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Introduction

Cardiovascular disease (CVD) is the leading cause of death in Oregon, accounting for 34.8% of all deaths in 2002 (Figure 1). The most common causes of CVD mortality are heart attack and stroke. CVD is also a major cause of hospitalization and disability. During 2003, there were 49,166 CVD-related hospitalizations in Oregon, resulting in hospital charges of $970 million.

Death rates for heart disease have been declining in the past decade. Death rates for stroke, however, have increased. These trends may reflect changes in the prevalence of risk factors contributing to CVD. The decline in heart disease mortality is also, in part, due to advances in medical management of myocardial infarction and other acute heart disease-related events.

Death and disability from CVD are related to a number of modifiable risk factors, including high blood cholesterol, high blood pressure, smoking, lack of regular physical activity, diabetes, and being overweight or obese. Oregonians could reduce much of the burden of death and disability from CVD by adopting healthier lifestyles.

This report describes the burden of CVD, heart disease, and stroke in Oregon. Its purpose is to present a brief overview of CVD, heart disease, and stroke death rates in the past decade; to describe the prevalence of CVD, heart disease, stroke and the risk factors for them among Oregonians; and to report the number and cost of CVD, heart disease, and stroke hospitalizations.
Mortality

Oregon vs. United States

While CVD death rates have been continuously declining over the past decade, both in Oregon and the United States, (Figure 2), stroke death rates in Oregon climbed steadily throughout the 1990s. Despite decreases in 2000 and 2001, they remain 20% above the national average (Figure 3). The observed decrease in CVD death rates has been driven primarily by a decline in heart disease death rates (4).

Mortality rates in this report are age-adjusted and are based on the U.S. Census 2000 standard population. Rates are per 100,000 population.

Figure 2

Cardiovascular Disease Death Rates in Oregon and the United States, 1990-2001

Source: CDC Wonder

Figure 3

Stroke Death Rates in Oregon and the United States, 1990-2001

Source: CDC Wonder
Racial Disparities

In Oregon, there is a remarkable racial disparity in the risk of dying from CVD. Death rates from CVD among African Americans are two times higher than among Asian/Pacific Islanders and Hispanics/Latinos and more than 25% higher than among Whites and American Indians/Alaska Natives (Figure 5). Similar disparities exist for heart disease and stroke deaths (Figure 6 and Figure 7). In contrast to the higher death rates experienced by African Americans, both Asians/Pacific Islanders and Hispanics/Latinos have heart disease death rates nearly 50% lower than the general population. Asians/Pacific Islanders and Hispanics/Latinos also have lower death rates from stroke, though the difference is not as pronounced as that seen with heart disease.
Figure 6

Heart Disease Deaths in Oregon, by Race, 1998-2002

Source: 1998-2002 Oregon Death Certificates

Figure 7

Stroke Deaths in Oregon, by Race, 1998-2002

Source: 1998-2002 Oregon Death Certificates

Premature Death

The percentage of deaths occurring before 65 years of age is one measure of premature death. Men had higher rates of premature death for CVD, heart disease, and stroke than did women (Figure 8). Overall, 13% of CVD-related deaths, 15% of heart disease deaths, and 9% of stroke deaths among Oregonians occurred in persons under age 65.
Prevalence of Cardiovascular Disease – Heart Disease and Stroke

The State of Oregon tracks the prevalence of heart disease and stroke, that is, the fraction of people living with these conditions, through the Behavioral Risk Factor Surveillance System Survey (BRFSS). This is a random telephone survey conducted throughout the year among adult Oregonians. (For a more complete description of this survey, see: http://www.dhs.state.or.us/publichealth/chs/brfssum.cfm).

Oregonians participating in the 2003 BRFSS were asked whether a health professional had ever told them that they had angina or coronary heart disease, that they had experienced a heart attack/myocardial infarction, or that they’d had a stroke. Among adults age 45 and older, 8% reported having been told by a health care provider that they had angina or coronary heart disease, while 7% had been told that they had experienced a heart attack or myocardial infarction (Figure 9). 4% of adults had been told they had experienced a stroke.

Figure 9

Source: Oregon Behavioral Risk Factor Surveillance System
Note: Includes only adults age 45 and older
Cardiovascular Disease Hospitalizations

In addition to the 10,811 deaths caused annually by CVD, thousands of Oregonians are hospitalized each year from CVD events such as heart attacks or strokes. Of the 306,230 hospitalizations reported to the State Hospital Discharge Index in 2003, 49,166 had a CVD event as the principal diagnosis (14%). The total number of CVD-related hospitalizations is actually higher than this because the Veterans’ Administration hospital system does not participate in the Hospital Discharge Index. The number of CVD-related hospitalizations would likely increase substantially if data from these hospitals were included. Heart attacks accounted for 71% of the CVD hospitalizations, while strokes were responsible for 17% of them.

Costs of Cardiovascular Disease

The financial burden of cardiovascular disease incurred by Oregonians is enormous. In 2003, Oregonians spent $970 million on hospital costs alone for CVD-related illnesses. Of this total, $711 million was spent on heart disease and $133 million on stroke. The average costs for heart disease and stroke hospitalizations were $21,058 and $16,578, respectively. As shown in Figure 10, the costs of CVD hospitalizations greatly exceeded the costs of other chronic disease-related causes of hospitalization such as cancer and chronic obstructive pulmonary disease (COPD).

Figure 10

![Hospitalization Costs by Principal Diagnosis, 2003](image)

Source: Oregon Hospital Discharge Index

Hospitalization costs, however, reflect only a portion of the full financial burden of cardiovascular disease. Costs related to outpatient care, prescription medications, rehabilitation, long-term care, and loss of productivity are not included in the above totals and would drive estimates of the economic burden from CVD much higher.
Risk Factors for Cardiovascular Disease

Some CVD risk factors are “modifiable”, meaning that individuals who control these factors can slow, or even reverse, the process of arterial blockage and decrease their risk of having a heart attack or stroke. Modifiable risk factors include smoking, high blood pressure, high blood cholesterol levels, poorly controlled diabetes, being overweight or obese, and lack of regular physical activity. Addressing these risk factors is a crucial strategy in reducing the prevalence of CVD and its resultant morbidity.

Some CVD risk factors cannot be changed, such as age, and family history of heart attack or stroke. Individuals with non-modifiable risk factors should be particularly diligent in avoiding or controlling the modifiable risk factors.

Smoking

The prevalence of smoking among adult Oregonians has declined from 23% in 1993 to 21% in 2003 (Figure 11). The association between smoking and heart disease is less recognized than is the association between smoking and cancer. Yet, smoking causes more deaths from heart disease than from cancer. The risk of heart disease for smokers is reversible. A person’s risk of death from heart disease decreases 40% within 1 year of quitting smoking. The majority of smokers (64%) reported that they were seriously considering quitting within the next 6 months. Of these, 43% planned to quit in the next 30 days (Figure 12).

Figure 11

Note: The questions on the BRFSS used to measure smoking prevalence changed in 1996. In this figure, the smoking prevalence for 1993 through 1995 have been increased by 1 percentage point to account for the difference in the way the smoking prevalence is measured, as recommended by the Centers for Disease Control and Prevention.
Oregonians who have been diagnosed with angina or coronary heart disease (CHD), heart attack/myocardial infarction (MI), or stroke report smoking rates similar to those among Oregonians without a history of CVD (Figure 13). Current smokers with a history of CVD report that they are considering quitting smoking at rates similar to those among Oregonians without a history of CVD (Figure 14).
High Blood Pressure

High blood pressure, or hypertension, is a major risk factor for both heart disease and stroke. Overall, 24% of adult Oregonians reported having been told by a doctor that they had high blood pressure. The prevalence of high blood pressure increases with age, exceeding 50% among adults age 65 and older (Figure 15). Many people with high blood pressure can control it by losing weight, engaging in regular physical activity, and through medication.
The percentage of adults with clinically diagnosed high blood pressure who are taking medication to control it increases with age (Figure 16). However, rates of medication use for those with high blood pressure under age 45 are less than 40%. Further, Oregonians with high blood pressure seldom engage in certain other behaviors that are beneficial in controlling the condition. While adults with a history of high blood pressure are slightly more likely to report trying to lose weight than adults with no history of high blood pressure, fewer than half report making the attempt. The proportion of adults with high blood pressure who meet the Center for Disease Control and Prevention’s recommendations for physical activity is actually lower among those with high blood pressure than it is among those without it (Figure 17).
Adults with clinically diagnosed CVD are three times as likely as those without CVD to have been diagnosed with high blood pressure as well (Figure 18).

**Figure 18**

![Percentage of Adult Oregonians Reporting High Blood Pressure, by Presence or Absence of History of Cardiovascular Disease, 2003](image)

Source: Oregon Behavioral Risk Factor Surveillance System

**High Blood Cholesterol**

Another risk factor for both heart disease and stroke is high blood cholesterol. As with high blood pressure, the proportion of adults who report a history of high blood cholesterol increases with age (Figure 19). Adults age 55 and older are nearly two times more likely to report a history of high blood cholesterol than adults age 35-44 and nearly a third more likely than adults age 45-54.

**Figure 19**

![Percentage of Adult Oregonians with Clinically Diagnosed High Blood Cholesterol, by Age, 2003](image)

Source: Oregon Behavioral Risk Factor Surveillance System
Identifying and controlling high blood cholesterol is an important strategy in the prevention of CVD. The U.S. Preventive Services Task Force strongly recommends routine screening for high cholesterol among men 35 years of age or older and women 45 years of age or older. This practice is not universal; while 90% of adults over the age of 55 have had their blood cholesterol checked within the past 5 years, nearly 20% of men age 35-54 have never had their cholesterol checked. In contrast, only 11% of women who age 45-54 have never had their cholesterol checked. (Source: 2003 BRFSS)

Oregonians who have been diagnosed with high blood cholesterol are trying to lose weight at a slightly higher rate than those who do not have this diagnosis (Figure 20). 48% of Oregonians with high blood cholesterol are trying to lose weight. Of these, 81% are eating fewer calories and/or fat as part of their weight loss program. Reduction of saturated fat in the diet is an important factor in reducing blood cholesterol levels.

**Figure 20**

![Weight Loss Attempts by Presence or Absence of Clinically Diagnosed High Blood Cholesterol, 2003](source)

Source: Oregon Behavioral Risk Factor Surveillance System

**Diabetes**

Diabetes is another risk factor for CVD. Overall, 6% of adult Oregonians report they have clinically diagnosed diabetes. Adults who have been clinically diagnosed with CVD are more than four times as likely as those without it to report having diabetes as well (Figure 21).

**Figure 21**

![Percentage of Adults with Clinically Diagnosed Diabetes, by Presence or Absence of History of Cardiovascular Disease, 2003](source)

Source: Oregon Behavioral Risk Factor Surveillance System
Physical Activity & Overweight/Obesity

Lack of physical activity is a risk factor for CVD. Having a high proportion of weight for one’s height also puts a person at higher risk. This latter risk is determined by calculating a person’s body mass index (BMI), which is obtained by dividing the person’s weight in kilograms by the square of their height in meters (kg/m²). The percentage of adult Oregonians who are overweight (BMI of 25 to 29.9) or obese (BMI of 30 or greater) has been steadily increasing over the past 10 years (Figure 22). The proportion of obese or overweight adults in Oregon was just under 50% in 1994 and climbed to 58% by 2003, an increase of 16%. The rise in the proportion of adults who are considered obese has been particularly rapid and increased 50% between 1994 and 2003.

Figure 22

![Overweight & Obesity in Adult Oregonians, 2003](image)

Source: Oregon Behavioral Risk Factor Surveillance System

In addition to the increasing problem of overweight/obesity, many Oregonians are not physically active on a regular basis. Overall, half of Oregon adults do not meet the Center for Disease Control and Prevention’s physical activity recommendation. (See Figure 23 for the distribution by age group.)

Figure 23

![Adult Oregonians Not Meeting CDC's Physical Activity Recommendation, by Age, 2003](image)

Source: Oregon Behavioral Risk Factor Surveillance System
For people who have cardiovascular disease, physical activity can be an important strategy in preventing further CVD events. However, Oregonians who have been diagnosed with CVD are somewhat less likely than those without it to meet the physical activity recommendations set forth by the CDC (Figure 24).

**Figure 24**

| Percentage of Adults Meeting CDC's Physical Activity Recommendations, by Presence or Absence of Clinically Diagnosed Cardiovascular Disease, 2003 |
|---|---|---|---|---|
| Angina/Coronary Heart Disease | Heart Attack | Stroke |
| % of Adult Oregonians History | No History |
| 0% | 10% | 20% | 30% | 40% | 50% | 60% |

Source: Oregon Behavioral Risk Factor Surveillance System

### CVD Prevalence and Risk Factors for Populations with Disparities

#### Racial and Ethnic Groups

The following data were obtained by combining BRFSS data from 2000-2001. Information about risk factors for CVD by race and ethnicity has been reported previously and is available in the publication, *Keeping Oregonians Healthy* (KOH). The website for the KOH report is [http://oregon.gov/DHS/ph/hpcdp/docs/healthor.pdf](http://oregon.gov/DHS/ph/hpcdp/docs/healthor.pdf).

While additional surveys were done to increase the number of survey responses from African Americans, Asians/Pacific Islanders, Hispanics/Latinos, and American Indians/Alaska Natives, total numbers of respondents from each of these groups remained small, and the following results should be interpreted with caution.
Angina/Coronary Heart Disease

Both African Americans and Hispanics reported having been diagnosed with angina or coronary heart disease at lower rates than American Indians/Alaska Natives, Asians/Pacific Islanders, and Oregonians in general (Figure 25).

Figure 25

Heart Attack

American Indians/Alaska Natives report heart attack diagnosed by a health professional at a rate 50% higher than that for Oregonians in general. However, African Americans, Asians/Pacific Islanders, and Hispanics report having had a heart attack in their lifetime at substantially lower rates (Figure 26). For Asians/Pacific Islanders and Hispanics, this is consistent with the lower death rates from heart attacks experienced by these groups. African Americans, however, have higher death rates from heart attack than any other group, in contrast with their lower rates of reported heart attack prevalence.

Figure 26
Stroke

African Americans report having had a stroke in their lifetime at rates higher than those for Oregonians in general (Figure 27), while Asians/Pacific Islanders and Hispanics report lower rates of stroke.

**Figure 27**

Percentage of Adult Oregonians Diagnosed with Stroke, by Race/Ethnicity, 2000-2001

Source: 2000-2001 BRFSS Race/Ethnicity Augment
Low Socio-Economic Status

Health disparities often exist between persons of limited means and those who have access to more resources. For this report, we define a person of low socio-economic status (SES) as someone who is not a college graduate, and who in addition, meets one of the following criteria: someone who lives in a household with an annual income of less than $25,000, or someone with a household income of less than $50,000 who: is not a high school graduate, is eligible for Medicaid, or does not have medical insurance coverage. The population of Oregon adults between the ages of 25 – 64 is used for comparison because adults 65 years and older have Medicare coverage.

Figure 28 shows that those with low SES reported a higher prevalence of cardiovascular disease than did those who were not in the low SES group. Coronary artery disease and heart attack prevalence was 50% higher among low SES Oregonians, while reported stroke prevalence was twice the rate among more affluent Oregonians.

Figure 28

Prevalence of Cardiovascular Disease among Low SES and other Oregonians between 25 and 64 Years of Age, 2003

Source: Oregon Behavioral Risk Factor Surveillance System
Figure 29 shows modifiable risk factors for cardiovascular disease by SES. Among the most notable disparities involve smoking prevalence and the percentage of people meeting physical activity recommendations.

**Figure 29**

Modifiable Risk Factors among Low SES and other Oregonians between 25 and 64 years old, 2003

![Graph showing modifiable risk factors](image)

Source: Oregon Behavioral Risk Factor Surveillance System

**Seniors**

Figure 30 shows the prevalence of cardiovascular disease among Oregonians over the age of 50 compared to those less than 50 years old. As expected, people over the age of 75 reported higher prevalence of coronary heart disease, heart attack, and stroke.

**Figure 30**

Percentage of Cardiovascular Disease among Oregon's Senior Population, 2003

![Graph showing cardiovascular disease](image)

Source: Oregon Behavioral Risk Factor Surveillance System
Figure 31 shows modifiable risk factors among Oregon’s senior population. While smoking and obesity decrease with age, so does physical activity. High blood pressure increases with age among Oregon seniors. Prevalence of high blood cholesterol and overweight increase up to age 74 and then decrease afterward.

**Figure 31**

<table>
<thead>
<tr>
<th>Prevalence of Cardiovascular Disease Risk Factors, by Age Group, 2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-49 years old</td>
</tr>
<tr>
<td>Current smoker</td>
</tr>
<tr>
<td>High blood pressure</td>
</tr>
<tr>
<td>High blood cholesterol</td>
</tr>
<tr>
<td>Meets physical activity guidelines</td>
</tr>
<tr>
<td>Overweight</td>
</tr>
<tr>
<td>Obese</td>
</tr>
</tbody>
</table>

Source: Oregon Behavioral Risk Factor Surveillance System

**Rural Oregonians**

Figure 32 shows that Oregonians living in “frontier” counties (population density <6 persons/square mile) have higher prevalence of coronary heart disease and heart attack. There was no difference in prevalence for stroke.

**Figure 32**

Source: Oregon Behavioral Risk Factor Surveillance System
Figure 33 shows modifiable risk factors for CVD by population density of county of residence. Oregonians living in “frontier” counties have the lowest prevalence of smoking and obesity, but the highest prevalence for high blood pressure, high blood cholesterol, and overweight. In addition, those living in “frontier” areas have the lowest reported levels of leisure time physical activity.

**Figure 33**

Modifiable Risk Factors for Cardiovascular Disease, by Population Density of County of Residence, 2003

<table>
<thead>
<tr>
<th></th>
<th>Metro</th>
<th>Non-metro</th>
<th>Frontier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current smoker</td>
<td>20%</td>
<td>22%</td>
<td>19%</td>
</tr>
<tr>
<td>High blood pressure</td>
<td>23%</td>
<td>25%</td>
<td>33%</td>
</tr>
<tr>
<td>High blood cholesterol</td>
<td>33%</td>
<td>34%</td>
<td>47%</td>
</tr>
<tr>
<td>Meets physical activity guidelines</td>
<td>51%</td>
<td>50%</td>
<td>42%</td>
</tr>
<tr>
<td>Overweight</td>
<td>35%</td>
<td>38%</td>
<td>47%</td>
</tr>
<tr>
<td>Obese</td>
<td>21%</td>
<td>22%</td>
<td>20%</td>
</tr>
</tbody>
</table>

Source: Oregon Behavioral Risk Factor Surveillance System

**Conclusion**

This report summarizes the most recent information available describing the prevalence, mortality and economic costs of cardiovascular disease in Oregon. As it has for more than a decade, the stroke mortality rate in Oregon remains above the national average, while heart disease mortality has continued to decline. The explanation for Oregon’s elevated stroke mortality is not clear. Declining death rates from heart disease are due in part to improved acute medical management of this condition.

Large disparities exist between racial and ethnic groups regarding frequency of cardiovascular disease risk factors. Similar disparities exists based on age, socio-economic status, and region of residence.

Measures that can reduce CVD risk include eating a healthy diet, engaging in regular physical activity, controlling high blood pressure if present, reducing blood cholesterol if it is elevated, managing diabetes among those with this condition, and not smoking. Addressing these risk factors among all Oregonians who have them could greatly reduce the burden of heart disease and stroke in Oregon.