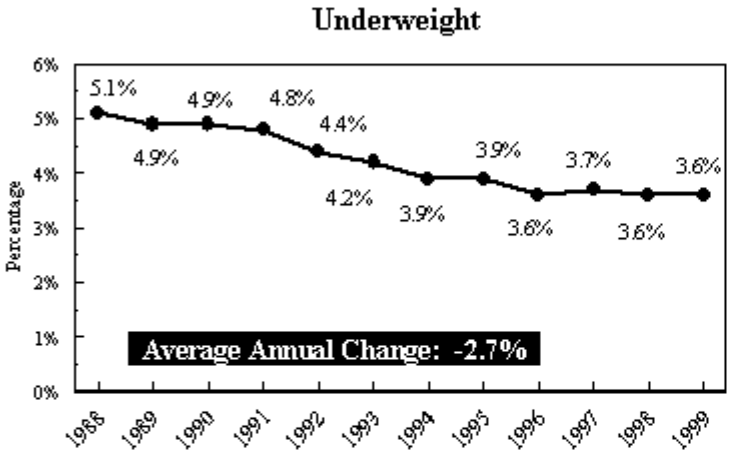


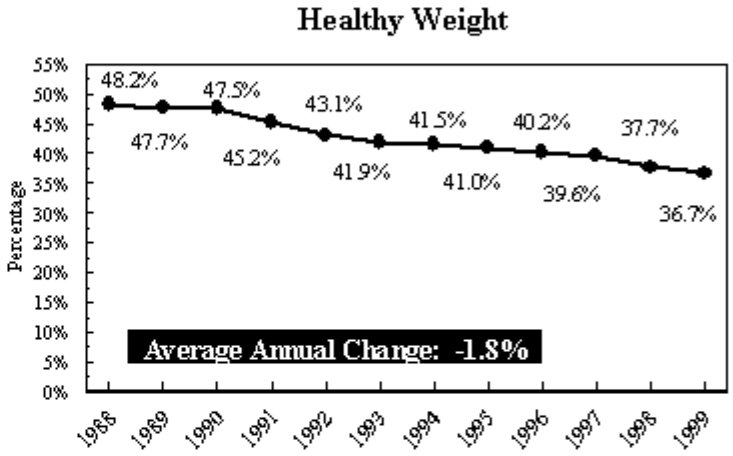
[6]Underweight respondents were omitted from further analysis for two reasons. First, the sample sizes of adults meeting the definition of underweight were too small to allow meaningful comparisons; secondly, it was not possible to control for such factors as ongoing illnesses that might be an underlying cause of underweight.

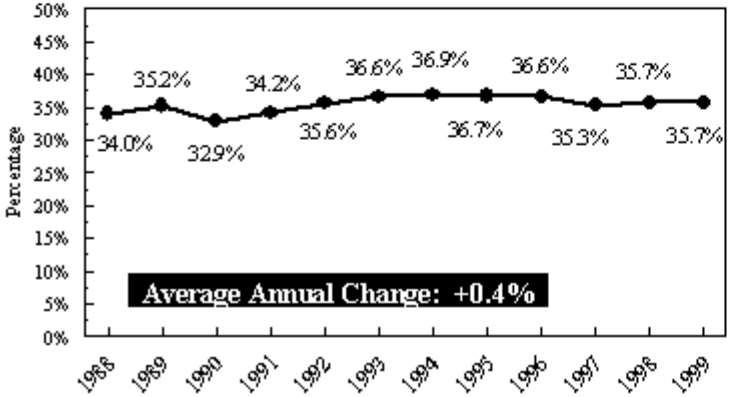
Figure 3

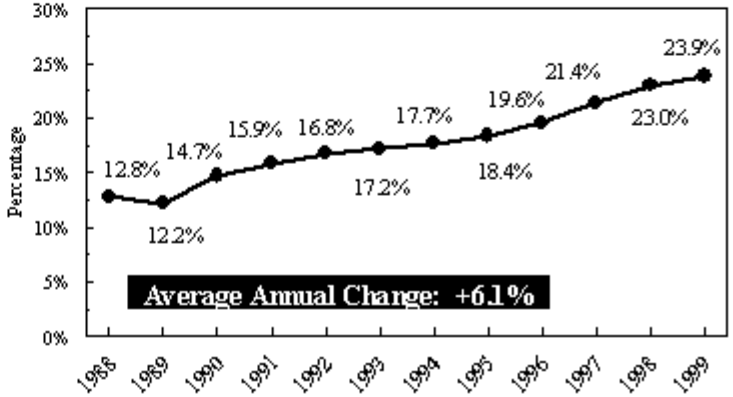
Weight Category Prevalences

WVBRFSS, 1987-2000 (3-Year Moving Averages)









Middle-aged adults (aged 45-64) were more likely to be either overweight or obese than adults of other ages (Figure 5). Young adults aged 18-24 were the most likely to report a healthy weight; even so, just over half of this age group had a BMI in the healthy range. Nonwhite residents were less likely than white residents to be a healthy weight or be overweight and were more likely to be obese (Figure 6).

Figure 5
Weight Categories by Age Group
WVBRFSS, 1996-2000

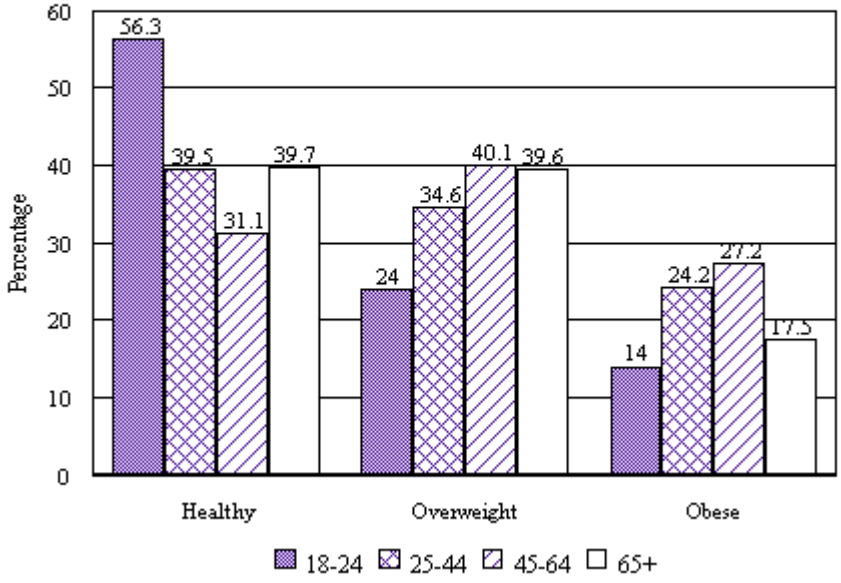
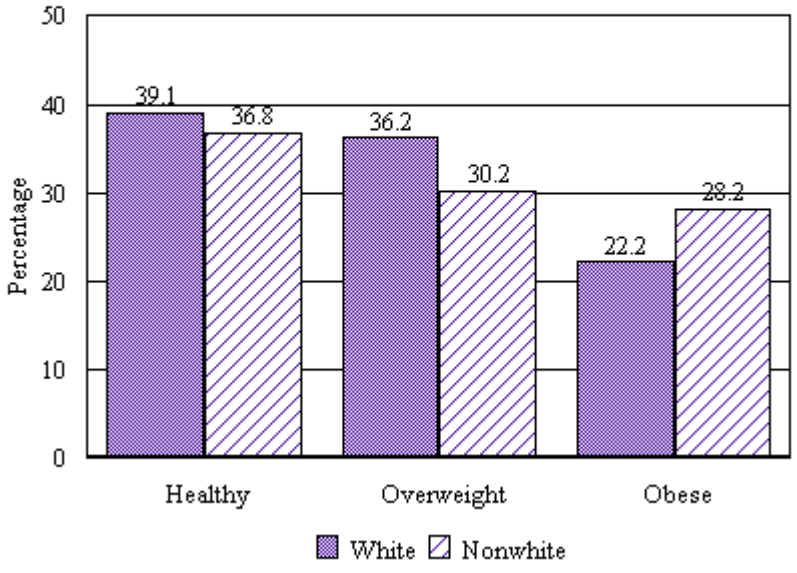


Figure 6
Weight Categories by Race
WVBRFSS, 1996-2000



An association between weight and educational level was noted within the categories of healthy weight and obesity, with respondents having at least a college degree more likely to report a healthy weight and less likely to be obese (Figure 7). Respondents with the highest household incomes also were more likely to have a healthy BMI and less likely to be obese (Figure 8).

Figure 7
Weight Categories by Years of Education
WVBRFSS, 1996-2000

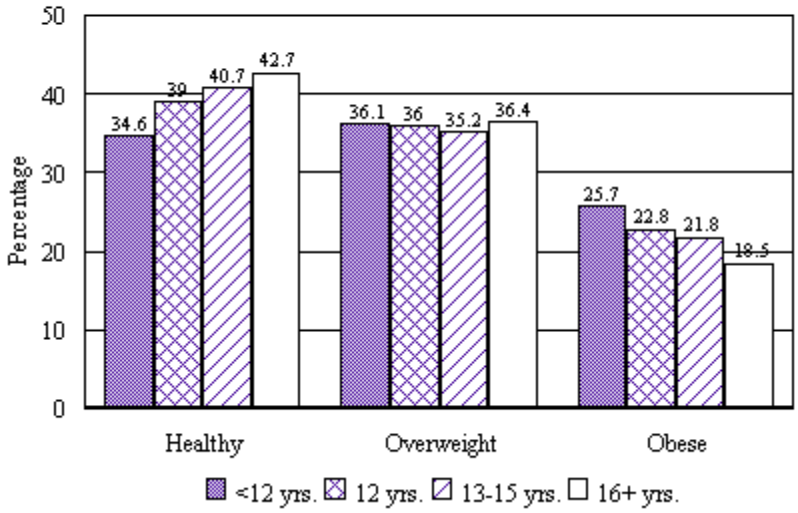
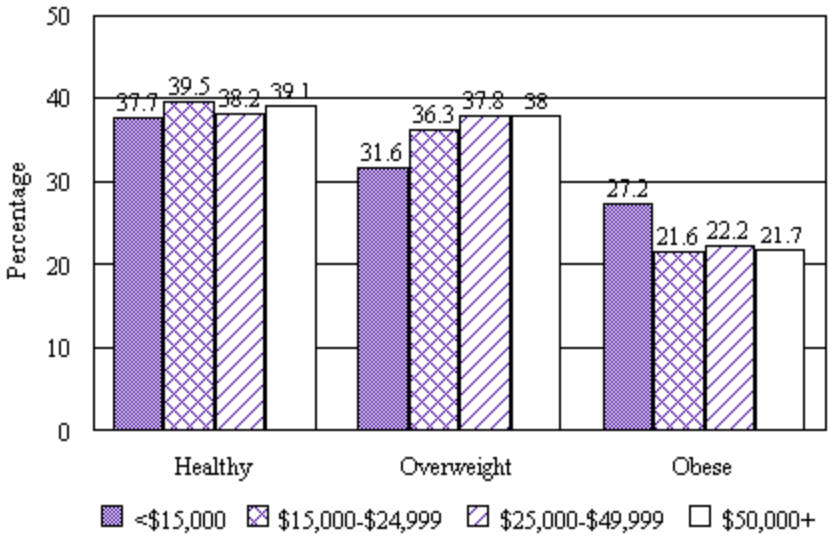
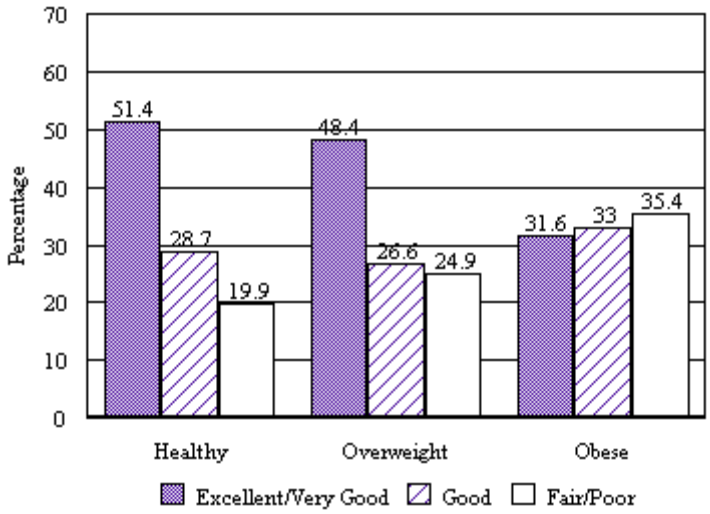


Figure 8
Weight Categories by Household Income
WVBRFSS, 1996-2000



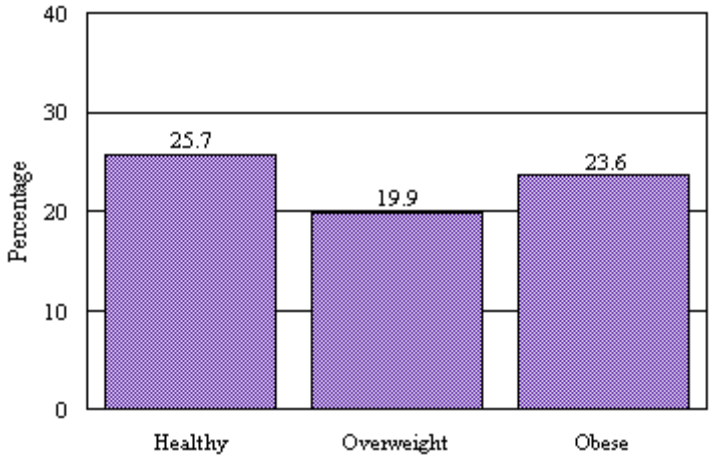
Weight Category and Health Status. Self-perceived health status was ascertained by asking respondents if in general they thought their health was excellent, very good, good, fair, or poor. Figure 9 shows how perceived health status is associated with weight. Obese individuals were far less likely than their leaner counterparts to describe their health as excellent or very good; conversely, they were more likely to report only fair or poor health.

Figure 9
Self-Reported Health Status by Weight Category
WVBRFSS, 2000



Although obese individuals were more likely to report having only fair or poor health, they were less likely to have health insurance than their overweight counterparts, as shown in Figure 10. Nearly one-fourth (23.6%) of obese adults aged 18-64 reported in 2000 that they had no health care coverage.

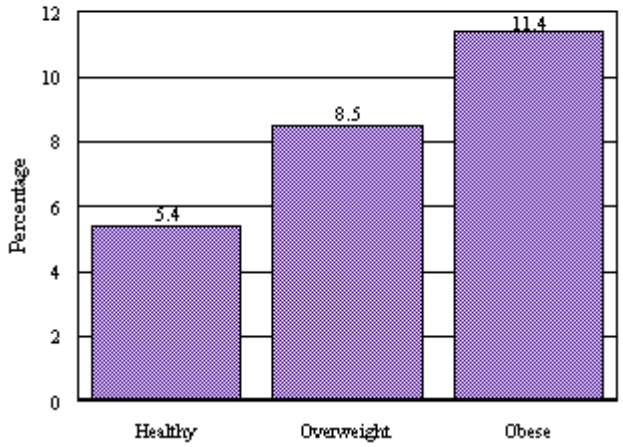
Figure 10
Prevalence of Respondents* Lacking Health Insurance
By Weight Category, WVBRFSS, 2000



*Aged 18-64

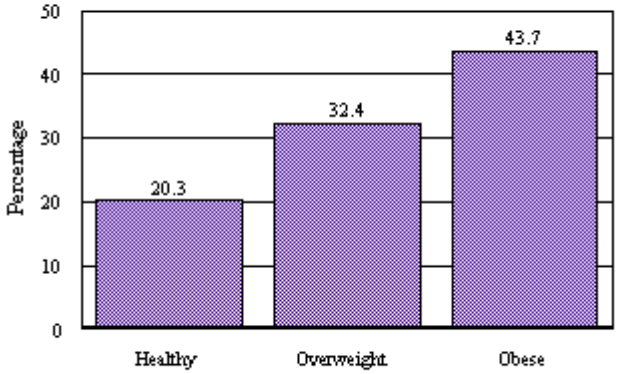
Weight Category and Chronic Disease Prevalence. Excess weight has been linked to many chronic diseases including heart disease, diabetes, asthma, hypertension, and osteoarthritis. Data from the West Virginia BRFSS surveys allowed an examination of relationships between weight and the prevalence of these diseases among the state's adults. Figure 11 illustrates the prevalence of having had a heart attack by weight category. While only 5.4% of respondents of healthy weight reported a heart attack, over twice as many, or 11.4%, of obese respondents had suffered a heart attack.

Figure 11
Prevalence of Respondents Who Have Had a Heart Attack
By Weight Category, WVBRFSS, 2000



Hypertension prevalence data from 1999 (the most recent available at time of publication) are presented in Figure 12. As with having had a heart disease, the lowest prevalence of high blood pressure was reported by adults of healthy weight. Overweight individuals reported hypertension at a rate nearly 60% higher than their normal-weight counterparts, while obese respondents were more than twice as likely to have been told they had high blood pressure.

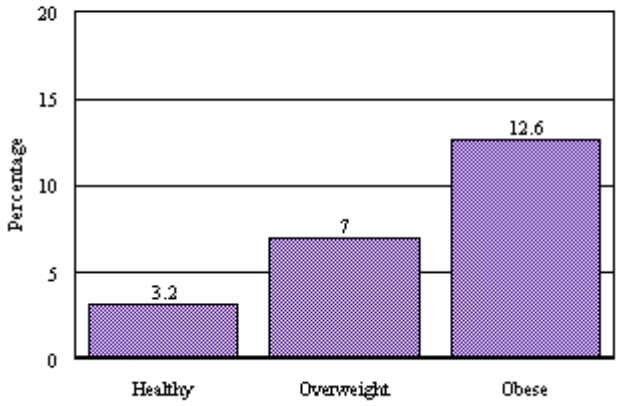
Figure 12
Prevalence of Hypertension* by Weight Category
WVBRFSS, 1999



*Answered yes when asked "Have you ever been told by a doctor, nurse, or other health professional that you have high blood pressure?"

The association between weight and diabetes is even more striking, as illustrated in Figure 13. Only 3.2% of those with a BMI of 18.5-24.9 had ever been told they had diabetes. Seven percent (7.0%) of overweight respondents had diabetes, however, while 12.6% of obese West Virginians surveyed from 1996-2000 had been diagnosed with diabetes.

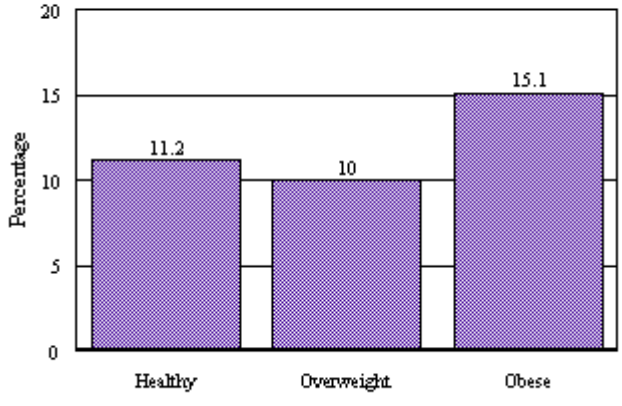
Figure 13
Prevalence of Diabetes* by Weight Category
WVBRFSS, 1996-2000



*Answered yes to the question have you ever been told by a doctor that you have diabetes?

A clear-cut association between asthma and weight was not evident in the 2000 BRFSS data. As shown in Figure 14, little difference in asthma prevalence was noted among respondents who reported a healthy weight or were overweight. Obese persons were more likely, however, to report having been diagnosed with asthma.

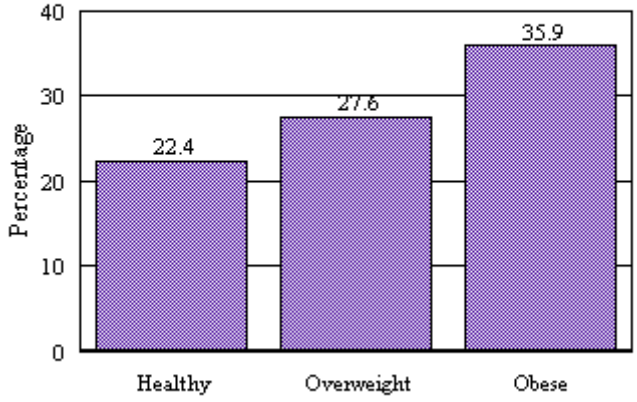
Figure 14
Prevalence of Asthma* by Weight Category
WVBRFSS, 2000



*Answered yes to the question has a doctor ever told you that you have asthma?

One of the questions asked respondents to the 2000 Behavioral Risk Factor Survey if they were limited in any way during the previous 12 months because of back pain. The graph below illustrates clearly the direct association between weight and activity limitation due to back pain. While approximately one in five (22.4%) respondents who were of healthy weight answered yes to this question, 35.9% of obese persons had been limited in some of their activities because of back pain.

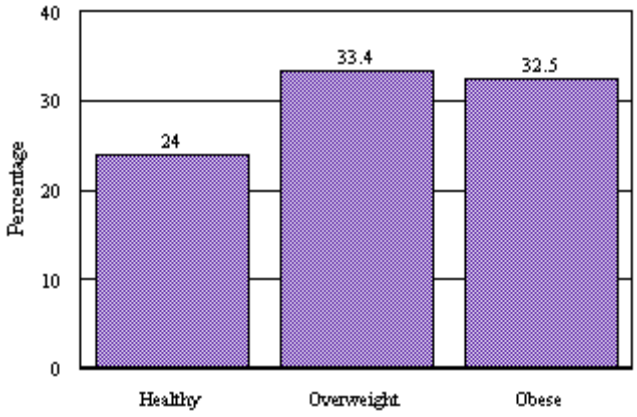
Figure 15
Prevalence of Activity Limitation due to Back Pain*
By Weight Category, WVBRFSS, 2000



*During the past 12 months

Weight Category and Seatbelt Nonuse Prevalence. Overweight and obese persons were less likely than other respondents to always use seatbelts when driving or riding in a motor vehicle. Approximately one in three overweight and obese respondents did not always buckle up, compared with fewer than one in four healthy weight respondents.

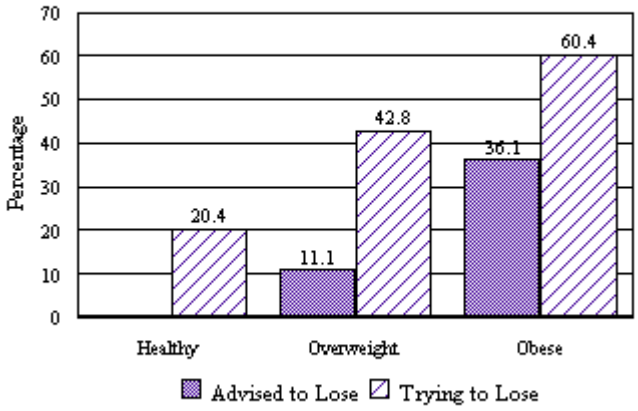
Figure 16
Prevalence of Seatbelt Nonuse* by Weight Category
WVBRFSS, 1999



*Do not always use seatbelts when driving or riding in motor vehicles.

Weight Reduction. Only slightly over one-third (36.1%) of the obese respondents to the 2000 BRFSS reported that they had been advised to lose weight during the previous 12 months by a doctor, nurse, or other health professional; however, 60.4% were currently trying to lose weight (Figure 17). Eleven percent (11.1%) of overweight individuals had been advised to lose weight, with fewer than half (42.8%) actually trying to reduce. One in five (20.8%) healthy weight respondents reported they were currently attempting to lose weight.

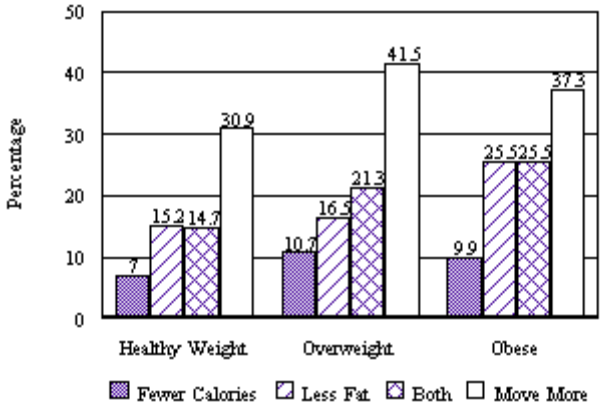
Figure 17
Prevalence of Respondents Advised to Lose Weight* and
Now Trying to Lose Weight, by Weight Categories, WVBRFSS, 2000



*In the past 12 months

Among those respondents who reported they were currently trying to lose weight, obese persons were more likely than healthy weight or overweight persons to report eating less fat or a combination of fewer calories and less fat to reduce (Figure 18). Forty-two percent (41.5%) of overweight and 37.3% of obese respondents who were currently trying to lose weight reported doing more physical activity in order to achieve weight loss.

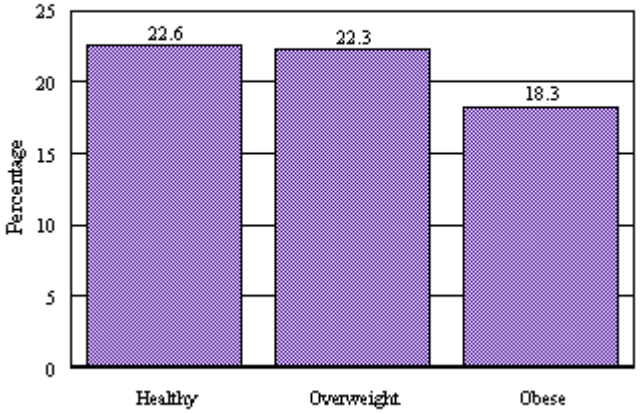
Figure 18
Prevalence of Respondents* Eating Less or Moving More
To Lose Weight by Weight Category, WVBRFSS, 2000



*Among those respondents trying to lose weight

Any weight reduction or control program must involve a healthy, balanced diet. Part of such a diet is the consumption of at least five fruits and vegetables a day, according to U.S. Department of Agriculture (USDA) recommendations. When the prevalence of West Virginia adults meeting the USDA recommendation was examined by weight category (Figure 19), obese respondents were the least likely to include an adequate number of servings of fruits and vegetables in their daily meals.

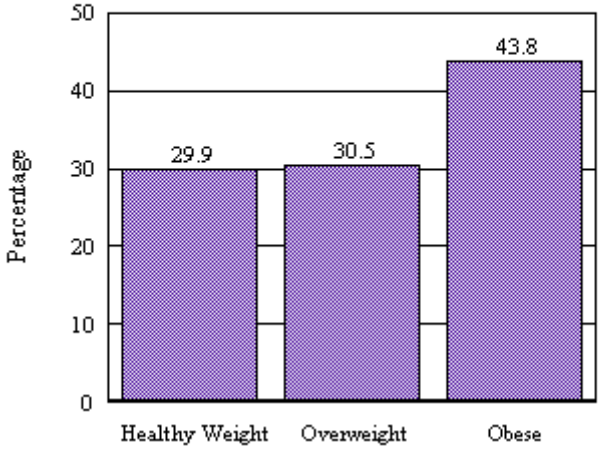
Figure 19
Prevalence of Adults Meeting the 5-a-Day Recommendation*
By Weight Category, WVBRFSS, 2000



*USDA recommendation to eat at least five fruits and vegetables every day

Little difference was noted in prevalence of physical inactivity among healthy weight and overweight respondents to the 2000 BRFSS survey. As Figure 20 shows, however, obese persons were much more likely to have reported no participation in any leisure-time physical activity during the month preceding the interview.

Figure 20
Prevalence of Physical Inactivity by Weight Category
WVBRFSS, 2000



Dietary Intake Study. A 2001 study by Krummel et al. on dietary intake and leisure-time physical activity among adult West Virginians found similar overall caloric intake among state residents and national respondents to the NHANES III survey (92). West Virginia men averaged 2,501 kcal daily, compared with 2,478 among males nationally. The mean caloric intake for West Virginia women was 1,720 kcal, compared with 1,732 for NHANES III female respondents.

The Krummel study examined the proportion of West Virginians surveyed who met the dietary recommendations for reducing chronic disease risk published by the national Committee for Diet and Health (93). Three-quarters (75%) of those surveyed met the daily recommendation for dietary cholesterol, while 70% met that for percentage of calories obtained from protein. Fewer than half (42%) ate a healthy percentage of total fat in their daily diets, and only one in five (20%) ate the recommended amount of dietary fiber. Even worse, only 18% of respondents got enough folate daily and only 10% obtained the recommended amount of Vitamin E. Concerning findings on leisure-time activity, the study's author writes, "Diet and activity levels were modestly related, suggesting that those who adopt a healthy diet also become more active or vice versa."

Obesity and Other Cardiovascular Disease Risk Factors. Although obese persons are at increased risk for cardiovascular disease from their excess weight alone, most have other CVD risks as well, making weight control even more imperative. Health professionals recognize that a combination of risk factors can have a synergistic effect on the chances of developing cardiovascular disease, as well as the severity of the disease. Data from the 2000 BRFSS were examined in terms of the prevalence of multiple CVD risk factors (i.e., current smoking, hypertension, high cholesterol, and physical inactivity) among those respondents who were obese. The results are presented in Table 2.

In 2000, 23.2% of the adults surveyed by the BRFSS were obese. Of this subpopulation, 22.3% did not report having any of the other four CVD risk factors in our analysis. Nearly one-third (32.4%) had one other risk factor, with the largest percentage of these persons (11.8%) reporting hypertension as the other risk factor. Twenty-six percent (26.4%) of obese respondents had two additional risk factors, 16.1% reported three additional risk factors, and 2.9% had all five risk factors, that is, they smoked, had high blood pressure and high cholesterol, and were physically inactive in addition to being obese. Figure 21 illustrates the prevalence of multiple CVD risk factors among the state's obese adults in 2000.

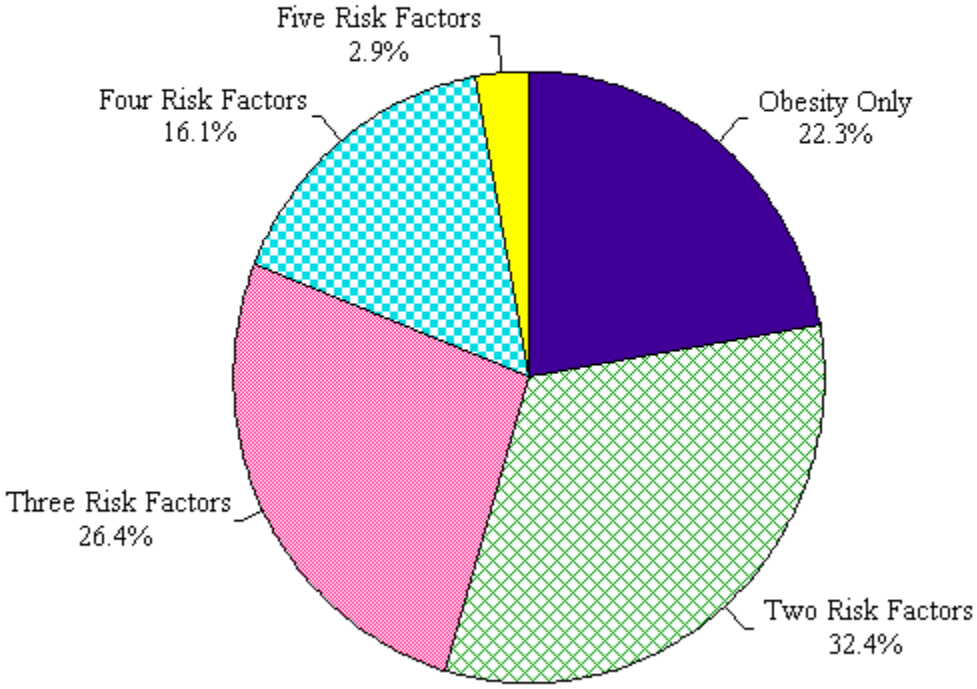
Overweight among West Virginia's Youth. The data available on the problem of overweight among our state's youth are limited. The latest statistics available at the time of this report were obtained from the 1999 Youth Risk Behavior Survey.[7] The categories of overweight and at risk of overweight were determined using the definitions for childhood obesity given in Chapter

[7]Results from the 2001 YRBS survey were unavailable for West Virginia due to loss in transit of a portion of the actual survey forms.

Table 2
Prevalence of Respondents at Risk for CVD due to Obesity, Current Smoking, Hypertension, High Cholesterol, and/or Physical Inactivity
2000 West Virginia Behavioral Risk Factor Surveillance System

Risk Factor(s) Contributing to CVD	% at Risk
Obesity Only	**22.3**
Two Risk Factors	**32.4**
Obesity and Hypertension	11.8
Obesity and Physical Inactivity	8.6
Obesity and Current Smoking	7.1
Obesity and High Cholesterol	4.9
Three Risk Factors	**26.4**
Obesity, Hypertension, and High Cholesterol	9.5
Obesity, Hypertension, and Physical Inactivity	6.7
Obesity, Current Smoking, and Physical Inactivity	3.8
Obesity, Physical Inactivity, and High Cholesterol	3.2
Obesity, Current Smoking, and High Cholesterol	1.7
Obesity, Current Smoking, and Hypertension	1.5
Four Risk Factors	**16.1**
Obesity, Hypertension, Physical Inactivity, and High Cholesterol	8.6
Obesity, Current Smoking, Hypertension, and High Cholesterol	3.7
Obesity, Current Smoking, Hypertension, and Physical Activity	2.5
Obesity, Current Smoking, Physical Inactivity, and High Cholesterol	1.3
Five Risk Factors	**2.9**
Obesity, Current Smoking, Hypertension, Physical Inactivity, and High Cholesterol	2.9

Figure 21
Obesity and Multiple CVD Risk Factors
WVBRFSS, 2000



One.[8] Overall, 12.2% of West Virginia high school students in grades 9 through 12 were overweight in 1999, 15.8% of males and 8.3% of females. Sixteen percent (15.9%) of students were at risk of overweight, 16.5% of males and 15.4% of females. In contrast, female students were much more likely to think that they were overweight, 42.5% compared with 27.2% of males. An even greater disparity between the sexes was noted for those students who had tried to lose weight at some time during the 30 days prior to the survey, 65.0% of females vs. 30.1% of males. Table 3 illustrates the differences between the national median and West Virginia students. Questions on daily diets revealed that only one in five students ate five or more servings of fruits and vegetables each day (20.4%) or drank at least three glasses of milk (19.1%)

[8]Overweight includes those students who were BMI-for-age > or = 95th percentile; at risk of overweight includes those students who were BMI-for-age > or = 85th percentile but <95th percentile.

Table 3
Prevalence (%) of High School Students Who Were Overweight or At Risk of Becoming Overweight[9], Thought They Were Overweight, and Who Were Attempting Weight Loss
1999 YRBS, United States and West Virginia

	Total		Male		Female	
	US	**WV**	**US**	**WV**	**US**	**WV**
Overweight	9.9	12.2	11.9	15.8	7.9	8.3
At Risk of Overweight	16.0	15.9	17.5	16.5	14.4	15.4
Thought They Were Overweight	30.0	34.7	23.7	27.2	36.4	42.5
Attempting To Lose Weight	42.7	47.0	26.1	30.1	59.4	65.0

Physical Activity among West Virginia Youth. Seventy percent (70.0%) of male high school students reported during the 1999 YRBS survey that they participated in vigorous physical activity,[10] compared with 54.2% of the female students. Another 27.3% of males participated in moderate physical activity,[11] as did 23.5% of female students. Sixty-four percent (63.9%) of males and 47.6% of females had participated in strengthening exercises.[12] On the negative side, 54.9% of males and 60.7% of females watched at least two hours of television on an average school day. As Figure 22 illustrates, little difference was noted between state students and the national median in terms of activity and TV watching.

Only 38.2% of West Virginia high school students were enrolled in physical education (PE) class at the time of the survey, 44.4% of males and 31.6% of females. Thirty-four percent (34.1%) of males and 27.1% of females attended PE class daily. Of those students enrolled in PE, 87.1% of

[9]See footnote 8.

[10]Activities that caused sweating and hard breathing for at least 20 minutes on at least three of the seven days preceding the survey.

[11]Activities that did not cause sweating or hard breathing for at least 30 minutes on at least five of the preceding seven days preceding the survey.

[12]Such as push-ups, sit-ups, or weightlifting on at least three of the seven days preceding the survey.

males and 81.3% of females reported exercising at least 20 minutes during an average class. Overall, half (49.5%) of the students had played on a sports team during the 12 months preceding the survey, 55.2% of males and 43.6% of females. Figure 23 compares West Virginia students to the national median.

Figure 22
Physical Activity and TV Watching among High School Students
1999 YRBS, United States and West Virginia

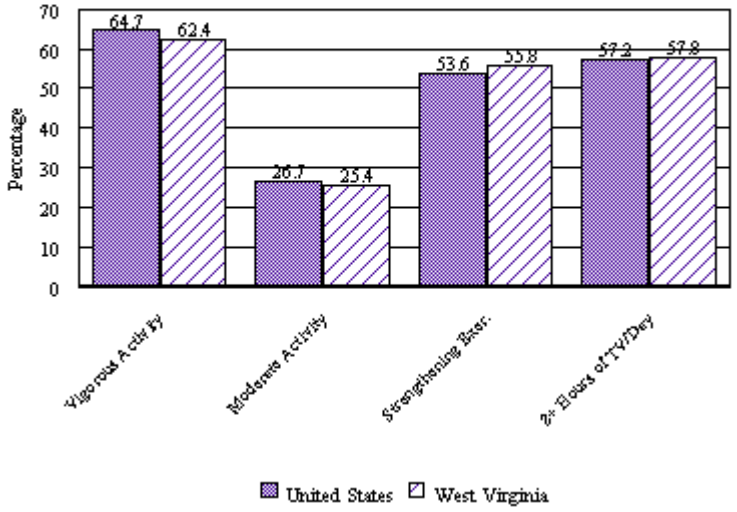


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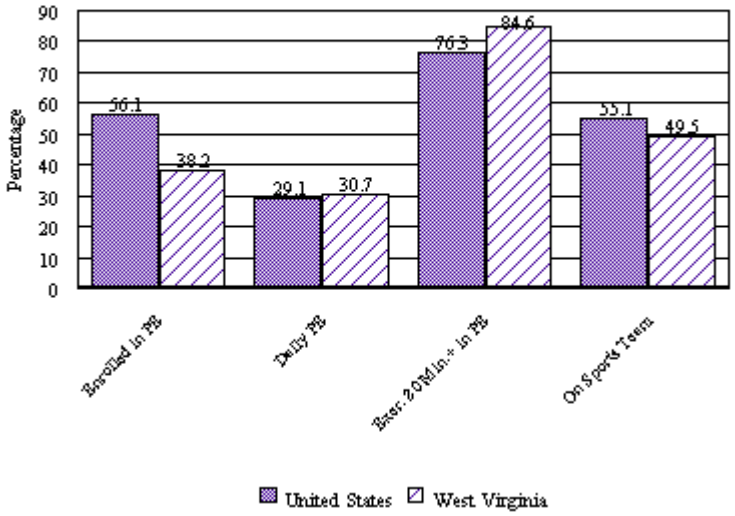
Figure 23
PE Class and Sports Team Participation
1999 YRBS, United States and West Virginia



Health Care Expenditures due to Obesity in West Virginia. Data are unavailable at the present time to estimate total health care expenditures due to obesity in West Virginia. Preliminary analyses have been conducted, however, using data from the Bureau of Medical Services (Medicaid) and the Public Employees Insurance Agency (PEIA) (94, 95). An economic model developed by the Centers for Disease Prevention and Control was applied to claims from covered individuals during FY2001 for four disease states associated with obesity, as well as the pharmacy costs related to those disease states. Tables 4 and 5 present the estimated medical expenditures for each payor.

It is estimated that together PEIA and Medicaid had over $200 million in obesity-related expenditures in FY2001. The highest costs of medical care related to obesity for both Medicaid and PEIA were found among individuals with claims related to cardiovascular disease. Total obesity-related medical costs paid by PEIA were nearly $29 million, while those paid by Medicaid were $36 million. Nearly $40 million in pharmacy costs to PEIA were attributed to obesity, with more than twice that amount, or almost $100 million, paid by Medicaid.

Table 4
Public Employees Insurance Agency Estimated Medical and Pharmacy Costs Related to Obesity-Related Diseases
West Virginia, July 1, 2000 - June 30, 2001

Disease State	FY2001 Medical Expenditures	% of Persons with Disease Who Are Obese*	Obesity-Related Costs
Diabetes	$3,436,144.10	80%	$2,748,915.28
Cardiovascular	33,518,763.60	62%	20,781,633.43
Musculoskeletal and Gout	19,798,107.63	25%	4,949,526.91
Cancer (Pancreas, Stomach, Colon, Liver, Kidney)	2,068,576.98	19%	393,029.63
Total Medical			$28,873,105.25
Pharmacy Costs (Related to Above Disease States)			$39,416,289.86
Total PEIA Expenditures			**$68,289,395.11**

*Based on CDC estimates

Table 5
Medicaid Estimated Medical and Pharmacy Costs
Related to Obesity-Related Diseases
West Virginia, July 1, 2000 - June 30, 2001

Disease State	FY2001 Medical Expenditures	% of Persons with Disease Who Are Obese*	Obesity-Related Costs
Diabetes	$8,086,390.52	80%	$6,469,112.42
Cardiovascular	38,493,489.60	62%	23,865,963.55
Musculoskeletal and Gout	22,155,875.70	25%	5,538,968.93
Cancer (Pancreas, Stomach, Colon, Liver, Kidney)	1,708,667.75	19%	324,646.87
Total Medical			36,198,691.77
Pharmacy Costs (Related to Above Disease States)			99,187,082.45
Total Medicaid Expenditures			**$135,385,774.22**

*Based on CDC estimates