Cardiovascular Disease *in* Ohio 2001

A Profile of Cardiovascular Disease Mortality and Related Behavioral Risk Factors

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Division of Prevention
The Ohio Department of Health

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Acknowledgements

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With Thanks to:
Deborah Arms, R.N., Ph.D.; Frank Bright, M.S.; Robert Campbell, Ph.D.; Rosemary Duffy, D.D.S., M.P.H.; Frank Holzhauer, Ph.D.; John Paulson, M.S.; James Pearsol, B.A., M.Ed.; William Ramsini, Ph.D.; Ron Sherwood, B.A.; Mari-Jean Siehl, B.A.; Jeff Smith (GIS manager).

Suggested Citation:
Chan, W.F., Boyle, K.K., Pryor, B.A., and Indian, R.W. (July 2001).
Cardiovascular Disease in Ohio, 2001. Division of Prevention, Ohio Department of Health.

Executive Summary

In Ohio:

- Cardiovascular disease (CVD), which includes heart disease and stroke, was the number one cause of death in 1998, accounting for over 40% of all deaths.

- The two most common forms of CVD, coronary heart disease (CHD) and stroke, together account for more deaths in every Ohio county than any other cause of death, including cancer.

- The CVD mortality rate was the 19th highest in the nation and exceeded the national CVD mortality rate by 6%. Coronary heart disease (CHD) mortality rate was the 8th highest and exceeded the national CHD mortality rate by 11%. Stroke death rate was the 34th highest in the nation and slightly lower than the U.S. rate.

- In 1998, the CVD death rate was 18% higher for black males than white males. In addition, the risk of dying from CVD was 21% higher for black females than white females.

- In the 1990s, CVD death rates declined for both blacks and whites, but the gap between the two groups did not narrow.

- In 1999, 95% of adult Ohioans reported at least one risk factor for CVD, and almost 80% reported two or more CVD risk factors.

- The prevalence of the modifiable CVD risk factors, i.e., obesity, cigarette smoking, high blood pressure, high cholesterol, and diabetes has increased in the past 10 years.

Introduction

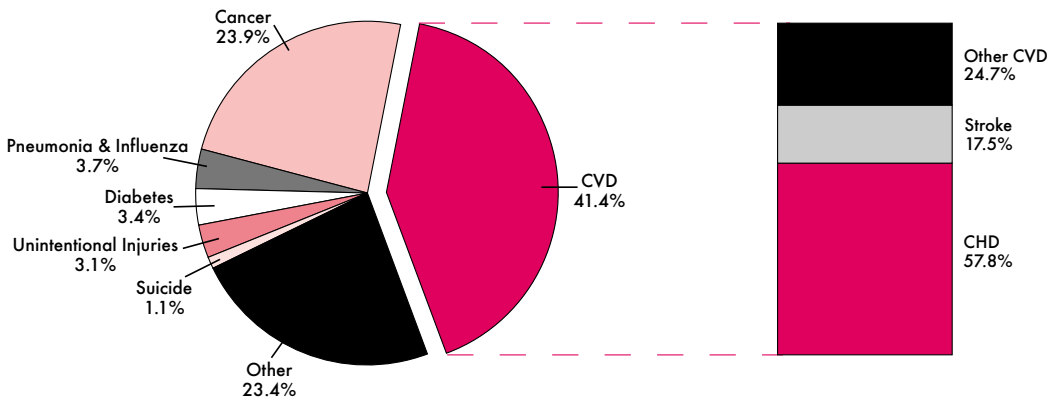
Cardiovascular disease (CVD) is the nation's leading killer among both men and women, and affects all racial and ethnic groups. The disease is the leading cause of death among Americans in middle age, killing more than 160,000 people between ages of 35 and 64 each year in the United States[1]. In Ohio, CVD is the number one cause of death (Figure 1) and the primary cause of premature mortality for both men and women, assuming average life expectancy of 76.7 years[2]. The two most common forms of CVD, coronary heart disease (CHD) and cerebrovascular disease (stroke), together account for more deaths in every Ohio county than any other cause of death. Among the 50 states and District of Columbia, Ohio ranks 19th highest for age-adjusted mortality rate for total cardiovascular disease, 8th highest for coronary heart disease, and 34th highest for stroke[3].

Morbidity and mortality from CVD are related to a number of modifiable risk factors, including unhealthy behaviors (cigarette smoking, sedentary lifestyle, and poor dietary habits) and adverse health conditions (high blood pressure, elevated blood cholesterol, diabetes, and obesity). Many experts view cardiovascular disease as largely preventable. Multiple risk factors in an individual impart a greater than additive risk. Reducing the prevalence of modifiable risk factors is an important way to reduce cardiovascular disease morbidity and mortality in Ohio.

The purposes of this report are to:

- present an overview of CVD death rates, including:
  - trend analyses, for the period of 1990-1998;
  - average annual age-adjusted mortality rate by county, 1994-1998; and,
- describe the prevalence and trends for modifiable CVD risk factors in Ohio.

Figure 1
Leading Causes of Death among Ohio Residents, 1998



Source: Community Health Assessments Section BHSIOS-Prevention, Ohio Department of Health, 2001.

Methods

CVD Mortality

All CVD deaths between 1990 through 1998 (numerator) were identified through the population-based, computerized database maintained by the Office of Vital Statistics, Ohio Department of Health. The inter-censal population estimate from the U.S. Bureau of Census was used as the denominator. The rates were age-adjusted using the U.S. 2000 standard population.

Two methods of calculating mortality rates were used: direct age-adjusted mortality rates and average annual direct age-adjusted rates. Direct age-adjusted mortality rates were calculated for different race and gender groups (white male, black male, white female, black female, and total) for all nine years between 1990 - 1998. Average annual direct age-adjusted rates were calculated for Ohio's 88 counties for the five-year period, 1994-1998. Because some Ohio counties have a relatively small number of residents, and thus a small number of CVD deaths, five years of data were combined to obtain a sufficiently large sample for analysis. To allow observation of geographic patterns, a State of Ohio map was used to show each county's quartile rank for mortality.

Modifiable CVD Risk Factors

Data on the seven modifiable risk factors for CVD were collected for Ohioans 18 years of age and older using the Ohio Behavioral Risk Factor Surveillance System (BRFSS). BRFSS is an ongoing state-based, random-digit-dialed telephone survey of the U.S. non-institutionalized civilian population. The data used to determine prevalence were collected in 1999.

The seven modifiable CVD risk factors, as defined for the BRFSS and used in this analysis are: current cigarette smoking, obesity, high blood pressure, high blood cholesterol, diabetes, sedentary lifestyle, and poor dietary habits.

Trend analyses are presented for each of the risk factors. The number of years analyzed varies among the risk factors according to the data available from the BRFSS. The BRFSS defines these risk factors as follows:

1. **Current cigarette smoking (1984-1999):** Smoked at least 100 cigarettes in one's lifetime and currently smoke every day or some days.

2. **Obesity (1984-1999):** Body Mass Index (BMI) greater than or equal to 30.

3. **High blood pressure (1984-1999):** Persons who were told by a doctor or other health professional that their blood pressure was high.

Methods *continued*

4. **High blood cholesterol (1987-1999):** Persons who were told by a doctor or other health professional that their blood cholesterol was high.

5. **Diabetes (1988-1999):** Persons who have ever been told by a doctor that they have diabetes.

6. **Sedentary lifestyle (1990-1999):** Persons who are "physically inactive" (no leisure-time physical activity reported during the past month) or who participate in "irregular activity" (any physical activity or pair of activities, done for less than 20 minutes or done less than three times per week during the past month).

7. **Poor dietary habits (1990-1999):** Persons who consumed less than five servings of fruits and vegetables per day.

To assure that prevalence estimates are representative of Ohio's population, data were weighted for age, gender, race, and probability of selection using a three-stage cluster sampling methodology. Respondents who answered "don't know/not sure" or refused to answer the question were excluded from the analyses for that question.

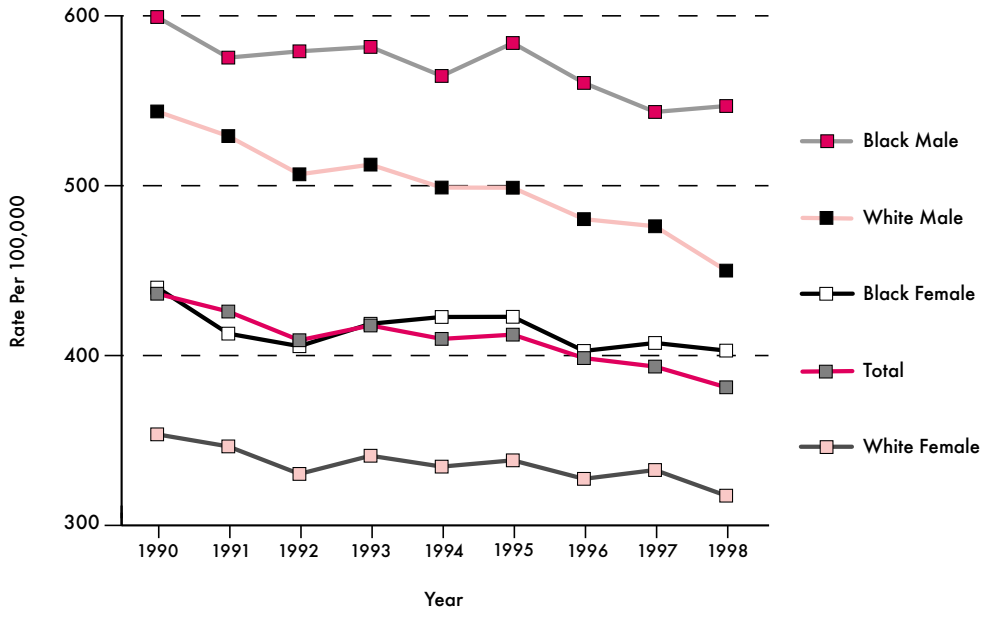
Results: Cardiovascular Disease Mortality

A. Ohio Trend Analysis (1990-1998)

- In Ohio, the overall CVD age-adjusted mortality rate (U.S. 2000 standard population) in 1998 was 381.3 per 100,000 persons. The 1998 mortality rates from CVD were 450.0 per 100,000 for white males; 546.9 per 100,000 for black males; 312.5 per 100,000 for white females; and 402.9 per 100,000 for black females.
- From 1990 to 1998, overall death rates from CVD declined 12.6% (from 436.4 per 100,000 in 1990 to 381.3 per 100,000 in 1998). In the same nine-year period, the actual number of CVD deaths declined 1.1%.
- From 1990 to 1998, CVD death rates decreased 17.2% among white males and 10.2% among white females, but decreased only about 8.7% among black males and 8.4% among black females.

Figure 2

Trend in Cardiovascular Disease Age-Adjusted Mortality Rate, Per 100,000 Persons, by Race and Gender, Ohio 1990-1998(1)(2)(3)(4)



(1) Source: Community Health Assessments Section BHSIOS-Prevention, Ohio Department of Health, 2001.
(2) The direct age-adjusted rates were calculated using the inter-censal population estimates for 1990-1998 as a denominator and to U.S. 2000 standard population for age adjustment.
(3) Ohio residents where the underlying cause of death was determined to be cardiovascular disease; International Classification of Diseases, Injuries, and Causes of Deaths, (ICD) code 390-448 (World Health Organization, Geneva, Switzerland, 1979, Volume 9).
(4) Total mortality included other races.

Results: Cardiovascular Disease Mortality *continued*

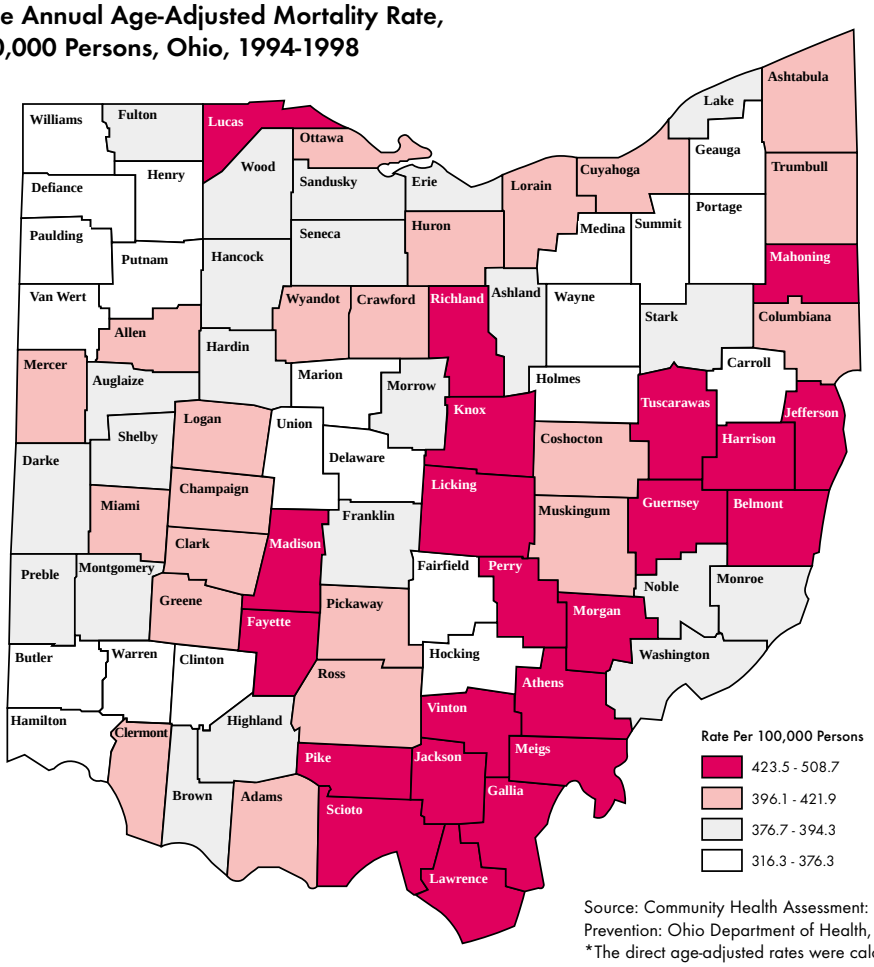
B. County Mortality (1994-1998)

- The average annual age-adjusted CVD mortality rate for Ohio was 398.9 per 100,000 persons for the five-year period 1994-1998. Among the 88 Ohio counties, average annual rates for CVD ranged from a high of 508.7 per 100,000 persons in Fayette County to a low of 316.3 per 100,000 in Holmes County (See Appendix 1).

- CVD mortality rates appear to be highest in southern and eastern Ohio. The lowest CVD mortality rates appeared to be clustered in the northwestern, northeastern, and southwestern parts of the state.

Figure 3

Cardiovascular Disease:
Average Annual Age-Adjusted Mortality Rate,
Per 100,000 Persons, Ohio, 1994-1998



Source: Community Health Assessment: BHSIOS Prevention: Ohio Department of Health, 2001.
*The direct age-adjusted rates were calculated using the inter-censal population estimates for 1994-1998 as a denominator and to U.S. 2000 standard population for age adjustment.
**ICD-9 codes: 390-448

Ohio Rate: 398.9 Per 100,000

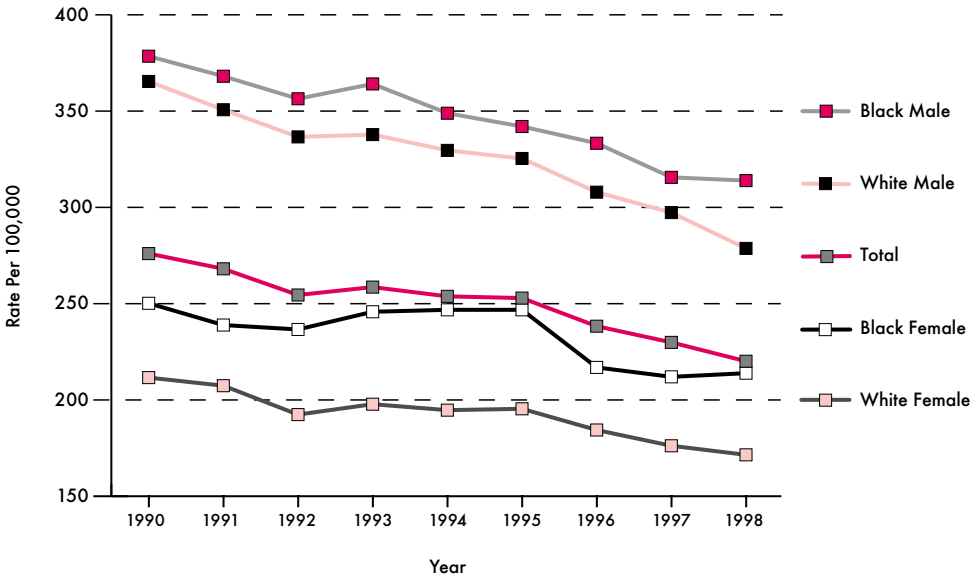
Results: Coronary Disease Mortality

A. Ohio Trend Analysis (1990-1998)

- In Ohio, the overall age-adjusted CHD mortality rate in 1998 was 220.1 per 100,000 persons, compared to a national rate of 208 per 100,000[4]. The 1998 mortality rates from CHD were 278.7 per 100,000 persons for white males and 313.9 per 100,000 for black males; 171.5 per 100,000 for white females and 213.9 per 100,000 for black females.
- From 1990 to 1998, overall death rates from CHD declined 20% (from 276.0 per 100,000 in 1990 to 220.1 per 100,000 in 1998). In the same nine-year period, the actual number of CHD deaths declined 10%.
- From 1990 to 1998, CHD death rates decreased 23.7% among white males and about 19% among white females. The decline in death rates was 17.4% and 14.5% among black males and black females, respectively.

Figure 4

Trend in Coronary Heart Disease Age-Adjusted Mortality Rate, Per 100,000 Persons, by Race and Gender, Ohio, 1990-1998(1)(2)(3)(4)



(1) Source: Community Health Assessments Section BHSIOS-Prevention, Ohio Department of Health, 2001.
(2) The direct age-adjusted rates were calculated using the inter-censal population estimates for 1990-1998 as a denominator and to U.S. 2000 standard population for age adjustment.
(3) Ohio residents where the underlying cause of death was determined to be cardiovascular disease; International Classification of Diseases, Injuries, and Causes of Deaths, (ICD) code 402, 410-414, 429.2 (World Health Organization, Geneva, Switzerland, 1979, Volume 9).
(4) Total mortality included other races.

Results: Coronary Disease Mortality *continued*

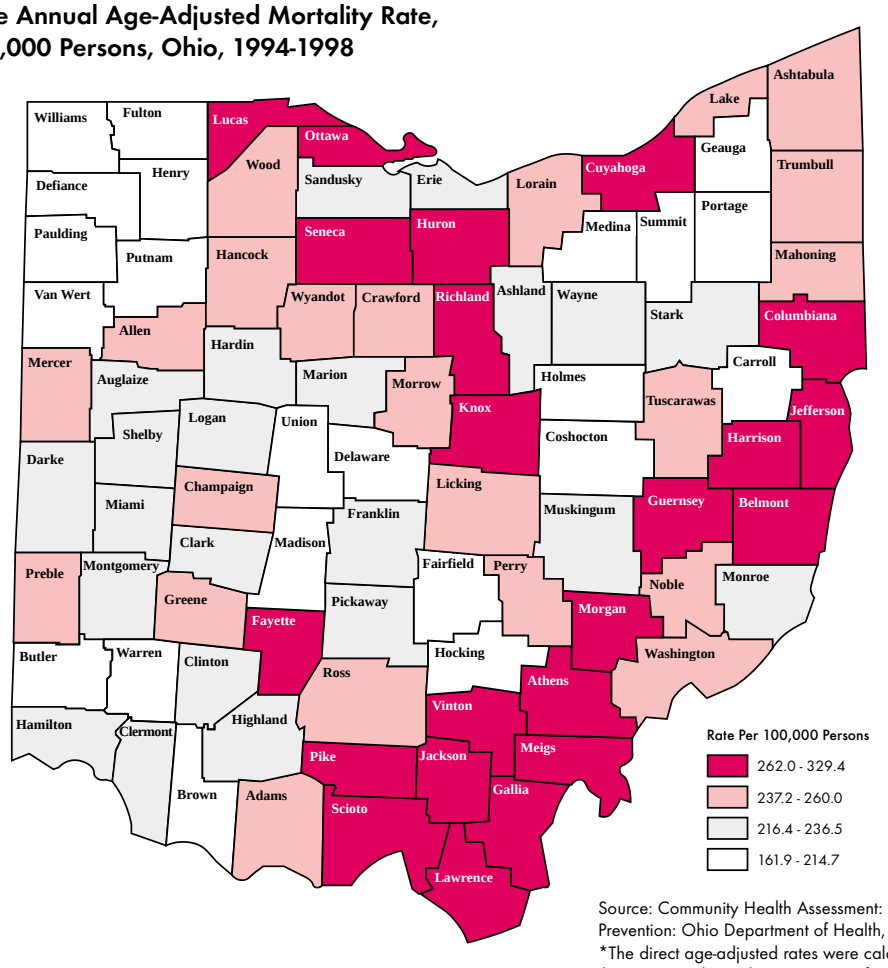
B. County Mortality (1994-1998)

- The CHD average annual age-adjusted mortality rate for Ohio was 238.8 per 100,000 persons for the five-year period (1994-1998). Among Ohio's 88 counties, the rates for CHD ranged from a high of 329.4 per 100,000 persons in Fayette County to a low of 161.9 per 100,000 in Holmes County (See Appendix 2).

- The CHD mortality rates appear to be highest in southern, southeastern, eastern and north central Ohio. The lowest CHD mortality rates appear to be in the northwestern, northeastern, and southwestern parts of the state.

Figure 5

Coronary Heart Disease:
Average Annual Age-Adjusted Mortality Rate,
Per 100,000 Persons, Ohio, 1994-1998



Source: Community Health Assessment: BHSIOS Prevention: Ohio Department of Health, 2001.
*The direct age-adjusted rates were calculated using the inter-censal population estimates for 1994-1998 as a denominator and U.S. 2000 standard population for age adjustment.
**ICD-9 codes: 402, 410-414,429.2

Ohio Rate: 238.8 Per 100,000

Results: Cerebrovascular Disease (Stroke) Mortality

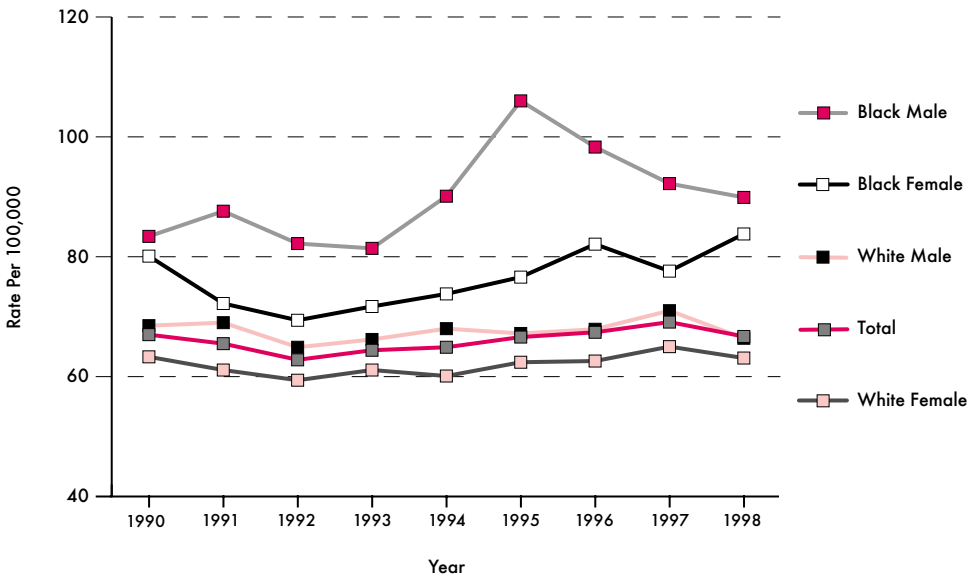
A. Ohio Trend Analysis (1990-1998)

- In Ohio, the 1998 age-adjusted stroke mortality rate was 66.7 per 100,000 persons, compared to 60 per 100,000 for the U.S.[4]. The 1998 mortality rates from stroke were 66.4 per 100,000 persons for white males; 89.9 per 100,000 for black males; 63.1 per 100,000 for white females; and 83.8 per 100,000 for black females.

- From 1990 to 1998, overall death rates from stroke remained the same (67 per 100,000 in 1990 and 66.7 per 100,000 in 1998). In the same nine-year, period the actual number of stroke deaths increased about 15%. The death rates from stroke declined slightly among white males (3.1%) and white females (0.3%), but the death rate increased almost 8% among black males and increased 5% among black females.

Figure 6

Trend in Cerebrovascular Disease (Stroke) Age-Adjusted Mortality Rate, Per 100,000 Persons, by Race and Gender, Ohio, 1990-1998(1)(2)(3)(4)



(1) Source: Community Health Assessments Section BHSIOS-Prevention, Ohio Department of Health, 2001.
(2) The direct age-adjusted rates were calculated using the inter-censal population estimates for 1990-1998 as a denominator and to U.S. 2000 standard population for age adjustment.
(3) Ohio residents where the underlying cause of death was determined to be cardiovascular disease; International Classification of Diseases, Injuries, and Causes of Deaths, (ICD) code 430-438 (World Health Organization, Geneva, Switzerland, 1979, Volume 9).
(4) Total mortality included other races.

Results: Cerebrovascular Disease (Stroke) Mortality *cont'd*

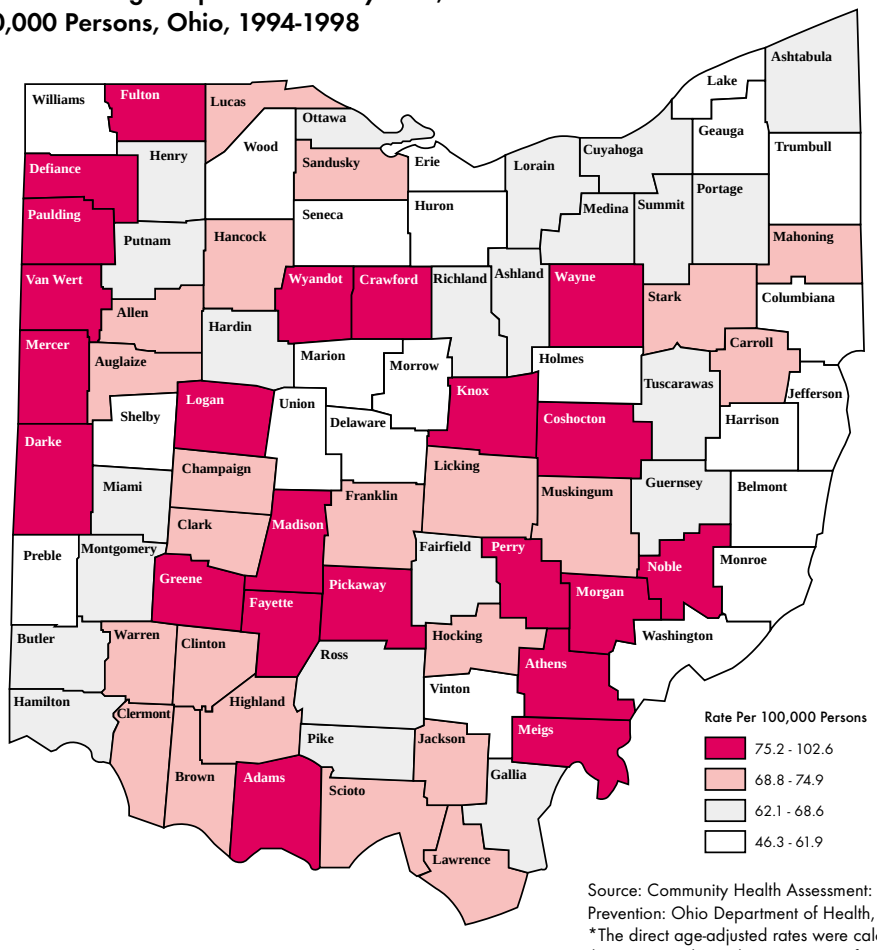
B. County Mortality (1994-1998)

- The average annual age-adjusted mortality rate for stroke in Ohio was 66.9 per 100,000 persons for the five-year period (1994-1998). The rates for stroke ranged from a high of 102.6 per 100,000 persons in Wyandot County to a low of 46.3 per 100,000 in Harrison County (See Appendix 3).

- The stroke mortality rates appear to be highest in western, central, and southern Ohio. The lowest stroke mortality rates appear to be in the eastern and northeastern parts of the state.

Figure 7

Cerebrovascular Disease (Stroke)
Average Annual Age-Adjusted Mortality Rate,
Per 100,000 Persons, Ohio, 1994-1998



Source: Community Health Assessment: BHSIOS Prevention: Ohio Department of Health, 2001.
*The direct age-adjusted rates were calculated using the inter-censal population estimates for 1994-1998 as a denominator and U.S. 2000 standard population for age adjustment.
**ICD-9 codes: 430-438

Ohio Rate: 66.9 Per 100,000

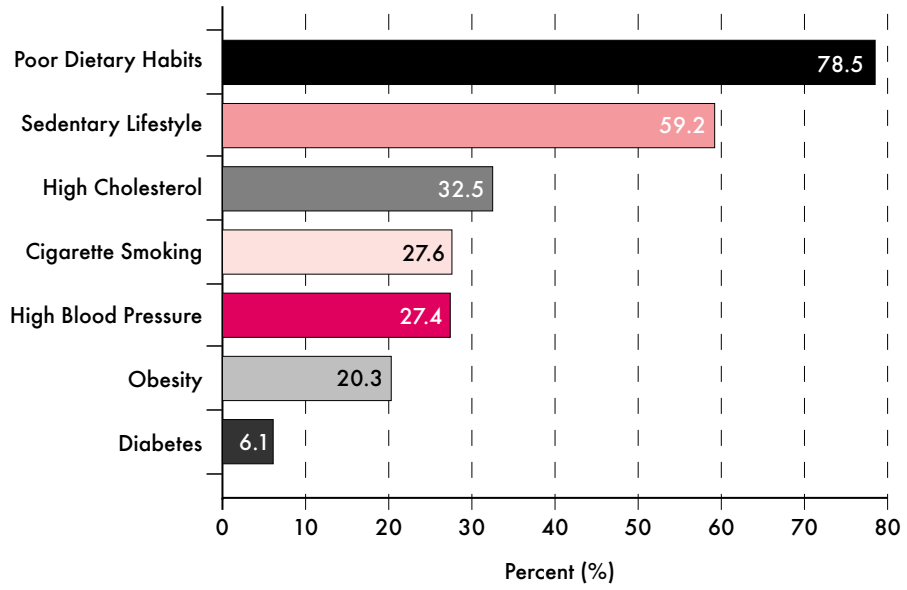
Results: Modifiable CVD Risk Factors

I. Risk Factor Prevalence

♥ Of the seven modifiable CVD risk factors used in this analysis, poor dietary habits had the highest prevalence (78.5%). The prevalence of the other six CVD risk factors, shown in Figure 8, are as follows: sedentary lifestyle (59.2%), high cholesterol (32.5%), cigarette smoking (27.6%), high blood pressure (27.4%), obesity (20.3%), and diabetes (6.1%).

Figure 8

Estimated Prevalence of Cardiovascular Disease (CVD) Modifiable Risk Factors, Ohio, 1999(1)



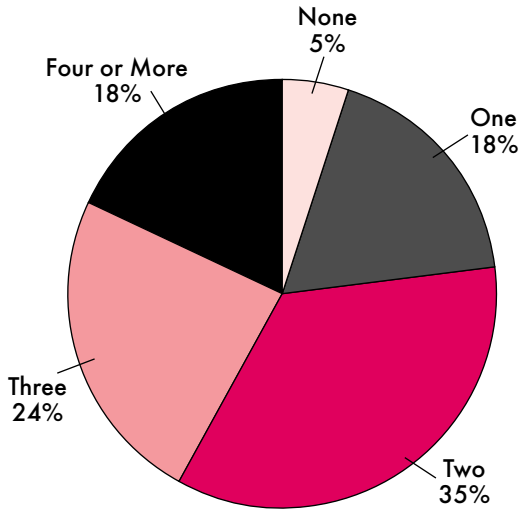
(1) Source: Ohio Behavioral Risk Factor Surveillance System, Community Health Assessments Section, BHSIOS-Prevention, Ohio Department of Health, 2001.

Results: Modifiable CVD Risk Factors *continued*

♥ Overall, 95% of adult Ohioans reported at least one risk factor for CVD, and almost 80% reported two or more CVD risk factors. Figure 9 shows the distribution: 18% reported only one CVD risk factor; 35% reported two CVD risk factors; 24% reported three CVD risk factors, 13% reported four CVD risk factors; 5% reported five CVD risk factors; 1% reported six CVD risk factors; and none reported all seven CVD risk factors. About 5% reported no risk factor for CVD.

Figure 9

Distribution of Modifiable Cardiovascular Disease Risk Factors, Ohio, 1999(1)(2)



(1) Source: Ohio Behavioral Risk Factor Surveillance System, Community Health Assessments Section, BHSIOS-Prevention, Ohio Department of Health, 2001.
(2) CVD risk factors: poor dietary habits, diabetes, cigarette smoking, high blood pressure, high cholesterol, sedentary lifestyle, and obesity.

Results: Modifiable CVD Risk Factors

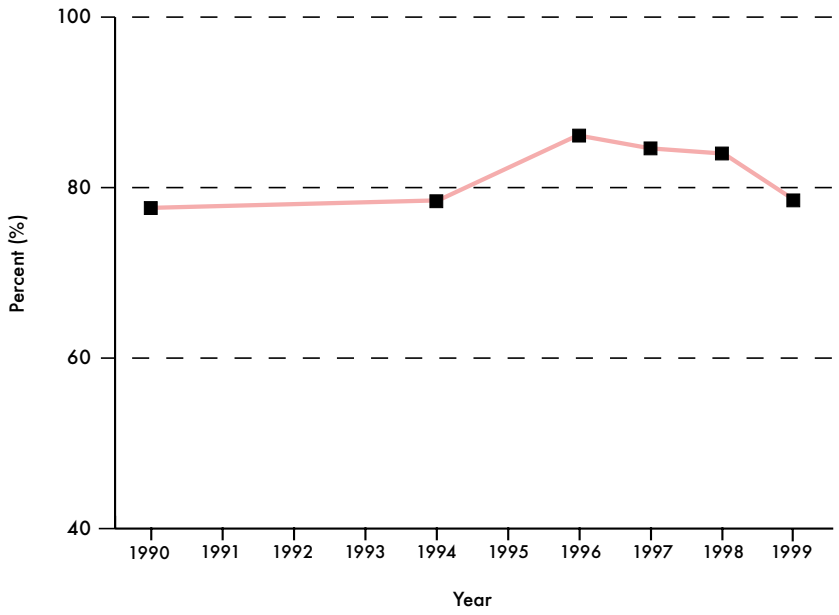
II. Modifiable Risk Factor Trend Analyses:

♥ Poor Dietary Habits (1990-1999)

From 1990 to1999, the BRFSS indicated that 77.6% to 86.1% of adult Ohioans consumed less than five servings of fruits and vegetables per day. This rate has remained fairly stable for the past ten years.

Figure 10

Trend in Prevalence of Adults, Age 18 Years and Older, Who Consumed Less than Five Servings of Fruits and Vegetables, Ohio, 1990-1999(1)(2)



(1) Source: Ohio Behavioral Risk Factor Surveillance System, Community Health Assessments Section, BHSIOS-Prevention, Ohio Department of Health, 2001.
(2) Questions regarding fruit and vegetable consumption were not asked in 1991-1993 and 1995.

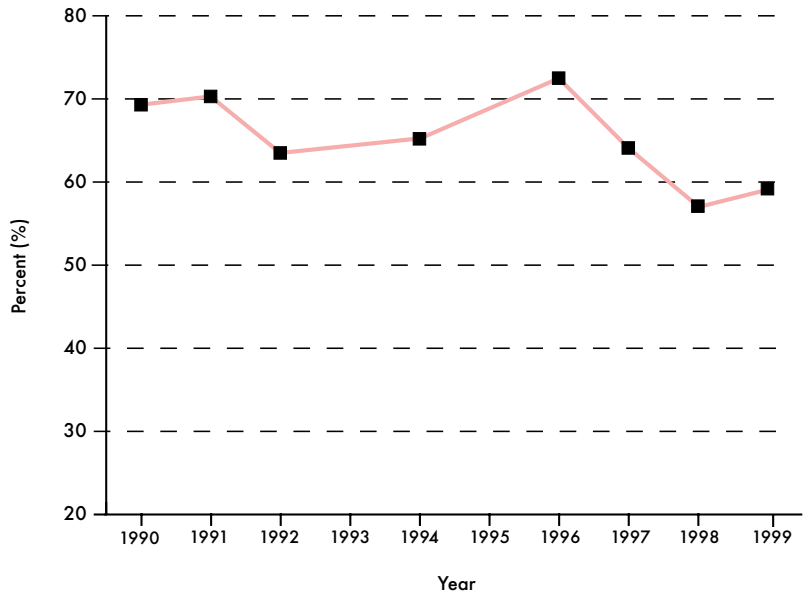
Results: Modifiable CVD Risk Factors *continued*

♥ Sedentary Lifestyle (1990-1999)

The proportion of Ohio adults who were sedentary increased slightly between 1992 and 1996, but has improved since 1996. In 1996, 72.5% of Ohioans were classified as living a sedentary lifestyle. The prevalence decreased to 57.1% in 1998 and to 59.2% in 1999.

Figure 11

Trend in Prevalence of Adults, Age 18 Years and Older, Who Were Classified as Living a Sedentary Lifestyle, Ohio, 1990-1999(1)(2)



(1) Source: Ohio Behavioral Risk Factor Surveillance System, Community Health Assessments Section, BHSIOS-Prevention, Ohio Department of Health, 2001.
(2) Questions regarding physical activity were not asked in 1993 and 1995.

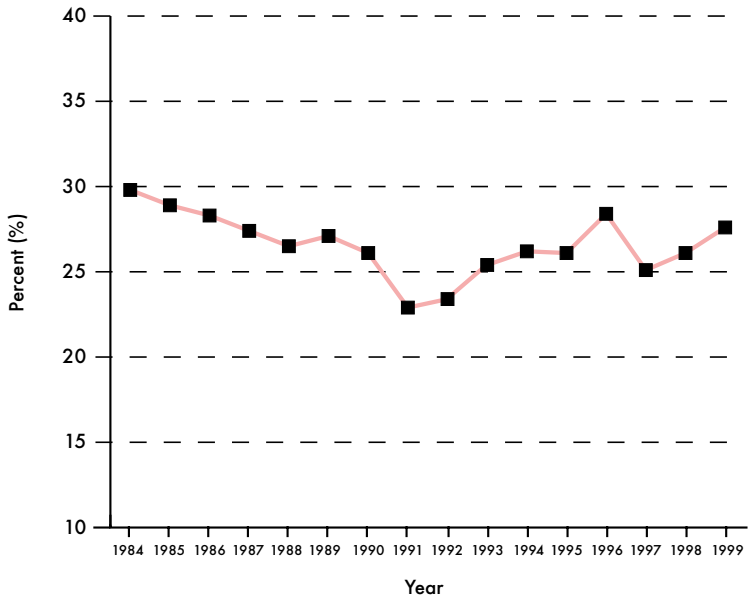
Results: Modifiable CVD Risk Factors *continued*

♥ Cigarette Smoking (1984-1999)

In 1984, about 30% of Ohioans smoked, declining to 23.1% in 1991. However, the prevalence of cigarette smoking increased steadily during the 1990's to a high of 28.4% in 1996, ranking Ohio the third highest state in the nation. Prevalence remained between 25% and 28% from 1997 through 1999.

Figure 12

Trend in Prevalence of Current Cigarette Smoking, among Adults Age 18 Years and Older, Ohio, 1984-1999(1)



(1) Source: Ohio Behavioral Risk Factor Surveillance System, Community Health Assessments Section, BHSIOS-Prevention, Ohio Department of Health, 2001.

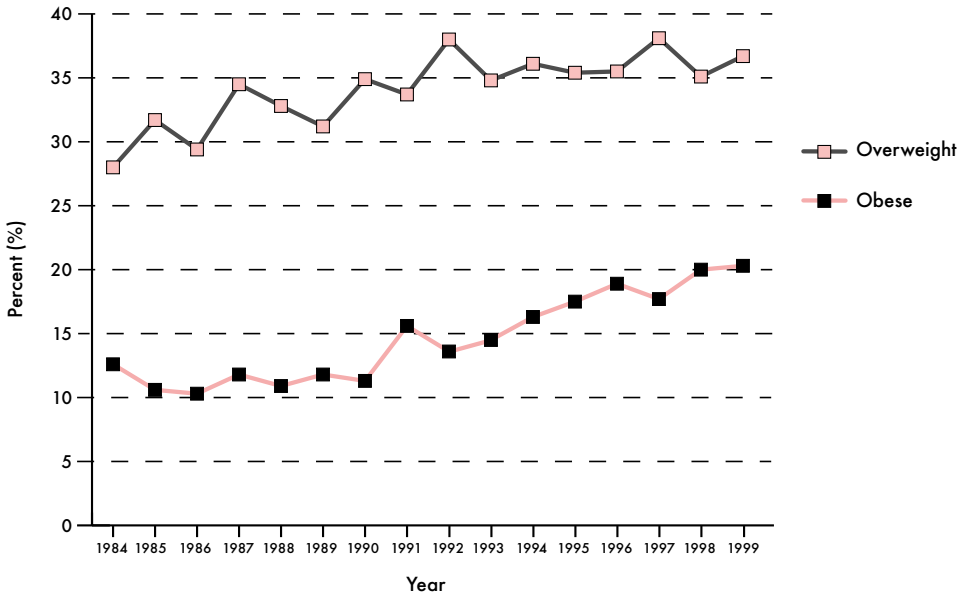
Results: Modifiable CVD Risk Factors *continued*

♥ Obesity (1984-1999)

The percentage of obese Ohio adults increased over the 16-year period from 1984 to 1999. In 1985, about 10% of Ohioans were obese. In 1999, over 20% of Ohioans were classified as obese (BMI greater than or equal to 30). The average prevalence of obesity increased about 1% per year for the years between 1988 through 1999. Figure 13 also shows the increasing trend in prevalence for persons who are overweight (BMI 25.0 to 29.9). Overweight persons are at greater risk to become obese. Prevalence of overweight persons ranged from 28% in 1984 to 37% for 1984 to 1999.

Figure 13

Trend in Prevalence of Obese and Overweight Adults, Age 18 Years and Older, Ohio, 1984-1999(1)



(1) Source: Ohio Behavioral Risk Factor Surveillance System, Community Health Assessments Section, BHSIOS-Prevention, Ohio Department of Health, 2001.

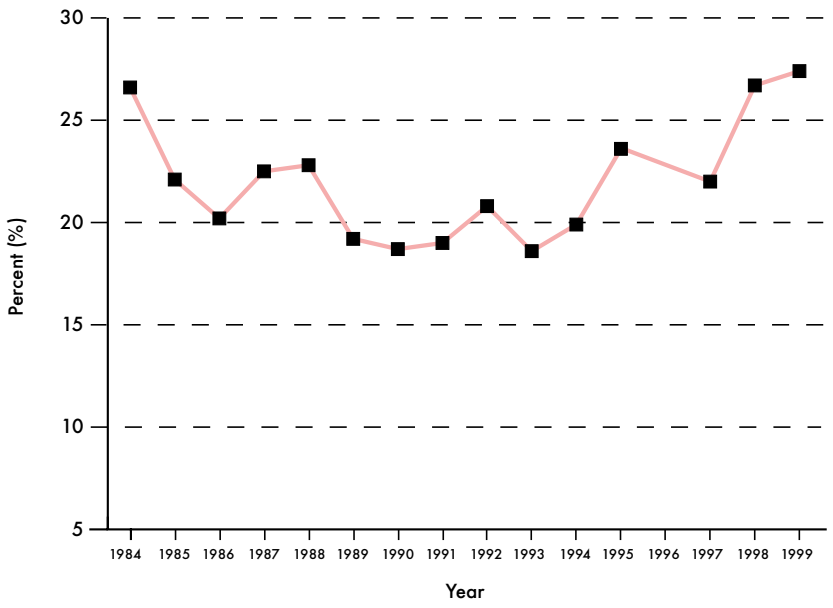
Results: Modifiable CVD Risk Factors *continued*

♥ High Blood Pressure (1984-1999)

The prevalence of persons with high blood pressure has gradually increased since 1993. In 1990, less than 20% of respondents reported having been told their blood pressure was high. In 1999 hypertension prevalence (27.4%) reached the highest point for the 10-year period from 1990-1999.

Figure 14

Trend in Prevalence of Adults with High Blood Pressure Age 18 Years and Older, Ohio, 1984-1999(1)(2)



(1) Source: Ohio Behavioral Risk Factor Surveillance System, Community Health Assessments Section, BHSIOS-Prevention, Ohio Department of Health, 2001.
(2) Blood Pressure questions were not asked in 1996.

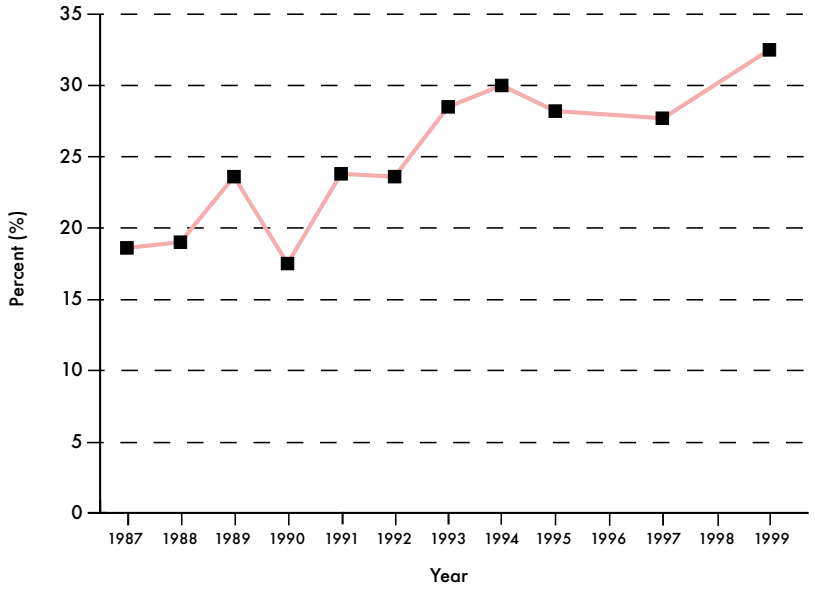
Results: Modifiable CVD Risk Factors *continued*

♥ Elevated Blood Cholesterol (1987-1999)

Since 1990, the prevalence of Ohio adults who had ever been told that their blood cholesterol was high increased - from 17% in 1990 to 32.5% in 1999.

Figure 15

Trend in Prevalence of Adults with Elevated Blood Cholesterol, Age 18 Years and Older, Ohio, 1987-1999(1)(2)



(1) Source: Ohio Behavioral Risk Factor Surveillance System, Community Health Assessments Section, BHSIOS-Prevention, Ohio Department of Health, 2001.
(2) Cholesterol questions were not asked in 1996 and 1998.

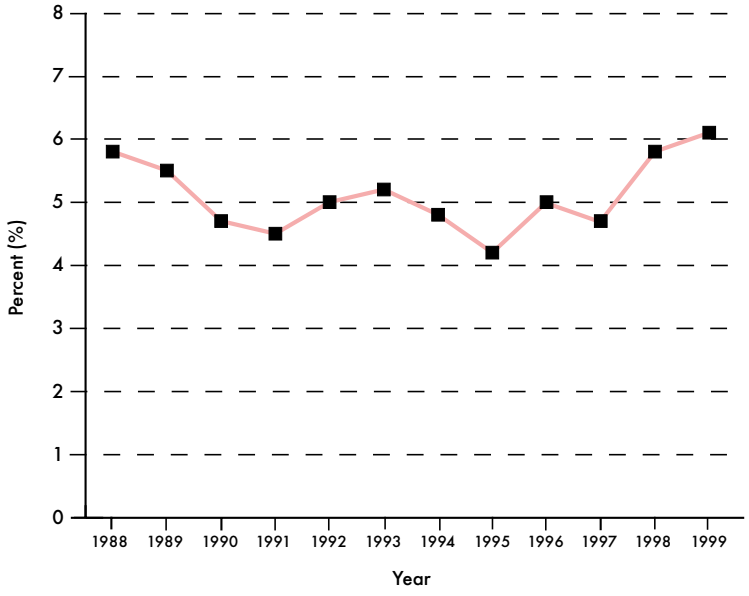
Results: Modifiable CVD Risk Factors *continued*

♥ Diabetes (1988-1999)

Between 1990 and 1994, diabetes prevalence remained stable (4.7% to 5.2%). However, the percent of persons with diagnosed diabetes has steadily increased since 1995. The highest rate in the past decade occurred in 1999 (6.1%).

Figure 16

Trend in Prevalence of Adults with Diabetes, Age 18 Years and Older, Ohio, 1988-1999(1)



(1) Source: Ohio Behavioral Risk Factor Surveillance System, Community Health Assessments Section, BHSIOS-Prevention, Ohio Department of Health, 2001.

Discussion and Conclusions

CVD Mortality

Overall, CVD death rates have declined in Ohio over the past nine years. The decrease in CVD death rates is generally attributed to improvements in medical care and, secondarily, to behavioral changes[5]. Although the Ohio CVD death rate continues to decline, the rates differ by race and sex: Men continue to have higher rates than women, and blacks have higher rates than whites. The racial disparity related to the risk for dying from CVD is striking. In 1998, the risk was 18% higher for black males than white males and 21% higher for black females than white females. Even though the total rate for CVD deaths declined 12.6% from 1990 through 1998, the rate of decline varied by race and gender. There was an 8.7% decrease in the death rate for black males and an 8.4% decrease for black females, compared to a 17.2% decrease for white males and a 10.2% decrease for white females during the same nine-year period.

The racial disparity related to CHD mortality is also significant. The risk was 10% higher for black males than white males, and 20% higher for black females than white females. When CHD death rates over time among different race and gender groups are compared, death rates for white males decreased by 23.7% compared to 17.4% for black males; and white females by 19% compared to 14.5% for black females.

Stroke death rates in 1998 for black males (89.9 per 100,000) and black females (83.8 per 100,000) were much higher than for white males and white females (66.4 and 63.1 per 100,000, respectively). Rates have not changed substantially over the past decade for the total population. The stroke death rates for white males and white females decreased slightly for 1990 to 1998, however, the death rates increased almost 8% among black males and increased 5% among black females for the same period.

The three maps illustrating the geographic distribution of mortality for CVD, CHD and stroke show different patterns for CVD/CHD compared to stroke. The highest CVD and CHD death rates are clustered in southern, eastern and southeastern Ohio counties (e.g., Fayette, Pike, Scioto, Jefferson, and Gallia), while the highest stroke death rates appear to be in western, central, and southern Ohio (e.g., Wyandot, Fayette, Logan and Madison).

The reasons for gender, racial, and geographic disparities in mortality are not well understood. Prevalence of risk factors in these populations, factors related to socio-economic status, access to health care services, or other variables need to be examined.

Based on the mortality trend analyses, it will be challenging for Ohio to reach the Healthy People (HP) 2010 goals for heart disease and stroke, especially among black males. Table 1 shows the 1998 mortality rates for CHD and stroke by race and gender, HP 2010 objectives, and percent reduction needed to achieve the objectives. By 2010, the CHD mortality rate

Discussion and Conclusions *continued*

Table 1

**Coronary Heart Diseases (CHD) and Stroke:
Age-Adjusted Mortality Rate (Per 100,000) Healthy People 2010 Goals, and Percent Reduction Needed to achieve Healthy People 2010 goals by Race and Gender, Ohio, 1998**[1][2][3]

Causes of Death	Race/Gender	1998 Mortality Rate	HP 2010 Goal	% Reduction Needed to Achieve HP 2010 Goals
CHD	Black Males	313.9	166	47.1%
	Black Females	213.9	166	22.4%
	White Males	278.7	166	40.4%
	White Females	171.5	166	3.2%
	Total*	220.1	166	24.6%
Stroke	Black Males	89.9	48	46.6%
	Black Females	83.8	48	42.7%
	White Males	66.4	48	27.7%
	White Females	63.1	48	23.9%
	Total*	66.7	48	28.0%

[1] Source: Community Health Assessments Section; BHSIOS- Prevention; Ohio Department of Health, 2001.
[2] The direct age-adjusted rates were calculated using the inter-censal population estimates for 1998 as a denominator and to U.S. 2000 standard population for age adjustment.
[3] Ohio residents where the underlying cause of death was determined to be coronary heart disease, (ICD) codes 402, 410-414, 429.2) and stroke (ICD) codes 430-438); International Classification of Diseases, Injuries, and Causes of Death, (World Health Organization, Geneva, Switzerland, 1979, Volume 9).
*Total includes other races.

needs to decrease at least 47.1% for black males and 40.4% for white males, 22.4% for black females and 3.2% for white females. Similarly, by 2010, the stroke death rate needs to decrease by 46.6% for black males and 42.7% for black females. For white males and white females, a reduction between 23.9% and 27.7% will be needed to achieve the HP 2010 stroke objective (48 per 100,000). Therefore, special programmatic efforts to eliminate the mortality disparities among race and gender groups will be crucial in Ohio.

Modifiable CVD Risk Factors

An individual can decrease their risk of having a heart attack or stroke by preventing and controlling modifiable risk factors. These modifiable risk factors could be responsible for almost 50% of all CVD deaths[6]. Risk factor modification provides important primary and secondary prevention opportunities to reduce CVD mortality in Ohio.

In Ohio, 95% of adults have at least one modifiable CVD risk factor and about 80% have two or more risk factors (Figure 9). The trend analysis for the seven CVD modifiable risk factors shows that levels of obesity, current cigarette smoking, high blood pressure, elevated blood cholesterol, and diabetes in Ohio are increasing. The possible impact of changes in physician practice related to high blood pressure detection, cholesterol testing, or communicating results to patients cannot be determined, but such changes could impact self-reported risk factors.

Discussion and Conclusions *continued*

Physical inactivity may contribute to 35% of all CVD deaths[6], about 24,000 deaths in Ohio. Physically active men and women are less likely than sedentary persons to become overweight or obese. Current recommendations encourage all adults to accumulate 30 minutes or more of moderate-intensity physical activity on most, or preferably all, days of the week. This report presents data from the Ohio BRFSS that the prevalence of sedentary lifestyle significantly decreased about 12% between 1996 and 1998 (Figure 11). The decrease could represent an increase in self-reported physical activity among Ohioans. However, the observation might be a result of random fluctuation in the samples of adult Ohioans surveyed. Continued observation of responses to this question in future BRFSS surveys is needed to accurately interpret the implications of this change.

Obesity is thought to be responsible for an average of 17% of all CVD deaths[6], about 7,400 deaths. Even though "overweight" is not defined as one of the modifiable CVD risk factors in this report, persons who are overweight are more likely to become obese if improvements in dietary behavior and physical activity do not occur. In addition, losing excess weight and increasing physical activity can improve blood cholesterol and blood pressure and can decrease the risk of developing diabetes.

In 1999, Ohio ranked third highest among the 50 states for current cigarette smoking with a prevalence of 27.6%. In Ohio there were nearly 22,000 smoking-attributable deaths in 1998, including over 8,300 cardiovascular disease deaths[7]. Reducing smoking rates is a critical public health priority and an important strategy to lower the risk of cardiovascular disease.

Conclusions

This report summarizes the most recent information available on cardiovascular disease mortality and the prevalence of modifiable CVD risk factors in Ohio, and provides a baseline overview of the health burden from cardiovascular disease in Ohio. Further analyses by race, gender, age, and geographic location, and an analysis of hospitalization and associated costs will be included in the State of Ohio Cardiovascular Health Plan. This Plan will provide information to articulate strategies for Ohio that are consistent with Healthy People 2010 objectives with regard to CVD, and define priorities and program directions for the state and local prevention efforts. In conclusion, the major findings of this report are:

- From 1990 to 1998, overall death rates from CVD and CHD have declined steadily. Overall stroke death rates remained stable from 1990 to1998.
- Overall CVD and CHD death rates differ by race and gender: men have higher rates than women, and blacks have higher rates than whites. In 1998, the risk of dying from CVD was 18% higher for black males than white males and 21% higher for black females than white females. The risk of dying from CHD was 10% higher for black males than white males, and 20% higher for black females than white females.

Discussion and Conclusions *continued*

- Stroke death rates differ by race, with blacks having a higher death rate than whites.
- Mortality rates show geographic disparities. Fayette County had the highest CVD and CHD death rates among 88 Ohio counties, while Holmes County had the lowest. The rates for stroke ranged from a high of 102.6 per 100,000 in Wyandot County to a low of 46.3 per 100,000 in Harrison County.
- Overall, 95% of adult Ohioans reported at least one modifiable risk factor for CVD, and almost 80% reported two or more modifiable CVD risk factors.
- The prevalence of the seven modifiable CVD risk factors are as follows: poor dietary habits (78.5%), sedentary lifestyle (59.2%), high cholesterol (32.5%), cigarette smoking (27.6%), high blood pressure (27.4%), obesity (20.3%), and diabetes (6.1%).
- The prevalence of obesity, cigarette smoking, high blood pressure, high cholesterol, and diabetes has increased in the past 10 years; sedentary lifestyle began to decrease after 1996, and fruit and vegetable intake remained stable.

Definitions and Technical Notes

- *Age-adjusted mortality rate:* A crude death rate is adjusted to account for different age distributions in populations, which allows comparisons. Age-adjusted mortality rates can be compared if adjusted to the same standard population (e.g., U.S. 2000 standard population).
- *Prevalence:* The percentage of a population that has a disease or a risk factor at a specific point in time.
- *Risk factor:* Factors whose presence is associated with an increased probability that disease will develop later.
- *ICD-9:* The International Classification of Disease, 9th Revision
- *Leading Causes of Death (Figure 1):* ICD-9 codes for the disease categories are: 1) CVD 390-448, 2) cancer 140-208, 3) stroke 430-438, 4) coronary heart disease 402, 410-414, 429.2, 5) unintentional injuries 800-949; 6) pneumonia and influenza 480-487, 7) diabetes 250, 8) suicide 950-959 and 9) all other disease codes not already categorized.
- *Note:* ICD-9 codes for total cardiovascular diseases in this CDC's publication (Preventing Cardiovascular Disease: Addressing the Nation's Leading Killer) are 390-459; coronary heart disease (ischemic heart disease) 410-414; and cerebrovascular disease (stroke) 430-438.

Definitions and Technical Notes *continued*

- The number of smoking-attributable deaths was estimated using the Smoking-Attributable Fraction (SAF) in the Smoking-Attributable Mortality, Morbidity, and Economic Costs (SAMMEC), developed by the Centers for Disease Control and Prevention.

References

1. The Centers for Disease Control and Prevention (CDC), 1999. Preventing Cardiovascular Disease: Addressing the Nation's Leading Killer.

2. Anderson, RN. United States Life Tables, 1997. National Vital Statistics Reports, Vol. 47, No. 28. The Centers for Disease Control and Prevention (CDC), National Center for Health Statistics, National Vital Statistics System.

3. The Centers for Disease Control and Prevention (CDC), 1999. Chronic Diseases and Their Risk Factors: The Nation's Leading Causes of Death.

4. National Center for Health Statistics (NCHS), 2000. Healthy People 2010: Objectives for Improving Health. Vol. 1.

5. Centers for Disease Control and Prevention: Decline in Deaths from Heart Disease and Stroke - United States, 1900-1999. Morbidity and Mortality Weekly Report 1999; 48(30):649-656.

6. Newschaffer CJ, Brownson, CA, and Dusenbury LJ (1998). Cardiovascular Disease. In Brownson, RC, Remington, PL, and Davis, RJ. Chronic Disease Epidemiology and Control. American Public Health Association. Washington D.C., 297-334.

7. Smoking-Attributable Mortality, Morbidity, and Economic Costs (SAMMEC), Centers for Disease Control and Prevention.

Appendix 1

Number of Deaths and Direct Average Annual Age-Adjusted Mortality Rate, Per 100,000 Persons, Total Cardiovascular Disease, by County, Ohio, 1994–1998[1][2][3]

County	Deaths	Rate (2000 Standard)	County	Deaths	Rate (2000 Standard)
State of Ohio	**222,460**	**398.9**			
Adams	576	408.8	Licking	2,631	423.5
Allen	2,298	400.5	Logan	969	413.0
Ashland	1,074	394.0	Lorain	4,937	400.1
Ashtabula	2,228	396.1	Lucas	10,153	448.0
Athens	1,024	451.8	Madison	674	428.8
Auglaize	1,028	389.5	Mahoning	7,045	437.8
Belmont	2,084	437.4	Marion	1,201	370.4
Brown	729	379.1	Medina	1,984	359.3
Butler	4,717	358.4	Meigs	578	436.5
Carroll	490	335.4	Mercer	860	400.1
Champaign	748	407.4	Miami	1,965	415.2
Clark	3,219	405.3	Monroe	382	390.1
Clermont	2,282	397.2	Montgomery	10,942	388.7
Clinton	693	363.1	Morgan	371	437.6
Columbiana	2,551	421.1	Morrow	480	377.3
Coshocton	854	421.0	Muskingum	1,823	401.1
Crawford	1,124	414.9	Noble	269	389.5
Cuyahoga	33,654	420.2	Ottawa	970	411.6
Darke	1,277	394.3	Paulding	325	345.6
Defiance	687	360.2	Perry	710	433.8
Delaware	1,013	327.7	Pickaway	883	420.6
Erie	1,603	379.8	Pike	702	501.0
Fairfield	1,836	353.8	Portage	2,091	361.4
Fayette	808	508.7	Preble	777	389.7
Franklin	15,335	392.3	Putnam	582	330.5
Fulton	818	393.8	Richland	2,793	431.5
Gallia	745	458.8	Ross	1,381	401.6
Geauga	1,277	323.4	Sandusky	1,293	386.5
Greene	2,361	411.2	Scioto	2,186	465.5
Guernsey	960	428.2	Seneca	1,263	385.4
Hamilton	17,006	374.0	Shelby	826	376.7
Hancock	1,358	394.3	Stark	7,945	381.6
Hardin	668	391.6	Summit	10,463	374.9
Harrison	476	453.5	Trumbull	5,142	421.9
Henry	536	321.7	Tuscarawas	2,175	426.7
Highland	830	379.7	Union	528	352.2
Hocking	501	350.2	Van Wert	651	363.8
Holmes	501	316.3	Vinton	273	461.3
Huron	1,124	407.8	Warren	1,808	354.0
Jackson	759	453.1	Washington	1,380	392.5
Jefferson	2,245	463.0	Wayne	1,940	376.3
Knox	1,227	443.5	Williams	709	336.0
Lake	4,098	387.8	Wood	1,941	392.6
Lawrence	1,440	448.3	Wyandot	579	418.9

[1] Source: Community Health Assessments Section; BHSIOS- Prevention; Ohio Department of Health, 2001.

[2] The direct age-adjusted rates were calculated using the inter-censal population estimates for 1994–1998 as a denominator and to U.S. 2000 standard population for age adjustment.

[3] Ohio residents where the underlying cause of death was determined to be cardiovascular disease; International Classification of Diseases, Injuries, and Causes of Deaths, [ICD] code 398-448 (World Health Organization, Geneva, Switzerland, 1979, Volume 9).

Appendix 2

Number of Deaths and Direct Average Annual Age-Adjusted Mortality Rate, Per 100,000 Persons, Coronary Heart Disease, by County, Ohio, 1994–1998[1][2][3]

County	Deaths	Rate (2000 Standard)
State of Ohio	**133,465**	**238.8**
Adams	350	248.0
Allen	1,406	244.9
Ashland	606	222.6
Ashtabula	1,425	252.6
Athens	616	271.3
Auglaize	591	224.0
Belmont	1,374	287.4
Brown	405	210.6
Butler	2,717	204.7
Carroll	275	187.1
Champaign	436	237.2
Clark	1,755	220.7
Clermont	1,275	219.0
Clinton	390	204.3
Columbiana	1,623	266.3
Coshocton	437	214.1
Crawford	652	241.0
Cuyahoga	21,138	263.1
Darke	744	231.4
Defiance	345	181.6
Delaware	580	186.1
Erie	963	225.7
Fairfield	1,023	195.9
Fayette	525	329.4
Franklin	8,829	225.2
Fulton	445	214.5
Gallia	491	302.1
Geauga	756	189.0
Greene	1,427	247.1
Guernsey	600	268.3
Hamilton	9,806	216.4
Hancock	874	253.6
Hardin	379	225.4
Harrison	313	295.8
Henry	313	190.0
Highland	488	223.9
Hocking	266	185.5
Holmes	255	161.9
Huron	768	279.0
Jackson	522	311.0
Jefferson	1,483	305.7
Knox	726	262.4
Lake	2,652	250.5
Lawrence	868	268.1

County	Deaths	Rate (2000 Standard)
Licking	1,544	247.4
Logan	553	234.8
Lorain	3,049	246.1
Lucas	6,758	298.0
Madison	347	215.3
Mahoning	4,132	254.8
Marion	726	223.6
Medina	1,136	203.5
Meigs	355	267.9
Mercer	527	246.0
Miami	1,097	231.0
Monroe	229	236.5
Montgomery	6,487	229.6
Morgan	227	268.3
Morrow	302	237.3
Muskingum	1,018	224.0
Noble	173	252.7
Ottawa	632	266.7
Paulding	169	176.5
Perry	416	254.2
Pickaway	469	220.0
Pike	458	327.2
Portage	1,147	195.8
Preble	514	257.0
Putnam	355	201.9
Richland	1,702	263.3
Ross	869	251.7
Sandusky	761	227.7
Scioto	1,406	298.7
Seneca	860	262.0
Shelby	494	225.3
Stark	4,524	216.4
Summit	5,714	204.0
Trumbull	3,193	260.0
Tuscarawas	1,251	245.0
Union	322	214.7
Van Wert	356	200.2
Vinton	193	324.6
Warren	1,018	196.4
Washington	837	238.4
Wayne	1,187	230.4
Williams	444	213.1
Wood	1,267	256.4
Wyandot	324	240.2

[1] Source: Community Health Assessments Section; BHSIOS- Prevention; Ohio Department of Health, 2001.

[2] The direct age-adjusted rates were calculated using the inter-censal population estimates for 1994-1998 as a denominator and to U.S. 2000 standard population for age adjustment.

[3] Ohio residents where the underlying cause of death was determined to be diseases of heart; International Classification of Diseases, Injuries, and Causes of Deaths, [ICD] code 402, 410-414, 429.2 (World Health Organization, Geneva, Switzerland, 1979, Volume 9).

Appendix 3

Number of Deaths and Direct Average Annual Age-Adjusted Mortality Rate, Per 100,000 Persons, Cerebrovascular Disease (Stroke), by County, Ohio, 1994–1998[1][2][3]

County	Deaths	Rate (2000 Standard)	County	Deaths	Rate (2000 Standard)
State of Ohio	**37,142**	**66.9**			
Adams	108	76.7	Licking	446	72.5
Allen	408	71.3	Logan	198	85.0
Ashland	184	67.1	Lorain	820	67.0
Ashtabula	348	62.1	Lucas	1,559	68.8
Athens	180	79.8	Madison	128	85.7
Auglaize	197	73.6	Mahoning	1,171	73.5
Belmont	285	58.9	Marion	192	59.3
Brown	134	69.5	Medina	352	64.8
Butler	818	63.4	Meigs	104	78.6
Carroll	102	71.0	Mercer	170	78.4
Champaign	137	74.8	Miami	311	66.1
Clark	582	73.3	Monroe	55	56.2
Clermont	382	69.2	Montgomery	1,891	67.7
Clinton	133	69.9	Morgan	73	84.8
Columbiana	330	54.6	Morrow	76	60.5
Coshocton	163	80.4	Muskingum	340	74.6
Crawford	212	77.9	Noble	56	80.2
Cuyahoga	5,075	63.6	Ottawa	160	68.2
Darke	253	76.9	Paulding	69	75.7
Defiance	156	81.2	Perry	123	75.2
Delaware	176	58.2	Pickaway	166	82.3
Erie	241	57.9	Pike	89	63.4
Fairfield	346	67.9	Portage	351	62.8
Fayette	148	93.5	Preble	94	47.4
Franklin	2,731	70.8	Putnam	112	63.1
Fulton	178	84.9	Richland	419	64.9
Gallia	106	64.8	Ross	214	62.8
Geauga	213	55.6	Sandusky	249	74.3
Greene	419	75.8	Scioto	325	69.1
Guernsey	155	68.6	Seneca	173	52.5
Hamilton	3,095	67.5	Shelby	135	61.8
Hancock	246	71.6	STARK	1,448	69.9
Hardin	111	63.6	Stark	1,781	64.2
Harrison	49	46.3	Trumbull	713	58.9
Henry	109	64.1	Tuscarawas	338	66.0
Highland	162	73.4	Union	92	61.9
Hocking	105	73.5	Van Wert	137	75.2
Holmes	80	50.6	Vinton	30	50.5
Huron	165	59.8	Warren	365	74.2
Jackson	125	74.9	Washington	208	59.0
Jefferson	289	60.0	Wayne	390	75.6
Knox	211	76.5	Williams	109	49.9
Lake	599	57.3	Wood	290	58.9
Lawrence	224	70.9	Wyandot	147	102.6

[1] Source: Community Health Assessments Section; BHSIOS- Prevention; Ohio Department of Health, 2001.

[2] The direct age-adjusted rates were calculated using the inter-censal population estimates for 1994–1998 as a denominator and to U.S. 2000 standard population for age adjustment.

[3] Ohio residents where the underlying cause of death was determined to be cardiovascular disease; International Classification of Diseases, Injuries, and Causes of Deaths, [ICD] code 398-448 (World Health Organization, Geneva, Switzerland, 1979, Volume 9).

Cardiovascular Disease *in* Ohio 2001

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