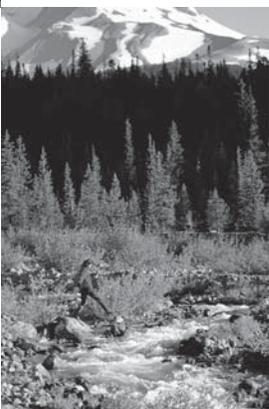


The Environmental Health of Multnomah County 2003



Multnomah County Health Department

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June, 2003

Dear Multnomah County Residents,

Our health is tied to our environment's health. Public health professionals have long understood this connection and have studied the relationships between human health and the quality of the air we breathe, the water we drink, the food we eat, the places we work, the houses we live in, the items we purchase, and many other aspects of our physical world.

Over the past century, an increasing number of people have become interested in and advocates for the health of our environment. The early 1900's brought public health movements resulting in laws protecting people from hazardous products and unsafe working conditions. The 1960's saw consumer-driven movements resulting in the protection of air and water quality. And today, as our Country continues to benefit from these and many other accomplishments, we face new occurrences of old challenges along with new threats to the environment's health.

An example of these challenges occurred in 1993, when more than 400,000 residents of Milwaukee, Wisconsin became ill from a pathogen in their drinking water supply. Tragedies like this underscore the need for continual monitoring of the environment as a part of preventing disease and protecting the public's health.

I am pleased to announce the *Environmental Health of Multnomah County*, a report developed to help us monitor the health of our local environment by identifying and discussing environmental factors that can affect human health. This report is a wealth of information that provides:

- An in-depth local assessment of many of the most important environmental health issues;
- Identification of local, state and federal agencies responsible for monitoring and protecting the environment; and
- Comparisons of our community's health to that of the State, the Nation, other counties', and important national health targets.

I would like to acknowledge the Health Department researchers and numerous individuals from local community groups, neighborhood associations, universities and governmental agencies who contributed to this effort. Working together, we continue our history of improving the health of our environment and move closer to our vision of healthy people in healthy communities.

Sincerely,



Lillian Shirley, RN, MPH, MPA
Director Multnomah County
Health Department



Diane M. Linn, Chair
Multnomah County
Board of Commissioners

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Executive Summary

The Environmental Health of Multnomah County presents information on the state of Multnomah County's natural and built environment as it relates to public health. It was prepared by the Multnomah County Health Department to address a core public health function, that of assessing and monitoring the health of the community. We have examined the quality of our County's air and water, its waste system, occupational health, food-borne illnesses, unintentional injuries, and other environmental factors. When possible, we have linked these to available public health data. We have also presented trends so that improvements and problems in the environment over time can be highlighted. We anticipate that this report will address a need among community residents and decision-makers for information on this important topic, and hope that it supports the efforts of interested groups to address public health issues stemming from the environment.

This report relies almost exclusively on secondary data, i.e. data collected by other organizations. The availability and quality of the data vary. The data are as current as possible, but many variations exist on the most current year available for both environmental and health measures.

Key Findings

+Strengths - Challenges ± Neutral

Drinking Water

- + Multnomah County has been in compliance with all federal and state drinking water quality standards since 1993. The County meets the Healthy People 2010 drinking water objective calling for 95% of residents to receive water from water systems meeting federal safety standards.
- + Waterborne disease outbreaks were rare in Multnomah County between 1991 and 2000, and waterborne disease rates have remained stable or declined since 1992.
- Five public water systems in Multnomah County, serving 2% of residents, were in violation of health-based standards for drinking water in 2000-2001.
- Multnomah County does not meet the Healthy People 2010 objective calling for at least 75% of community residents to receive optimal levels of fluoridated water. Less than 10% of the population in Multnomah County has access to optimal levels of fluoride in drinking water.

Food Safety

- + Rates of illness caused by unsafe food handling have declined in both Multnomah County and Oregon since the early 1990's.
- + Rates for one important source of food-borne illness – the bacteria *E. coli* – were consistently lower for Multnomah County than for Oregon between 1995 and 2000.
- However, Multnomah County has not met national objectives in reducing foodborne illness.

Hazardous Waste

- + Since 1989, 143 hazardous waste sites have been cleaned up, and no longer pose an environmental or health threat. In addition, over 6,800 leaking underground storage tanks have been cleaned up over the past 20 years.
- + While two Superfund sites in Multnomah County have been cleaned up and have been removed from the National Priorities List, there are currently three listed Superfund sites in Multnomah County. Two additional sites are candidates for the Superfund program.
- There are 155 sites throughout Multnomah County with confirmed hazardous waste contamination.

Housing and Indoor Air Quality

- + Radon levels in Oregon have been designated of moderate or low concern by the EPA.
- In 2000, 1.1% (3,117 units) of housing stock in Multnomah County lacked complete kitchen facilities and 0.8% (2,252 units) lacked complete plumbing facilities.
- The percentage of overcrowding in renter occupied units (8.7%) is higher than in owner occupied units (2.9%).
- Lead-based paint is most prevalent in houses built before 1950. There is a higher percentage of housing built in 1950 or earlier in the inner Northeast and Southeast neighborhoods.

Land Use and Community Design

- + While the rate of motor vehicle crash fatalities is consistently lower in Multnomah County than in Oregon and the U.S., motor vehicle accidents were the leading cause of death of Multnomah County and Oregon children age 1 to 17 years for the period 1997-2000.
- + While there has been a steady increase in recent years in the proportion of adults in Multnomah County who are at risk of overweight-related health

problems, the proportion in the county is consistently lower than Oregon and the Nation.

- Only one quarter of adults in Multnomah County participate in regular physical activity.

Occupational Health

- + There were a total of 6,115 accepted work-related disabling claims in Multnomah County in 2001, down from a high of 8,366 claims in 1990.
- + As of July 1, 2000, most businesses, including restaurants, are required to be smoke free throughout Multnomah County.

Outdoor Air Quality

- + Multnomah County has been in compliance with federal air quality standards since 1997, and meets Healthy People 2010 objective for criteria air pollutants established by the Clean Air Act. By comparison, eight counties in Oregon are not in compliance, as of July 2002.
- Fourteen air toxics (among 188 air toxics tracked by the EPA) in the County exceed health-based benchmarks, with six pollutants more than 10 times the benchmark.
- Most of the County exceeds the federal cancer risk benchmark for toxic outdoor air pollutants. The highest risk areas are in North and Northeast Portland.

Recreational Water

- + Rates for recreational waterborne disease are low for Multnomah County, and outbreaks are rare. There were two waterborne disease outbreaks in the County in the 1990's.
- Six of seven waterways in Multnomah County examined by the Oregon Department of Environmental Quality are ranked as poor or very poor. Five water bodies are in violation of federal Clean Water standards that protect beneficial uses.
- Current sewer designs in Multnomah County cause three billion gallons of rainwater and raw sewage to flow into the Willamette River every year.

Solid Waste and Wastewater

- + Portland's recycling rate is at 54%, the best in the country.
- St. Johns landfill, located in Portland and closed since 1991, has known leaks of hazardous substances that are polluting nearby waterways.

Vector-Borne Disease

- + Multnomah County experiences less than two cases of vector borne illness a year.
- + In the nine years between 1991 and 2000, only 4 animals tested positive for rabies in the County.
- Although mosquitoes tested in Multnomah County have not been found to carry the West Nile virus, the virus is expected to arrive in 2003.

Introduction

Purpose

The Environmental Health of Multnomah County provides an assessment of our environment, and highlights hazards in the community that may impact human health. It fulfills a core public health service, that of monitoring health status to identify community health problems. This resource document is the second in a series of health assessment reports conducted by the Multnomah County Health Department, and is part of our continuing commitment to provide the community with important health information. We hope that it will bring new depth to a continuing dialogue between the community and health professionals on factors that influence public health, so that together we can establish health priorities and continue to realize our vision of healthy people in healthy communities.

Environmental health “focuses on the relationships between people and their environment, promotes human health and well-being, and fosters a safe and healthy environment.”

What is environmental health and why is it important?

Environmental health is a branch of public health that “focuses on the relationships between people and their environment, promotes human health and well-being, and fosters a safe and healthy environment.”¹ According to a recent national survey, Americans are very much aware of the link between environment and human health. Ninety percent of Americans believe that environmental pollutants are important causes of disease. Further, 75% feel that they or a close family member live in a community where environmental pollutants such as air and water contaminants, hazardous wastes, and pesticides are a problem.² Scientific evidence linking environment to human health supports this belief.* The Centers for Disease Control and Prevention has estimated that 16% of all preventable deaths in the United States can be attributed to environmental factors. Researchers at the World Health Organization estimate that environmental factors may cause up to 33% of diseases worldwide. And one study of pediatric illnesses indicates that environmental pollutants may account for 5% of cancers, 30% of asthma cases, and 10% of neurobehavioral disorders, with costs exceeding \$55 billion annually.³⁻⁵

...75% [of Americans] feel that they or a close family member live in a community where environmental pollutants such as air and water contaminants, hazardous wastes, and pesticides are a problem.

Although many public health departments take seriously the possible health threats coming from the environment, others have noted public health’s shortcomings. More than a decade ago, the Institute of Medicine (IOM) presented a report arguing, in part, that environmental health had become disconnected from public health: “The removal of environmental health authority from public health agencies has led to fragmented responsibility, lack of coordination, and inadequate attention to the health dimensions of environmental problems.” Among IOM’s many recommendations was a call to public health departments to identify, understand and control environmental problems as health hazards.⁶

* *Social environment, biology, behavior, and health care access also play important roles in human health.*

Who is this report for?

This report is for anyone interested in an examination of Multnomah County’s environment and its possible impacts on human health. Anyone living within the Portland metropolitan region may find this report of special interest. We anticipate that this report will also appeal as a resource document to community organizations, public agencies, policy makers, public health professionals, and students.

What does this report cover?

This report is a community resource on Multnomah County’s environmental health. It provides an in-depth examination of selected environmental factors that influence human health. Each chapter focuses on nationally recognized environmental factors and provides data for several environmental health indicators, along with baseline data from previous years in order to highlight trends. We have examined the quality of our County’s air and water, its waste, occupational health, food-borne illnesses, unintentional injuries, and other environmental factors, and we have linked these to human health data- where it exists.

What is not covered?

While this report contains a wealth of information on the County’s environmental health, it is not a report of solutions. It does not prioritize issues or direct steps to be taken to address environmental health problems. In most cases, we do not advocate for or against any environmental health policies. We have sought simply to identify and understand factors in the physical and built environment in Multnomah County that may be health hazards. A more focused environmental health assessment is under way to address environmental problems in specific communities within the County (see PACE EH below).

This report addresses many environmental health issues; however, the list of topics is not exhaustive. There are other environmental health issues that do not appear in this report. Examples of topics not covered are radiation, mold and mildew, institutional health, environmental noise, and odors. In some cases, data for these environmental factors were difficult to obtain, inconsistently collected, or nonexistent. In other cases, time and staff resource constraints limited the number of environmental factors we could cover.

Finally, we were not able to show direct links between environmental exposures and human health problems. Measuring the actual health problems stemming from the environment is difficult, especially for chronic diseases such as cancer, birth defects and asthma.⁷ Cancer is especially difficult to tie to environmental causes, primarily because the time between exposure and the detection of the cancer can take many years. Therefore, many chapters in this report rely upon environmental health indicators.

What are environmental health indicators?

Environmental health indicators are measures that assess health status or risk as

it relates to the environment. The best indicators, according the Centers for Disease Control and Prevention, are those that “reliably predict the relationship between human health and the environment, are routinely collected, and have well-accepted definitions and data collection standards.”⁸

We relied greatly upon environmental health indicators developed by the Washington State Department of Health. Health researchers from this state recognized the need for an environmental health addendum to the Assessment Protocol for Excellence in Public Health (APEX/PH), developed by the National Association of City and County Health Officials (NACCHO) in 1991. These indicators are organized into major environmental topics – air, water, food, etc. – and each topic presents several environmental indicators. Indicators are of two types. Health status indicators measure health outcomes that can reliably be assumed to result from environmental exposure. An example of this is the foodborne illness indicator stemming from contaminated food. Environmental exposure indicators measure conditions or activities with the potential to expose humans to a contaminant or hazardous condition. Examples of these include air contaminant releases and hazardous waste sites.

Sources and Objectives

All data used in this report are secondary data – that is, data collected by other organizations. No primary data – i.e., new data, for the purpose of this project – were collected. The data were obtained from local, state, and federal agencies charged with monitoring a specific environmental factor. We have provided the most currently available data, and present data over several years in order to analyze trends. In many cases, data go back five years or more. We cannot guarantee the quality of the data, and in most cases we are not able to provide an in-depth analysis of data limitations. The availability and quality of the data vary by public agency.

Data by themselves are not very meaningful without something to compare them to. In many cases we compare ourselves to Oregon. In some cases we compare the County to the Nation and to other counties. The most useful comparisons come from national objectives found in **Healthy People 2010**, a resource developed by the U.S. Department of Health and Human Services, with input from more than 350 national organizations and 250 State public health and environmental agencies. It provides 467 10-year health objectives in 28 focus areas to target national health improvement activities for the Nation. Healthy People 2010 includes many health objectives that are relevant to the indicators in this report, including 30 environmental health targets. Environmental health indicators for Multnomah County are compared against Healthy People 2010 objectives whenever possible*.

* For more information on the development of Healthy People 2010, visit their website at <http://www.healthypeople.gov>.

Other Environmental Health Efforts – PACE EH

While environmental health monitoring is an important first step, it is not enough, especially without vital community input. Health professionals and community residents need to work together to identify environmental health issues and address the problems found. That is why Multnomah County Health Department has joined forces with community residents to assess the environmental health of our County. Through a process called the Protocol for Assessing Community Excellence in Environmental Health (PACE EH), a coalition of community residents and health and environmental professionals has emerged to set priorities for local action to address environmental hazards most clearly impacting human health.⁶ As this report went to press, the coalition was in the final stages of determining the geographic area upon which to focus its efforts.

We hope that this report, and the efforts of PACE EH, will address a need among community residents to understand the important links between environment and health so that, together, we can set priorities for action.

1. Adapted from: National Association of County and City Health Officials (NACCHO) *Protocol for Assessing Community Excellence in Environmental Health: A Guidebook for Local Health Officials*. Washington, DC. 2000.
2. Pew Charitable Trusts. Prepared by Princeton Survey Research Associates. *National Survey of Public Perceptions of Environmental Health Risks: Report on the Findings*. Washington, DC: Georgetown University. 2000.
3. CDC. (1994). Ten leading causes of death in the United States, 1990. Atlanta, GA: U.S. Centers for Disease Control.
4. Smith KR, Corvalan CF, Kjellstrom T. How Much Global Ill Health is Attributable to Environmental Factors? *Epidemiology*. 1999;10:5:573-584.
5. Landrigan PJ, Schechter CB, Lipton JM, Fahs MC, Schwartz J. Environmental Pollutants and Disease in American Children: Estimates of Morbidity, Mortality, and Costs for Lead Poisoning, Asthma, Cancer, and Developmental Disabilities. *Environmental Health Perspectives*, 2002;110:7:721-728.
6. Institute of Medicine. *The Future of Public Health*. Washington, DC: National Academy Press. 1988.
7. Pew Environmental Health Commission. *America's Environmental Health Gap: Why the Country needs a Nationwide Health Tracking System*. Baltimore, MD: Johns Hopkins School of Public Health. 2000.
8. *Environmental Public Health Indicators Project*. National Center for Environmental Health, Centers for Disease Control and Prevention. Accessed: 04/30/2003. <http://www.cdc.gov/nceh/indicators/>

Demographics of Multnomah County

Population

Multnomah County is largely urban, and home to 19.3% of the State's population. The city of Portland comprises 80% of the County's population and is the County seat. The next largest city is Gresham with 14% of the population. The cities of Troutdale, Fairview, and Wood Village comprise the remainder of the population.

Age Distribution

From 1990 to 2000, the population of Multnomah County grew 13%, from 583,887 to 660,486. During the same period, the population of Oregon grew 20%. In 2000, the median age of Multnomah County residents was 35 years. Population growth was not evenly distributed among age groups. Figure 1 shows

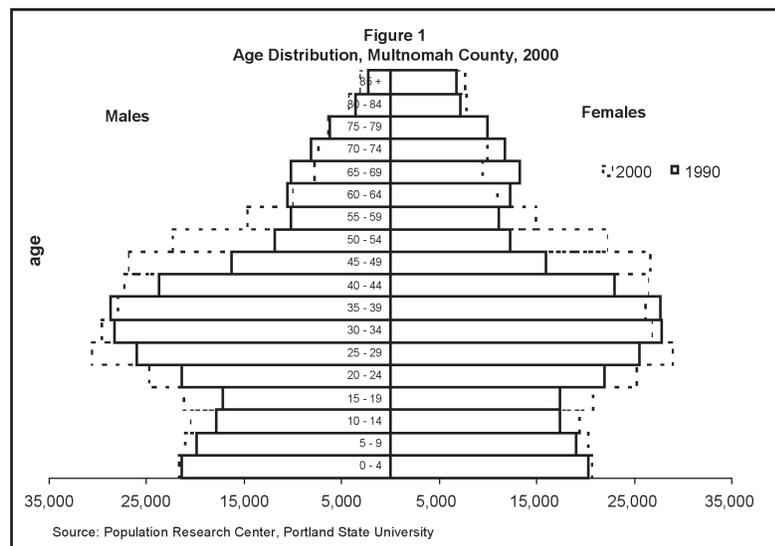
absolute population growth in the County between 1990 and 2000. The population of adults 74 years and older has remained relatively constant as has the population of very young children (0 to 4).

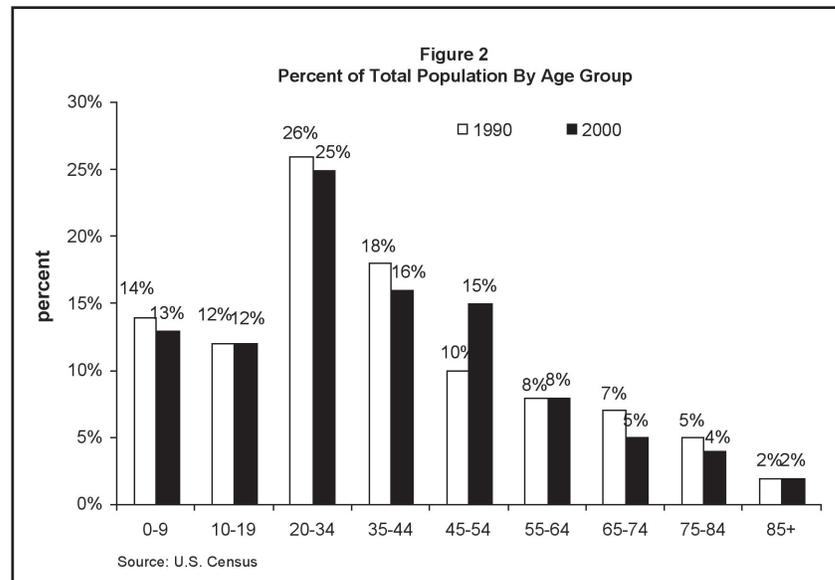
The population of children 5 to 9, adolescents 10 to 19 and young adults 20 to 29 has increased. The largest increase in the adult population from 1990 to 2000 was among 45 to 54 year olds. The County has seen a decrease in the population of 60 to 74 year olds and 35 to 39 year olds.

Figure 2 shows the percent of the population by ten year age groups in 1990 and 2000. The largest change in distribution was in the 45 to 54 year age group, which went from 10% of the population in 1990 to 15% in 2000.

Vulnerable Populations

A safe and healthy environment is important to maintain a physically and emotionally fit life. It is well recognized that vulnerable populations such as children and the elderly suffer greater health effects of poor environmental quality due to





Studies have shown that low-income, racial and ethnic minority individuals are much more likely to be exposed to toxic and hazardous wastes than affluent and white individuals.¹

higher susceptibilities or higher levels of exposure. For example, **environmental tobacco smoke** is one of the primary causes of poor indoor air quality associated with respiratory health problems in children. The hazards of exposure to lead-based paint poisoning are greatest among children under seven. Very young children, the elderly, and individuals with compromised immune systems are more likely to experience serious effects of food borne illness. Many factors exist in the built environment that contribute to unhealthy communities for vulnerable populations. Among these are lack of safe play areas, unsafe streets and homes, noise, and substantial traffic.

The relationship between prosperity and better health is well established and studies over the last 20 years suggest that there is also a relationship between income and environmental risk factors. Socioeconomically disadvantaged groups such as African Americans, Hispanics, American Indians and Pacific Islanders experience higher rates of cancer, birth defects, infant mortality, asthma, diabetes, and cardiovascular disease. Studies have shown that low-income, racial and ethnic minority individuals are much more likely to be exposed to toxic and hazardous wastes than affluent and white individuals. A higher percentage of low-income urban black children have blood lead levels that exceed safe limits compared to urban children with higher family incomes. According to a review of study data, “There is consistent evidence that people who are poorer in the United States are more likely to be exposed to multiple, environmental risks that portend adverse health consequences.^{1”}

While Multnomah County is predominately White non-Hispanic, there are proportionately more young people among populations of color than in the White non-Hispanic population. American Indian, African American, and Hispanic populations have the highest percentage of people living at or below the poverty level.

Race and Ethnicity

The 2000 U.S. Census asked individuals to respond to the question of race differently than it had in the past. In 2000, individuals had the opportunity to choose more than one racial category to describe themselves. In addition, the category Asian/Pacific Islander was divided into two categories: Asian and Native Hawaiian or other Pacific Islander. This resulted in racial categories of White, African American, Asian, Native Hawaiian or other Pacific Islander, American Indian, two or more races, and some other race. The question of ethnicity Hispanic or non-Hispanic remained unchanged in 2000. These changes make comparisons to earlier census data on race difficult.

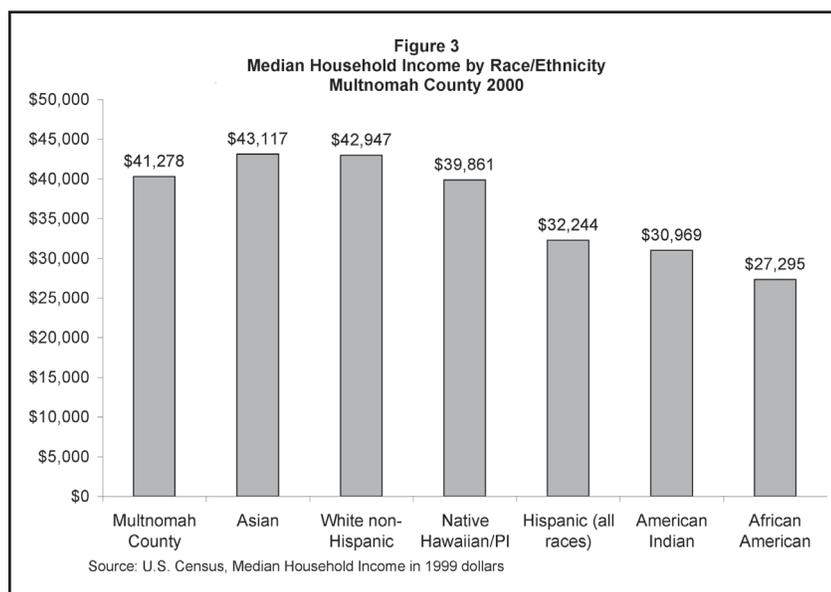
According to the 2000 U.S. Census, White non-Hispanics make up the largest percentage of the population of Multnomah County (Table 1). Among populations of color, Hispanics make up the largest percentage of the population followed by African American and Asian.

Race/Ethnicity	Percent
White non-Hispanic	76.5%
Hispanic (of any race)	7.5%
African American	5.7%
Asian	5.7%
American Indian	1.0%
Native Hawaiian or Pacific Islander	0.4%
Two or more races	4.1%
Some other race	4.0%

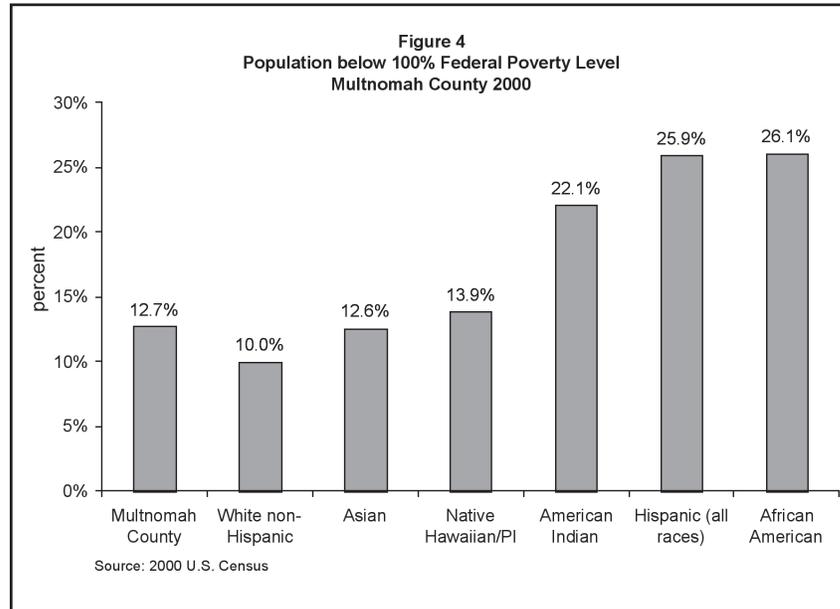
Source: 2000 U.S. Census

Income and Poverty

The 2000 U.S. Census reports that, at \$41,278, the median income in Multnomah County was 0.9% higher than median income for Oregon (\$40,916) and 1.7% lower than median income for the United States (\$41,994). In Multnomah County Hispanic, American Indian and African American populations



have a lower median household income than other racial/ethnic groups (Figure 3). The median household income for African Americans is the lowest of any racial/ethnic group and is 33% lower than the County median household income.



African Americans and Hispanics have higher percentages of individuals at or below 100% of federal poverty level, followed closely by American Indians (Figure 4). The percentage of African Americans in poverty is more than twice as high as for the county as a whole.

Income Inequality

A recent study shows that Oregon's wealthiest 1% saw an increase in its average annual income from \$374,000 to \$741,000, an increase of 98% between 1989 and 2000.² In the same period, the State's median income rose from \$24,600 to \$26,700, an increase of 9%. According to the report, in 1989, the wealthiest 1% comprised 11% of the States' total income, while in 2000 they comprised 17%. The report concludes that Oregon was one of two states with the fastest growing gap between the wealthy and the poor.

A recent study concludes that Oregon was one of two states in the nation in which the gap between the wealthy and the poor grew the fastest.

1. Evans G, Kantrowitz E. Socioeconomic Status and Health: The Potential role of Environmental Risk Exposure. *Annual Review of Public Health*. 2002; 23:303-331.
2. Leachman M, Thompson J. *Boom, Bust & Beyond: The State of Working Oregon 2002*. Oregon Center for Public Policy. Silverton, OR; 2002.

Drinking Water Quality

Fast Facts

- The Portland Water Bureau - the supplier of almost 90% of the water to County residents - has been in compliance with all federal and State water quality standards since 1993.
- Multnomah County meets the Healthy People 2010 Drinking Water objective calling for 95% of residents to receive water from water systems meeting federal safety standards.
- Five of the 23 public water systems in Multnomah County, serving 1.5% of residents, were in violation of health-based standards for drinking water in 2000-2001.
- Multnomah County does not meet the Healthy People 2010 objective that calls for 75% of residents to receive fluoridated water. Less than 10% of the population has access to optimal levels of fluoride in drinking water.
- 11% of Multnomah County residents have private water systems, which are not required to undergo monitoring, and are therefore more susceptible to contamination.
- Waterborne disease outbreaks were rare in Multnomah County (and Oregon) between 1991 and 1998, and disease rates associated with waterborne disease have remained stable or declined since 1992.

Problem Statement

The link between drinking water quality and human health has been understood for many years. Public concern over safe drinking water has led to strict federal and state standards, and as a result, drinking water in the U.S. is among the safest in the world. In turn, Americans have come to trust the quality of their drinking water. For example, according to the 2000 Oregon Population Survey, 85% of residents believe Oregon is doing a good or very good job of maintaining clean water. Still, drinking water can cause many acute and chronic illnesses from contaminants such as chemicals and **pathogens** (i.e., bacteria, viruses, protozoa). A dramatic example of this occurred in 1993 in Milwaukee, Wisconsin, when over 400,000 became ill from a pathogen in the drinking water supply. There are, on average, 7,600 reported cases of waterborne illness in the U.S. each year, with actual cases estimated as high as 900,000 per year.

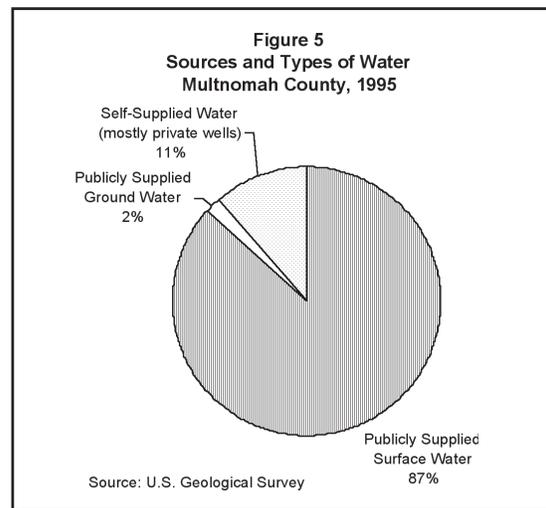
Drinking Water Regulations

Drinking water is regulated through the federal Safe Drinking Water Act and the Oregon Drinking Water Quality Act. The purpose of these acts is to assure safe drinking water free of contaminants to Oregonians using public water supplies. Primary (i.e., legally enforceable) standards for drinking water call for regulation and treatment of water supplies to eliminate pathogens, chemicals, and disinfectants (and their by products) in drinking water. To accomplish this objective, these Acts require that drinking water be tested regularly for 94 contaminants. Seven of these contaminants are pathogens such as *Cryptosporidium*, *Giardia lamblia*,

and E. coli, all of which can cause gastrointestinal illness if ingested. Regulations require the disinfection of water to remove or inactivate such organisms so that they do not pose a health threat. Organic and inorganic chemicals are also regulated, especially those that have been linked to chronic illnesses like liver and kidney disease, nervous system problems, and cancer. Nitrate, a chemical mostly linked to fertilizer runoff, is especially dangerous to infants, and can interfere with breathing.

Drinking Water Sources

According to data from the U.S. Geological Survey, 11,540 residents (1.9% of Multnomah County’s population) relied upon publicly supplied ground (well) water as their primary source in 1995, whereas 533,000 (87%) relied upon publicly



supplied surface water sources (primarily through the Bull Run Watershed and the Portland Water Bureau) (Figure 5). More than 69,500 residents (11%) in the County supplied their own drinking water in 1995, primarily through private wells. By comparison, 32% of residents in Oregon, and 16% nationally, supply their own drinking water. Since private water wells are not regulated under the federal and state drinking water acts, they can be a potential source of

contaminants, and pose a greater risk of causing waterborne illnesses.¹

There are 23 active **community water systems** (CWS) in Multnomah County. Each of these community water systems is publicly operated, and serves a minimum of 15 year-round resident households. The City of Portland Bureau of Water Works, the primary public water supplier of surface water to the County, supplies almost 90% of Multnomah County’s CWS drinking water. The Bull Run Watershed, east of the County near Mount Hood, is the largest source of surface water. It has been Portland’s primary water source for more than 100 years, and is of such high quality that it is one of the few surface water sources not required by the Environmental Protection Agency to be filtered.²

The Portland Water Bureau collects 10,000 water samples each year from throughout the water system, and conducts about 50,000 water analyses on the samples collected. They test for more than 150 contaminants. Of the regulated contaminants for which samples were collected, nearly all were below the maximum level before treatment. Treatment of the water (with chlorine, for example) eliminates risk of pathogen contamination, and all such contaminants were treated

effectively in 2000.³ Furthermore, no health-based or reporting violations have been reported for the Portland Water bureau since 1993 (the earliest year data is available).⁴

Drinking Water Violations

An analysis of County water systems through the Safe Drinking Water Information System (provided by the EPA) shows that five of the 23 active community water systems in the County in 2000 and 2001 violated health-based standards (i.e., having contaminants exceeding the EPA safety standard, or having water that was not treated properly). These five systems – Corbett Water District, Casselman’s Water System, City Bible College, Interlachen Water District, and Rocky Pointe Marina – served approximately 1.5% of Multnomah County residents in 2001. By comparison, statewide there were 177 community water systems violating health-based standards in 2000, serving 6% of Oregon’s population.⁴ Two water systems in Multnomah County, representing 6,500 residents, violated a maximum contaminant level for pathogens. The rest failed to comply with water treatment reporting. Multnomah County meets the Healthy People 2010 Water Quality objective that 95% of community residents receive drinking water that meets EPA safety standards. Over 98% of County residents using community water systems had safe drinking water in 2001.

Over 98% of Multnomah County residents using community water systems had safe drinking water in 2001.

Water Fluoridation

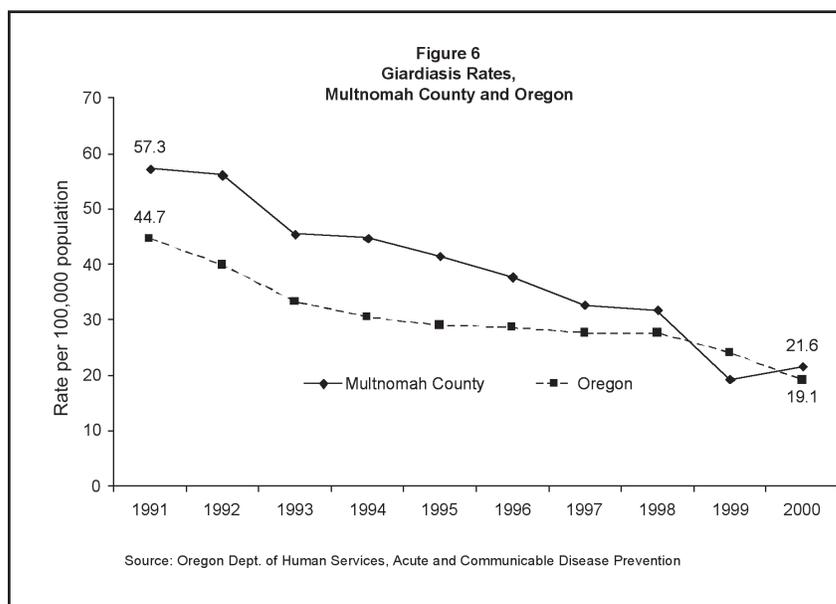
The U.S. Public Health Service recommends that drinking water be treated with optimal levels of fluoride - around one part per million. Optimal levels of fluoride in drinking water can help prevent tooth decay.⁵ According to the U.S. Surgeon General, “community water fluoridation continues to be the most cost-effective, practical and safe means for reducing and controlling the occurrence of tooth decay in a community.”⁶ In 2000, 66% of the U.S. population served by public water systems had drinking water with optimal fluoride levels.

No fluoride was detected in the Portland Bureau’s water supply. Portland is one of the few communities in the U.S. that does not fluoridate its water. Though specific statistics regarding fluoridation of public water are not available for Multnomah County, we estimate that less than 10% of County residents live in areas with optimal fluoride levels. Therefore, Multnomah County does not meet the Healthy People 2010 objective calling for at least 75% of community residents to receive optimal levels of fluoridated water. According to the CDC, only 23% of Oregon’s population is supplied drinking water with optimal levels of fluoride, the fifth lowest in the nation.⁷

Health Effects of Drinking Water

Drinking water is a potential source of many pathogens and chemicals, and can lead to a variety of acute and chronic illnesses. The most common acute illnesses are gastrointestinal illness, whereas chronic illnesses may include kidney and liver diseases, and many types of cancer, perhaps from chemicals and pathogens in a

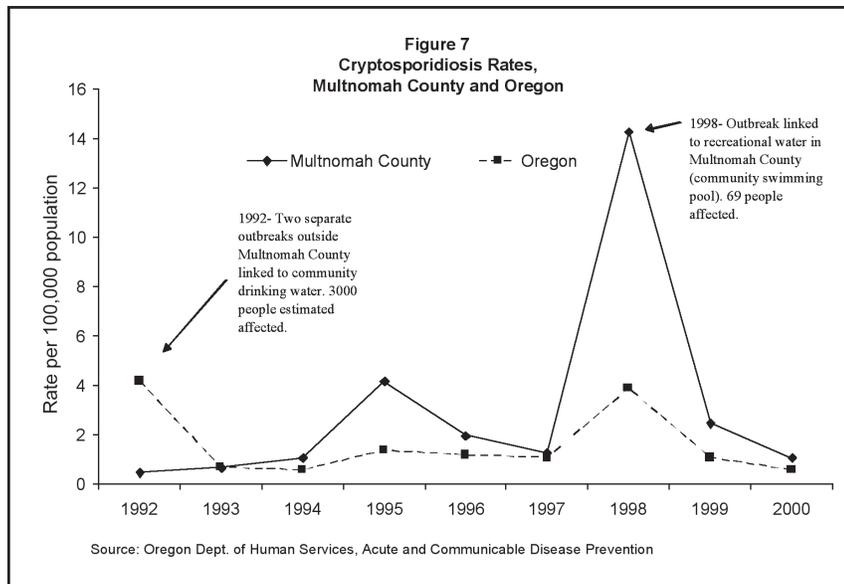
water supply over many years. Data for chronic diseases are difficult to link to water quality and are unavailable for Multnomah County. Data on acute waterborne diseases are available through the Oregon Department of Health Services Acute and Communicable Disease program. It is likely that waterborne disease data are underreported –e.g., not all who become ill from drinking water seek medical treatment. Such data probably underestimate actual water-related illnesses and outbreaks.



Giardiasis, caused by the *giardia* parasite, is considered one of the most common causes of waterborne disease in the U.S.⁸ The 1991-2000 average rate for Multnomah County is 34.7 per 100,000, compared to 27.2 for Oregon. Giardia rates from 1992 to 2000 in Multnomah County have declined continually and substantially. Rates declined 65% from 1992 to 2000 (Figure 6). It is not clear to what extent drinking water supplies are responsible for either the incidence of the disease, or in its decline.

Cryptosporidium is another parasite that may be found in a community water supply. Rates for this disease have remained fairly stable since 1992 (Figure 7), and there is no indication that drinking water is contributing to a rise in this disease. There was a fairly large outbreak of about 70 people in 1998, but this has been attributed to a contaminated community swimming pool.

According to the U.S. Centers for Disease Control and Prevention, there were three **waterborne disease outbreaks** of drinking water in Oregon from 1992 to 1998 (the latest for which data is available). Two outbreaks in 1992 were linked to a community water system, and 3,000 people were estimated affected by *Cryptosporidium*. The third outbreak in 1997 was associated with a campground



water source, and 100 people were affected with Giardia. It is unclear whether any of the outbreaks affected Multnomah County residents.

Conclusion

Stringent requirements for drinking water due to the federal Safe Drinking Water Act, combined with a high-quality surface water source, have provided a safe water supply for Multnomah County residents, with very few contaminants found, and only rare instances of waterborne disease outbreaks associated with drinking water.

Two issues relating to drinking water and health effects have been found. First, fluoride is not in drinking water at an optimal level in Multnomah County. Less than 10% of drinking water in the County has optimal fluoride levels. Second, 11% of Multnomah County residents supply their own water, primarily through private wells. As no testing is required for contaminants in the drinking water of private systems, these residents have an increased risk of drinking unsafe water.

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2. *Water Quality in the Willamette Basin, Oregon, 1991-1995*. U.S. Geological Survey. U.S. Department of the Interior. 1998.
3. Annual Water Quality Report. City of Portland Water Bureau. 2000.
4. *Envirofacts Data Warehouse*. U.S. Environmental Protection Agency. Accessed 9/1/2002. http://oaspub.epa.gov/enviro/ef_home2.water
5. Recommendation for Using Fluoride to Prevent and Control Dental Caries in the United States. *Morbidity and Mortality Weekly Report (MMWR)*. Centers for Disease Control and Prevention. 2001;50:RR—14:1-42.
6. *Community Water Fluoridation: Surgeon General's Statement, 2001*. Centers for Disease Control and Prevention. Accessed 3/26/2003. <http://www.cdc.gov/OralHealth/factsheets/fl-surgeon2001.htm>

7. Populations Receiving Optimally Fluoridated Public Drinking Water – United States. *Morbidity and Mortality Weekly Report (MMWR)*. Centers for Disease Control and Prevention. 2002; 51:07:144-7.
8. *Giardiasis*. Acute and Communicable Disease. Oregon Department of Human Services. Accessed 05/01/2002. <http://www.ohd.hr.state.or.us/acd/giardiasis/index.cfm>

Food Safety

Fast Facts

- Rates of illness caused by unsafe food handling have declined in both Multnomah County and Oregon since the early 1990's. However, Multnomah County has not met national objectives in reducing foodborne illness.
- Rates of Campylobacteriosis in Multnomah County have declined steadily since 1991. The rate in 2000 was 16.0 cases per 100,000 population.
- Incidence of Salmonella fluctuates and does not show a steady trend. The rate in 2000 was 11.7 cases per 100,000.
- Illness rates from E. coli are consistently lower in Multnomah County as compared to the State of Oregon. The rate in Multnomah County in 2000 was 1.7 cases per 100,000.

Problem Statement

Although the food supply in the United States is one of the safest in the world, preventing **foodborne illness** and death continues to be a major public health challenge. The CDC estimates that 76 million people get sick, more than 300,000 are hospitalized, and 5,000 Americans die each year from foodborne illness.¹

Multnomah County Health Department performs approximately 8,000 inspections of restaurants, special events, street vendors, hotels and motels, child care centers, schools, and adult foster care settings each year. Health inspectors make sure that hot foods are hot, cold foods are cold, hand washing facilities are available and used, and raw meats are not mixed with vegetables. These practices, if improperly performed, can lead to foodborne illness.

Although foodborne illnesses are reported to the local health department, surveillance of exposure and illness is complicated. Foodborne illnesses can be severe or even fatal, yet milder cases are often not detected because individuals do not seek medical care. Further, many diseases that are transmitted through food are also spread through water or from person to person. Thus, the cause of the disease may be difficult to trace.

Foodborne Outbreaks

Although most foodborne illness occurs in a private or home setting, occasionally **foodborne disease outbreaks** affect large groups of people. A foodborne disease outbreak is defined as the occurrence of two or more cases of the same clinical illness among people from different households resulting from the ingestion of the same food. A food borne outbreak is an indication that there was a breakdown in the food safety system. Laboratories and clinicians are required to report incidence of foodborne illness to the Multnomah County Health Department. The Health Department then investigates the foodborne illness incident and reports the case(s) to the State Acute and Communicable Disease Office. Public

Foodborne Disease Outbreak: The occurrence of two or more cases of the same illness among people from different households resulting from the ingestion of the same food.

health epidemiologists investigate outbreaks to control them, and also to learn how similar outbreaks can be prevented in the future.

Outbreaks are identified through citizen complaints or surveillance data from individual counties of identifiable foodborne illnesses. Outbreak data are, however, difficult to quantify. Frequently an individual case of foodborne illness may be identified, and while the case may be part of an outbreak, the cases are not linked. While outbreaks do not represent nearly as many cases of foodborne illness as

isolated cases, there is much to learn about foodborne illness from outbreaks. Incubation periods, exposure time, and specific food practices that led to the outbreak can be tracked more definitively in an outbreak than in an isolated case. Table 2 presents the number of outbreaks and the number of cases associated with an

**Table 2
Multnomah County
Foodborne Illness Outbreaks**

	1996	1997	1998	1999	2000	2001
Number of outbreaks	2	3	1	5	9	2
Cases associated with an outbreak	N/A	81	24	119	136	26
Rate per 100,000 population	N/A	12.7	3.7	18.4	20.6	3.9

Source: Oregon Department of Human Services, Acute and Communicable Disease Program

outbreak in Multnomah County as reported by the Oregon Department of Human Services. Because outbreaks are difficult to quantify, this is not a complete account of outbreaks occurring in the County.

Campylobacteriosis:
An illness caused by bacteria that lives in the intestines of healthy birds that can make people ill if ingested.

National foodborne illness surveillance data come from FoodNet, a collaboration between the CDC, the U.S. Department of Agriculture, the U.S. Food and Drug Administration, and selected state health departments that began in 1996. FoodNet collects data on laboratory-confirmed cases of foodborne illness in eight states,

including Oregon. Data from 1996-2000 show Oregon third behind California and Minnesota for the highest incidence of **Campylobacteriosis** infections and second behind Minnesota for **E. coli** infections.² Table 3 shows that in 2000 Oregon and Multnomah County were higher than

**Table 3
Food Borne Illness,
Rate per 100,000 population**

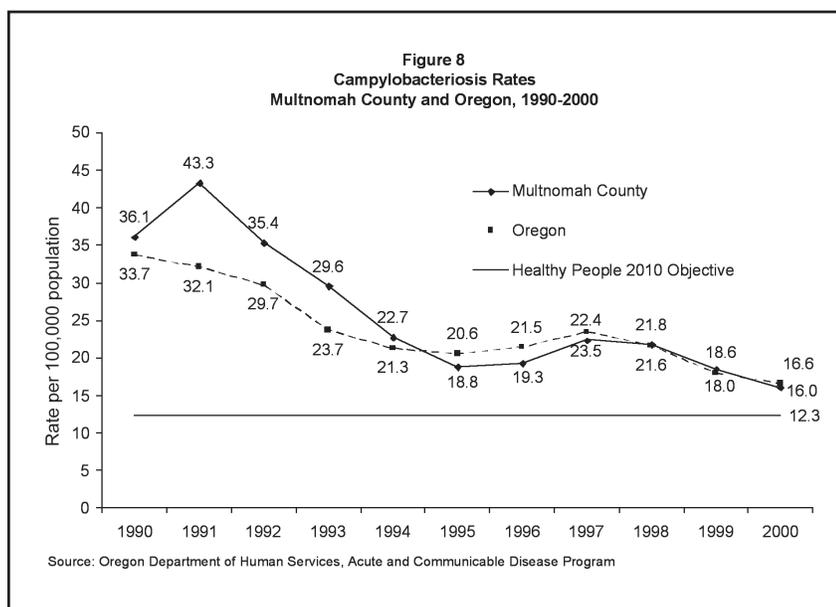
	8 State Sample 1996-2000	Oregon 2000	Multnomah County 2000
Campylobacteriosis	15.7	16.6	16.0
Salmonella	12.0	8.7	11.7
E. coli	2.9	3.9	1.7

Source: FoodNet, Centers for Disease Control and Prevention and Oregon Department of Human Services, Acute and Communicable Disease Program

the eight state sample from 1996-2000 for Campylobacteriosis. Oregon was higher than the eight state sample for E. coli, while Multnomah County was lower; both Oregon and Multnomah County are lower for Salmonella.

Campylobacteriosis. Campylobacteriosis is one of the most frequently reported foodborne illnesses in the United States and causes fever and diarrhea. Campylobacter is the bacteria that causes Campylobacteriosis, and it lives in the intestines of healthy birds. Most raw poultry is contaminated with Campylobacter. Eating undercooked poultry, red meats or other food that has been contaminated with juices from raw poultry or red meats is the most frequent source of this infection.

Rates of Campylobacteriosis have declined in both Multnomah County and Oregon since 1991 (Figure 8). In 1991 there was a spike in the rate of Campylobacteriosis in Multnomah County due to increased screening of children with diarrheal illnesses. This screening occurred in association with a Shigella (a bacteria spread by not washing hands) outbreak in children's day care centers.



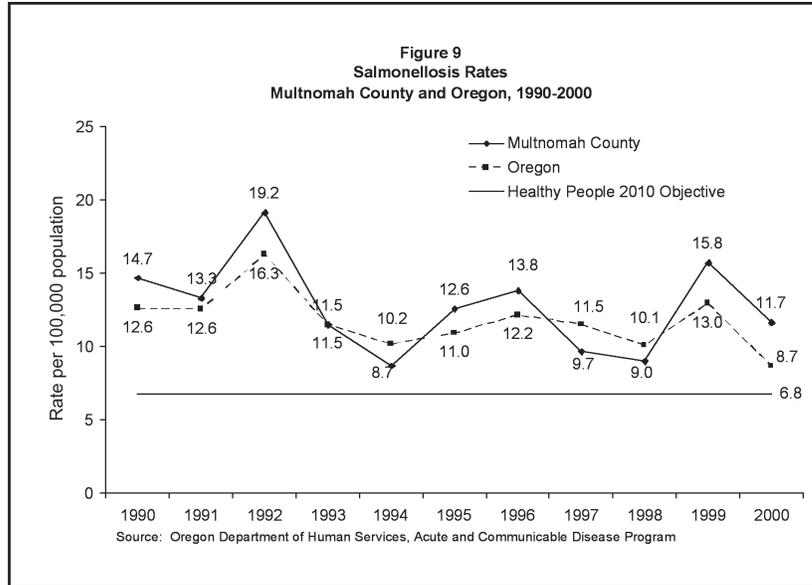
Salmonella: Bacteria that are frequently found in birds as well as other animals.

Salmonella. **Salmonella** are bacteria that are widespread in the intestines of birds, reptiles and mammals. The bacteria can spread to humans through a variety of different foods made from animals. Salmonella can get into the blood stream and cause life-threatening infections in persons with poor health or weakened immune systems, especially the very young or elderly. Incidence of Salmonella has fluctuated throughout the 1990's and do not show a steady trend. The rate in the County in 2000 was 11.7 cases per 100,000 (Figure 9).

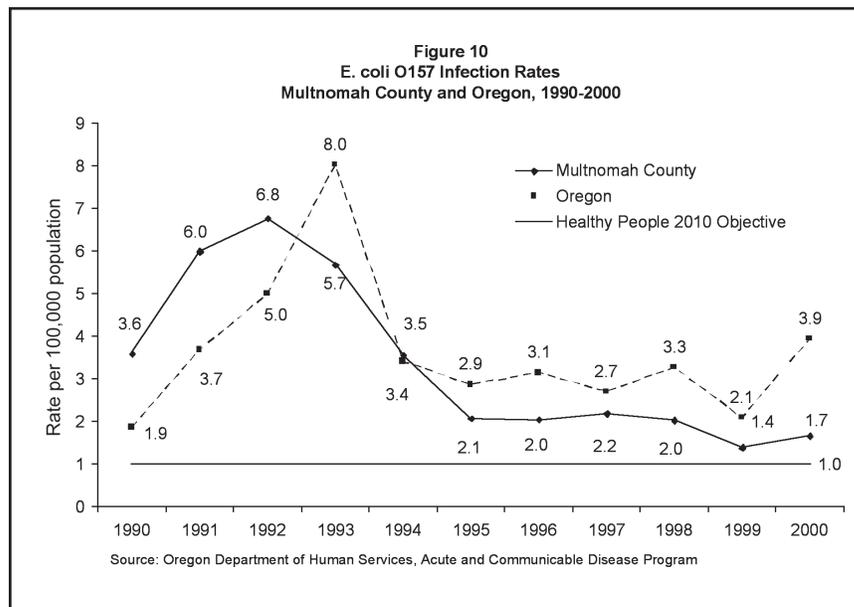
E. coli. E. coli is a bacterial pathogen commonly found in cattle. Human illness typically follows consumption of food or water that has been contaminated with microscopic amounts of cow feces and can cause severe and bloody diarrhea and painful abdominal cramps, without fever. E. coli has the potential for causing kidney failure, especially in children.

At special risk: Very young children, the elderly, and individuals with compromised immune systems are most likely to experience serious effects of foodborne illness.

E. coli:
A bacterial pathogen commonly found in cattle.



Rates of E. coli infection have steadily declined in Multnomah County since 1992 (Figure 10). The increased incidence of E. coli in the State in 1993 was due to an outbreak in three restaurants. The slight increase in the State rate of E. coli in 2000 was due to an outbreak in a restaurant in Marion County.



Health Department inspections

In order to prevent foodborne illness outbreaks, local health departments inspect food service facilities to insure they comply with food safety regulations. In Multnomah County in 2001, there were 2,922 year-round food service facilities requiring two inspections a year. Of the total number of inspections in 2001, six different facilities (0.24%) failed to comply with Oregon Food Sanitation Rules.

In 2001, there were 436 food borne related complaints to the health department, a rate of 0.654 complaints per 100,000 population.

Food handlers' certification training is required for all food service workers. In training sessions food service workers learn how to properly prepare and store food items. As of 2001, 82% of food handlers in Multnomah County had a food handlers card. There were 33,106 food handlers with a food handlers card out of 40,571 food handlers identified from inspection reports.

Fish Advisories

The State Office of Environmental Health and Systems and the Oregon Department of Environmental Quality have issued a number of fish advisories identifying elevated levels of mercury in fish caught in the Willamette River. In Oregon, including the Willamette River, most of the mercury in fish is from volcanic and geothermal mercury minerals rather than from man-made sources, unlike much of the remainder of the U.S.⁴ However, human activities that release mercury include burning petroleum and coal, mining, smelting processes, pesticide applications and industrial discharges. Mercury is absorbed by plants and small animal life and when eaten by larger animals the mercury accumulates so that older and larger fish have the highest concentrations of mercury.

Mercury is poisonous to the human body when it reaches certain concentrations in specific organs. The nervous system (brain, spinal cord and nerves) appears to be the most sensitive to mercury effects. Excessive exposure can result in tremors, loss of sensation in extremities, vision and hearing loss, and developmental and behavioral abnormalities.⁴

Mercury is especially harmful to fetuses and to small children. Women of childbearing age are at special risk because of the effect the level of mercury in their body would have if they were to become pregnant. Babies and small children are at special risk because their organ systems are developing rapidly and are more vulnerable to damage. Limiting consumption of fish is the only way to protect against mercury exposure. Cleaning or cooking techniques do nothing to reduce mercury exposure. The Oregon Department of Human Services recommends the following guidelines for the consumption of fish from the Willamette River:

- Children six years of age and younger should not eat more than one 4-ounce fish meal every seven weeks;
- All women of childbearing age, including pregnant females and breastfeeding mothers, should not eat more than one 8-ounce fish meal per month; and
- Women past the age of childbearing, children older than six years and all other healthy adults may safely consume as much as one 8-ounce fish meal per week.⁴

Although rates of illness caused by unsafe food handling have declined since the early 1990s, the County has not met national objectives in reducing rates of foodborne illness.

Conclusion

Although rates of illness caused by unsafe food handling have declined in both Multnomah County and Oregon since the early 1990s, Multnomah County has not met national objectives in reducing rates of foodborne illness. To meet national objectives involves risk reduction activities by individuals, education of food processors, preparers and servers, and adherence to national food manufacturing regulations.

1. *Food Safety Office*. Centers for Disease Control and Prevention. Accessed: 6/28/2002. <http://www.cdc.gov/foodsafety/>
2. Preliminary FoodNet Data on the Incidence of Foodborne Illnesses: Selected Sites, United States, 2000. *Morbidity and Mortality Weekly Report (MMWR)* Centers for Disease Control and Prevention. April 6, 2001;50:13:241-6.
3. *Population estimates 2001*. Population Research Center. Portland State University. February 3, 1997 *Oregon Health Services Fact Sheet Methylmercury In Sport-caught Fish: How Does Methylmercury Affect Health?* Oregon Department of Human Services. Accessed: 3/36/03. <http://www.ohd.hr.state.or.us/esc/docs/fishfact.cfm>

Hazardous Waste

Fast Facts

- There are currently three Superfund sites in Multnomah County. Two additional sites are candidates for the Superfund program.
- There are currently 155 sites throughout Multnomah County with confirmed hazardous waste contamination.
- There are close to 3,000 reported or confirmed leaking underground storage tanks in Multnomah County. The vast majority are residential heating oil tanks.
- Since 1989, 143 hazardous waste sites have been cleaned up, and no longer pose an environmental or health threat. In addition, over 6,800 leaking underground storage tanks have been cleaned up over the past 20 years.
- Two Superfund sites in Multnomah County have been cleaned up and have been removed from the National Priorities List.

Hazardous Waste:
Potentially harmful substances that have been released or discarded into the environment.

Problem Statement

Hazardous wastes - including acids, solvents, resins, sludge, and heavy metals - are toxic chemicals, primarily generated through commercial and industrial activity. According to the Environmental Protection Agency (EPA), over 40 million tons of hazardous waste is produced in the U.S. each year. Examples of hazardous waste producers include: large industrial facilities such as chemical manufacturers, electroplating companies, and steel mills; and more common businesses such as dry cleaners, auto repair shops, hospitals, exterminators, and photo processing centers.¹

Long-term exposure to hazardous waste is linked to cancer as well as damage to the brain, kidneys, nervous system and fetal development.

According to a recent national survey, six in ten Americans feel that hazardous wastes pose a very serious health threat.² Hazardous wastes that are mishandled or spilled can contaminate the environment and can harm human health. Long-term exposure to hazardous wastes such as benzene are known to cause cancer in humans, and heavy metals such as mercury and lead can damage the brain, kidneys, the nervous system and fetal development.³

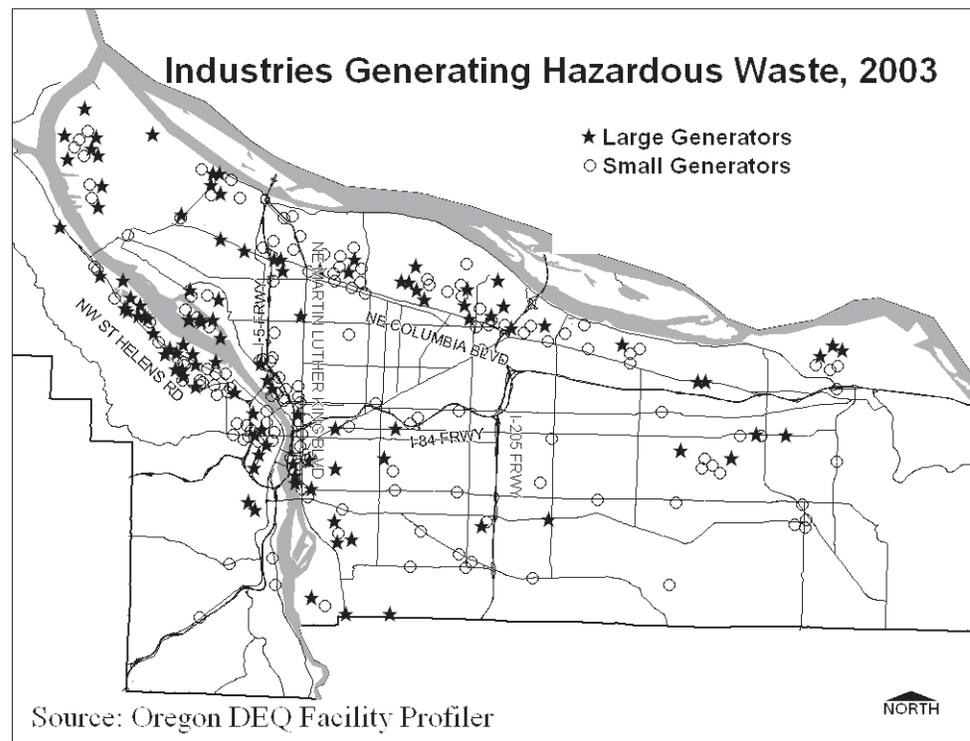
Most Large and Small Quantity Generators are located in the Northwest Industrial, North, and Northeast areas of Portland.

Hazardous Waste Sources and Amounts

Hazardous waste is usually thought to originate at a commercial or industrial facility, such as a dry cleaner or a factory. When industries or commercial properties do not properly contain or dispose of waste, or if a hazardous substance spill occurs, contamination of soil and water can occur. Contamination of the environment can also occur from residential properties, mostly through leaking underground storage tanks. Cleanup is essential in such cases to prevent harm to human health and the environment. Household hazardous wastes probably contribute significant amounts to the overall hazardous waste stream, but no data are currently available for Multnomah County. Such hazardous waste is not examined in this report.

Generators. Industries that generate hazardous waste are grouped into three separate categories, depending upon the amount they generate. **Large Quantity Generators** produce more than 2,200 pounds per month, **Small Quantity Generators** produce less than 2,200 pounds, and **Conditionally Exempt Generators (CEGs)** produce less than 100 pounds of hazardous waste. CEGs are not required to submit information on their hazardous waste. The Oregon DEQ issues permits to industries that generate hazardous waste. In 2003, there were 119 Large Quantity Generators, 160 Small Quantity Generators, and 1,162 (81% of the total) conditionally exempt generators. Most Large and Small Quantity Generators are located in the Northwest Industrial, North, and Northeast areas of Portland (see map).

Twenty of the largest 50 waste generators in Oregon are located in Multnomah County.



Multnomah County has been home to five Superfund sites over the past twenty years, with cleanup completed on two sites. Superfund sites are uncontrolled or abandoned places where hazardous waste is located.

The total amount of hazardous waste generated in Multnomah County is not available. However, data are available for Large Quantity Generators. According to a 1999 report by the EPA, Oregon generated over 81,000 tons of the total 40 million tons of hazardous waste in the United States that year. Twenty of the largest 50 waste generators in Oregon are located in Multnomah County, and these twenty generated over half - 46,000 tons- of the total Oregon hazardous waste in 1999. The top five hazardous waste generators in Multnomah County generated 43,000 tons, or 53% of the Oregon total (Table 4).⁴

Table 4
Top Five Large Quantity Generators, Multnomah County

Site Name	City	Tons Generated
McCormick & Baxter Superfund Site	Portland	33,792
Oregon Steel Mills, Inc.	Portland	6,112
Reynolds Metal Co.	Troutdale	2,321
Standard Battery	Portland	425
PCC Structural Inc.	Portland	406
Total		43,056

Source: EPA, 1999 National Biennial RCRA Hazardous Waste Report

A brownfield is any “abandoned, idled, or under-used industrial and commercial facility where expansion or redevelopment is complicated by real or perceived environmental contamination.”⁵

Superfund Sites

The EPA has the authority to cleanup the most hazardous sites in the U.S., and keeps track of over 1,200 sites through the **National Priorities List (NPL)**. The **Superfund** program is the cleanup funding source for the NPL. There have been 16 hazardous waste sites in Oregon that have been proposed or listed on the National Priorities List. Multnomah County has seven such sites, five of which were listed on the final NPL. Two sites have been cleaned up and have been removed from the NPL list (Table 5). Three Superfund sites in Multnomah County are currently undergoing cleanup.

Table 5
National Priorities List (Superfund) Sites, Multnomah County

Name	Location	Proposed Listing	Final Listing	Cleanup Completion	Removed from List
Allied Plating, Inc.	North Portland	1/22/87	2/21/90	6/29/93	11/14/93
East Multnomah Co. Ground Water Contam.	Gresham	5/10/93			
Gould Inc.	Northwest Portland	12/30/82	9/08/83	9/28/00	9/30/02
Harbor Oil	North Portland	9/05/02			
McCormick & Baxter Creos. Co.	North Portland	6/23/93	5/31/94		
Portland Harbor	North Portland	7/27/00	12/01/00		
Reynolds Metals Co.	Troutdale	8/23/94	12/16/94		

Source: U.S. Environmental Protection Agency, Oregon Department of Environmental Quality

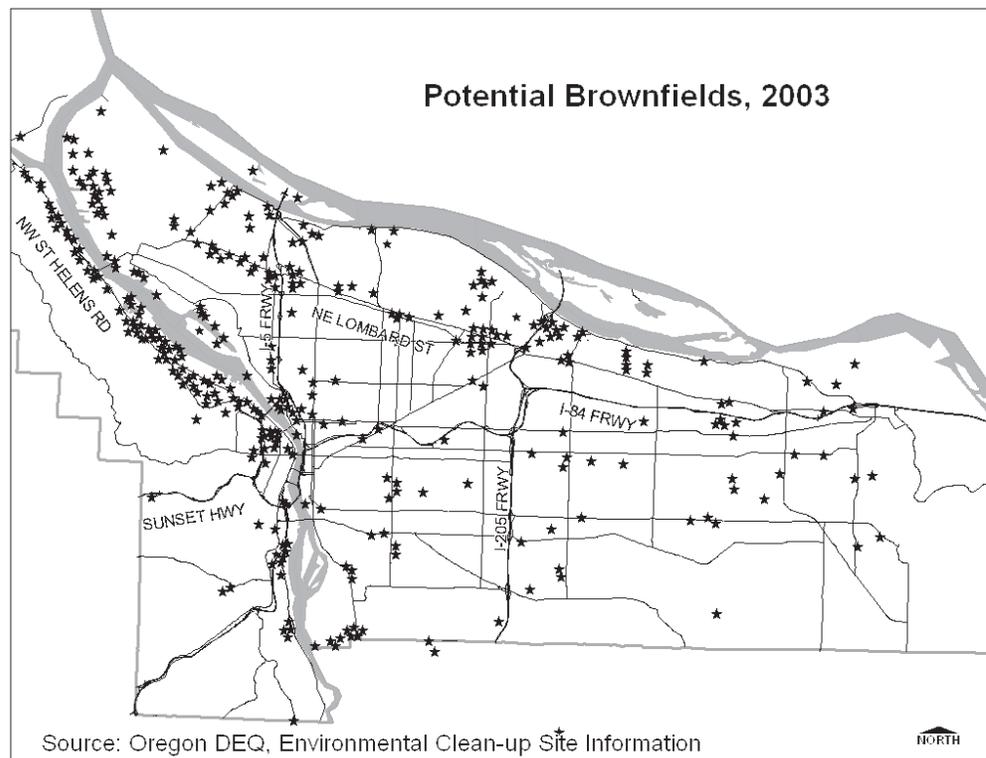
There are currently 155 sites throughout Multnomah County with confirmed hazardous waste contamination.

Brownfields

A brownfield is any “abandoned, idled, or under-used industrial and commercial facility where expansion or redevelopment is complicated by real or perceived environmental contamination.”⁵ Oregon DEQ keeps track of approximately 2,900 sites throughout Oregon with suspected, confirmed or past hazardous wastes. Although the actual number of brownfields in Multnomah County is unknown, we can approximate the number using DEQ’s Environmental Cleanup Site Information (ECSI) database, which tracks contaminated sites from 1989 to 2003. All sites listed, many of which are active businesses, have documented or suspected hazardous substance contamination (from solvents, metals, etc.) in soil, surface

water, groundwater, or sediments. Most sites listed were or are presently commercial or industrial properties that improperly handled hazardous wastes.⁶ According to ECSI data, there are currently 155 sites in Multnomah County with confirmed hazardous wastes that may harm human health or the environment. Of these 155, 105 require further investigation and cleanup of the site. In addition, Multnomah County is home to an additional 254 sites suspected to have hazardous wastes. According to ECSI data, 143 sites have been cleaned up, and no further action is required. An examination of potential brownfields (see map) reveals that most sites are in the Northwest industrial, North and Northeast areas of Portland.

In Multnomah County, the majority of leaking underground storage tanks are heating oil tanks located at residential properties.



Leaking Underground Storage Tanks

As of March 2003, the Oregon DEQ had identified over 21,000 leaking underground storage tanks in Oregon that were reported or confirmed to be leaking hazardous wastes. In most cases, the substance was petroleum. In Multnomah County, 9,789 leaking underground storage tanks have been identified over the past 20 years, with cleanup completed on 6,837, or 70%. The vast majority of tanks – 8,344 – are heating oil tanks, mostly located at residential properties. Cleanup has been completed on 82% (5,618) of heating oil tanks. About 1,400 regulated leaking storage tanks – mostly from industries and commercial businesses – have been identified, with cleanup completed on 1,165. There are close to 3,000 reported or confirmed leaking underground storage tanks in Multnomah County that have not been cleaned up. Most of these – 2,694 – are heating oil tanks, most likely located at private residences.⁷

Conclusion

There are many hazardous waste sites throughout the County - especially in Northwest Industrial, North, and Northeast Portland - that have contaminated the environment and may be posing human health risks. In many cases, health threats from hazardous waste are being reduced through state and federal programs charged with cleanup of hazardous waste sites. However, many hazardous waste sites remain. The human health impact to Multnomah County residents is unclear.

1. Hazardous Waste. U.S. Environmental Protection Agency. Accessed 04/18/2003. <http://www.epa.gov/ebtpages/wasthazardouswaste.html>
2. Pew Charitable Trusts. Prepared by Princeton Survey Research Associates. National Survey of Public Perceptions of Environmental Health Risks: Report on the Findings. Washington, DC: Georgetown University. 2000.
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4. National Biennial RCRA Hazardous Waste Report: Based on 1999 Data. U.S. Environmental Protection Agency: Washington, D.C. 2001.
5. Potential Brownfield Sites in Oregon from the Oregon Department of Environmental Quality's Environmental Cleanup Site Information (ECSI) and UST Cleanup Databases. Department of Environmental Quality: Portland, Oregon. 2003.
6. Frequently Asked Questions About ECSI – DEQ's Environmental Cleanup Site Information Database. Department of Environmental Quality: Portland, Oregon. 2003.
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Housing and Indoor Air Quality

Fast Facts

- In 2000, 1.1% (3,117 units) of housing stock in Multnomah County lacked complete kitchen facilities and 0.8% (2,252 units) lacked complete plumbing facilities.
- The percentage of overcrowding in renter-occupied units (8.7%) is higher than in owner-occupied units (2.9%).
- Lead-based paint is most prevalent in houses built before 1950. To a lesser extent, housing built between 1950 and 1978 may also have lead-based paint.
- There is a higher percentage of housing built in 1950 or earlier in the inner Northeast and Southeast neighborhoods.
- Radon levels in Oregon, according to the EPA, have been designated as of moderate or low concern.

Problem Statement

Adequate housing and good **indoor air quality** are important in providing a healthy environment for all individuals. People spend much of their time indoors. Some hazards associated with indoor environments include inadequate facilities, poor sanitation, **radon**, indoor tobacco smoke, and lead-based paint.

Radon is a colorless, naturally occurring, radioactive gas which in residential environments can be a potential source of illness for families. Radon has been directly linked to lung cancer and is estimated to cause thousands of deaths nationally each year.¹ Radon comes from the natural decay of uranium, which is found in the soils around a home. Radon can leak into the home through cracks or holes in the foundation.

Environmental tobacco smoke is defined as smoke given off by cigarettes, pipes, or cigars to which nonsmokers can be exposed. This type of **secondhand smoke** has been linked to many harmful and fatal diseases. Environmental tobacco smoke causes approximately 3,000 deaths each year among adult nonsmokers, serious lower respiratory tract infections and asthma among children, and has been linked to sudden infant death syndrome (SIDS) among infants.²

Lead is also a naturally occurring metallic element that has been mined for centuries for use in a variety of products. Lead is poisonous to humans. Exposure to lead can affect everyone, but it is especially dangerous for children aged six and younger. This is because children's developing brains and nervous systems are more sensitive to the damaging effects of lead. Lead-based paint is the most common source of lead exposure for children. Because they often put their hands and other objects in their mouths, small children are typically lead poisoned by swallowing household dust and soil contaminated with lead from old lead-based paint. The Centers for Disease Control and Prevention estimates that about half

Lead is poisonous to humans and exposure to lead can affect everyone, but it is especially dangerous for children aged six and younger.

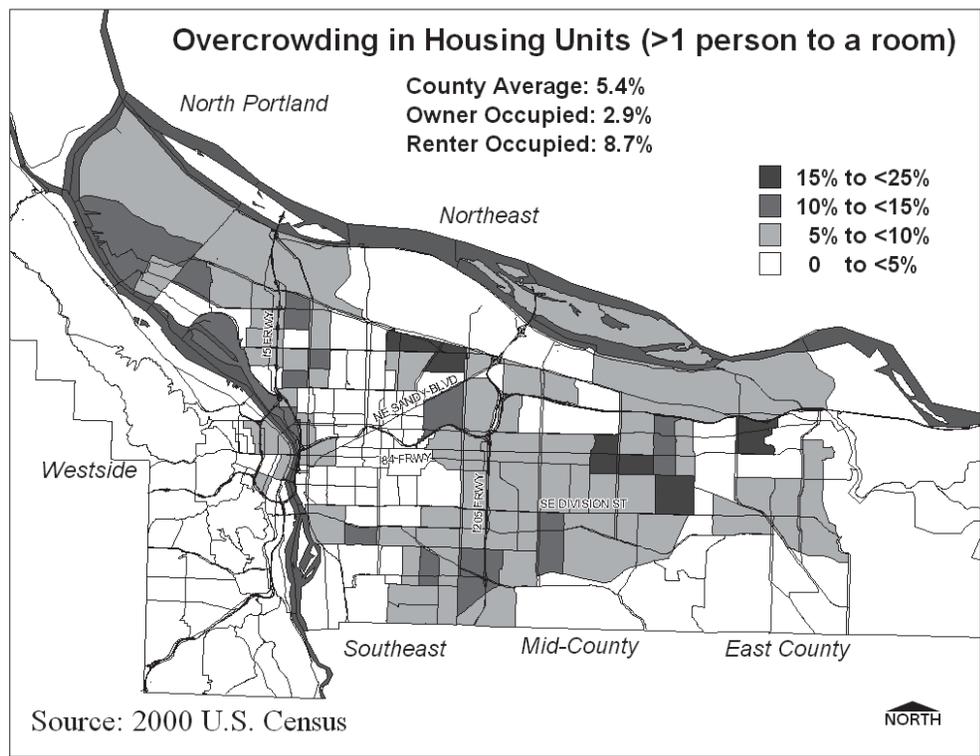
a million American children under the age of six have dangerously elevated levels of lead in their blood and that racial minority and poor children are disproportionately affected.³

Inadequate Housing

Kitchen Facilities, Plumbing Facilities and Overcrowding. Data on housing quality is found in the 2000 U.S. Census. Complete kitchen facilities are defined as a sink with piped water, a range, and a refrigerator. Complete plumbing facilities are defined as hot and cold piped running water, a flush toilet, and a bathtub or shower. A housing unit is considered crowded if it has more than one person to a room.

A housing unit is considered overcrowded if it has more than one person to a room.

Within the county, housing units that are considered overcrowded are primarily in North, Northeast and Mid-County. (see map)



In 2000, 1.1% (3,117 units) of housing stock in Multnomah County lacked complete kitchen facilities and 0.8% (2,252 units) lacked complete plumbing facilities. The percent of housing units in Multnomah County considered overcrowded is 5.4% (14,793 units). A lack of complete kitchen and plumbing facilities and overcrowding is higher among renters than among home owners. The percentage of housing without complete kitchen and plumbing facilities and those which are overcrowded is similar for Multnomah County, Oregon and the U.S. (Table 6)

Table 6
Measures of Housing Quality, 2000

	Multnomah County			Oregon	U.S.
	Owner Occupied	Renter Occupied	Total	Total	Total
Lack complete kitchen facilities	0.2%	1.9%	1.1%	1.3%	1.3%
Lack complete plumbing facilities	0.3%	1.2%	0.8%	0.9%	1.2%
Overcrowding in housing unit	2.9%	8.7%	5.4%	4.8%	5.7%

Source: Summary File 3, 2000 U.S. Census

Although testing for childhood blood lead has increased in the County, the average blood lead levels have shown a decline.

Lead Exposure

Lead Exposure Testing in Children. Children’s blood lead level testing data, both public and private, is reported to the Oregon Department of Human Services Lead-Based Paint Program which provides the data on confirmed childhood lead poisoning cases. Although testing for childhood lead poisoning is available in Multnomah County, many at-risk children are never tested for lead exposure; the actual prevalence of lead poisoning in children in the County is unknown. Blood lead levels of 10 micrograms per deciliter (µg/dL) or more can adversely affect a child’s intelligence, behavior and development. Testing for lead exposure in at-risk children is performed through the Multnomah County Health Department’s Primary Care Clinics and Immunizations Program. In 2002, 3,184 blood lead tests were conducted through the Health Department. This number is up from 2,886 in 2001 and 1,936 in 2000. Children are also tested through private physicians and community-based screening clinics.

Testing of children through the Multnomah County Health Department indicates 1% of those children who are actually tested have confirmed elevated **blood lead levels**. The Oregon Department of Human Services, Lead-Based Paint Program tracks the number of children county-wide who have tested positive for elevated blood lead levels (Table 7). Although testing for childhood blood lead has increased in the County, the average blood lead levels have shown a decline. The Healthy People 2010 objective is to eliminate elevated blood lead levels in children age one to six.

Table 7
Confirmed Childhood Lead Poisoning Cases*, Multnomah County

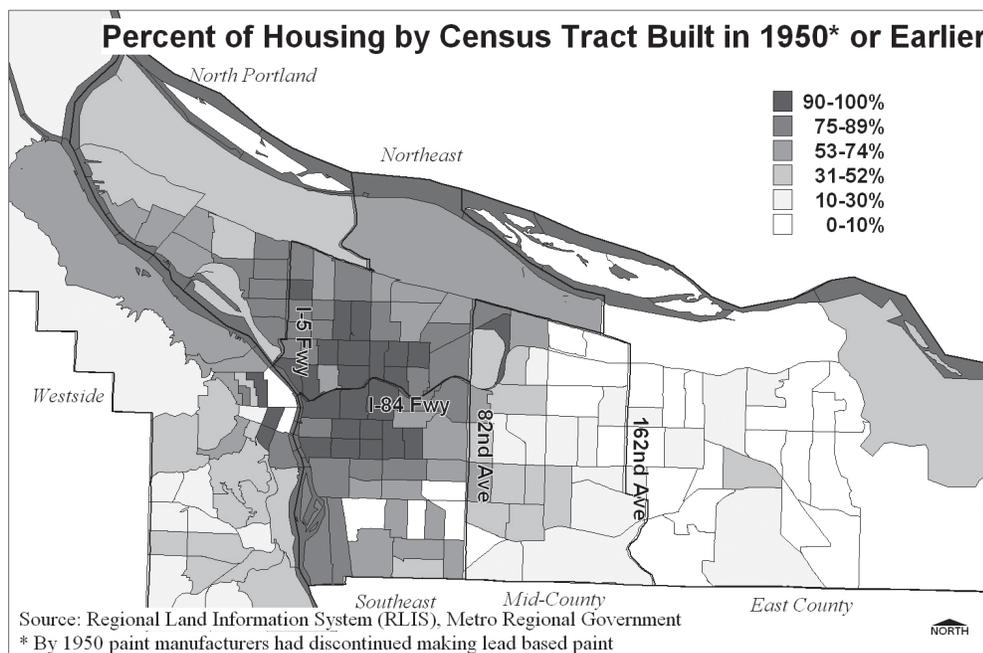
	1993	1994	1995	1996	1997	1998	1999	2000	2001
≥10_g/dL	94	90	63	49	39	58	56	64	44
≥15_g/dL	32	31	20	18	13	21	20	19	17

Source: Oregon Department of Human Services, Lead-Based Paint Program
*70% of the cases were determined to be caused by leaded house paint

Lead-based paint in housing. Lead-based paint is most prevalent in houses built before 1950. To a lesser extent, housing built between 1950 and 1978 may also have lead-based paint. By the early 1950's most paint manufacturers had discontinued producing lead-based paint. However, it was not until 1978 that a ban on manufacturing lead-based paint was enacted. According to the 2000 U.S. Census, 40% of Multnomah County's housing units were built before 1950 and 79.6% were built in 1979 or earlier.

The map below shows the percent of housing built in 1950 or earlier by census tract. In inner Northeast and Southeast neighborhoods there is a higher percentage of housing built in 1950 or earlier.

A February 2001 Multnomah County Health Department (MCHD) study looked at the prevalence of **household lead dust** hazards in North, Northeast and Southeast Portland housing built before 1930. It was found that 71% of homes in the study had lead dust levels that exceeded federal standards. It is important to note also that, at the time the study was conducted, the federal standards were 50% less stringent than they are today. The Healthy People 2010 objective recommends that 50% of people living in pre-1950s housing have their housing tested for the presence of lead-based paint.



MCHD provides environmental lead investigations in those homes where a child has been identified with a confirmed blood lead level of 15 ug/dL or higher. The investigation is designed to assist the family in determining the source or sources of lead exposure, to make recommendations for exposure prevention, and

to identify resources available to the family for lead hazard reduction. MCHD also provides educational materials and resource referrals to families whose children are confirmed at 10 – 14 ug/dL or are unconfirmed at levels of 10 ug/dL or higher. The Health Department, in partnership with the City of Portland, provides lead poisoning prevention education, information, and referral to appropriate assistance programs through the LeadLine.

While childhood blood lead testing in Oregon has increased by approximately 44% between 1999 and 2001, average blood lead levels have shown a decline. However, there are still many at-risk children living in the County who are never tested for lead. Less than 5% of children less than 6 years of age are tested for blood lead.⁴ Therefore, the actual prevalence of childhood lead poisoning in the County is unknown.

Indoor Air

Radon. Radon levels in Oregon, according to the EPA, have been designated as of moderate or low concern on a scale from low to moderate to high.⁵ The EPA has designated Multnomah County of “Moderate Potential” for radon exposure. This means that the average radon measurements for homes in the region should be in the range of two to four picocuries per liter (pCi/L). Data available from Oregon Department of Human Services, Oregon State Radiation Protection Services show radon levels are within such a range. Of 998 homes tested in Multnomah County, the average level of radon was 3.1 pCi/liter. This is higher than the national average indoor radon level of 1.3 (pCi/L). There were 253 homes (25%) in Multnomah County which tested higher than 4 pCi/liter.⁶ The Healthy People 2010 objective is to assure that 20% of the population live in homes that have been tested for radon concentrations and that there is an increase in the number of new homes constructed to be radon resistant.

Environmental Tobacco Smoke. Secondhand smoke has been linked to many harmful and fatal diseases. Children are especially vulnerable, and it has been estimated that 43% of those two months to 10 years live in a home where a tobacco smoker is present. Furthermore, 37% of adults lived in a home with at least one smoker.⁷ An analysis by Oregon Public Health Services indicates that 24% of adults in Multnomah County are tobacco smokers. It has also been estimated that in a typical week, 28% of County residents are exposed to secondhand smoke and indoor air housing quality in Multnomah is generally good.⁸

Conclusion

Housing and indoor air quality in Multnomah County is generally good. Renter-occupied housing units have a higher percentage of a lack of complete kitchen and plumbing facilities and a higher percentage of overcrowding than owner-occupied housing. Potential exposure to radon has been deemed moderate for Multnomah County. Exposure to environmental tobacco smoke is of concern for

young children when there is a tobacco smoker in the home. While testing of childhood blood lead levels has increased, the incidence of lead poisoning has decreased. However, less than 5% of children recommended for testing are receiving blood lead testing.

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Land Use and Community Design

Fast Facts

- Community design is being increasingly viewed as a factor influencing the environmental quality and safety of cities, and may be partially responsible for the decline in physical activity and the increase in overweight and obesity among city inhabitants.
- In a 1994 Multnomah County survey, 13.6% of trips were made by walking or bicycling compared with 79% made by auto.
- While the rate of motor vehicle crash fatalities is consistently lower in Multnomah County than in Oregon and the U.S., motor vehicle accidents were the leading cause of death of Multnomah County and Oregon children age 1 to 17 years for the period 1997-2000.
- There has been a steady increase in recent years in the number of adults in Multnomah County, Oregon and the U.S. who are at risk of overweight-related health problems.
- Only one quarter of adults in Multnomah County participated in recommended physical activity of at least 30 minutes 5 times a week in 2000.
- Only 34% of 8th graders and 29% of 11th graders participated in moderate physical activity 5 times or more a week in 2001.

Problem Statement

Understanding the environmental consequences of how we build our cities is an important public health issue. Community design and transportation systems can significantly impact the lifestyle and personal health of individuals. Up to twice as many people may walk or cycle in neighborhoods that have good public transportation than in neighborhoods that are designed for automobile use.³ In neighborhoods with square city blocks, people walk up to three times more than in neighborhoods with cul-de-sacs or other features that keep streets from connecting.³ Directly related to this is **physical activity**, which is one of the key elements in maintaining personal health. A 1996 surgeon general report concluded that a **sedentary lifestyle** is a primary factor in more than 200,000 deaths each year.¹ Cardiovascular disease, diabetes, hypertension, obesity and osteoporosis are linked to a sedentary lifestyle. At least one-third of all cancers are attributable to poor diet, physical inactivity, and being overweight.² In Multnomah County planners in the areas of transportation, land use design and public health are only just beginning to understand, analyze and evaluate the environmental and health impacts of the built environment.

Transportation

North Americans are much more likely to use a car for transportation than are Europeans. In 1996, for example, the car was the mode of transportation for 84% of all U.S. trips in urban areas compared to 36% of all trips within urban

*Community design
and transportation
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areas in Sweden.³ In the U.S., 25% of all trips made are less than one mile, and 75% of these trips are made with a car.¹

Although auto use for commuting to work is high within Multnomah County, it is lower than auto use for commuting to work in the State and nationally. Multnomah County has a well-developed transit system, along with pedestrian and bicycle advocacy groups that promote walking and biking. Data on commuting patterns can be found in the 2000 U.S. Census. The data are based on the long form questionnaire which was distributed to 1 in 6 American households during 1999. The census reports that walking, bicycling or other means (scooters, skateboards, roller blades etc.) comprise 7 percent of work commute trips in Multnomah County compared to 4.1 percent of work commute trips nationwide (Table 8).

Table 8 shows Multnomah County has a higher percentage of commute trips for work made by single drivers than San Francisco County (principal city – San Francisco) but lower than Pierce County, Washington (principal city – Tacoma). San Francisco County has two and a half times the percentage of work commute trips by public transit and twice the percentage of trips by walking than Multnomah County. Compared to the Nation, Multnomah County has twice the number of work commute trips made by public transit and four times the percent of trips by bicycle.

Table 8
Commuting Patterns, Multnomah County and Select Counties, 2000

Work Commute Trips	Auto Alone	Auto Carpool	Public Transit	Walk	Bicycle	Motorcycle /Other	Work at home
San Francisco County, CA	41.1%	9.3%	32.1%	8.8%	1.8%	2.1%	4.8%
Multnomah County	65.2%	12.2%	11.9%	3.9%	1.9%	0.9%	4.2%
Pierce County, WA	77.8%	12.2%	3.5%	1.3%	0.7%	0.8%	3.6%
Oregon	73.6%	12.6%	3.8%	3.2%	1.2%	0.8%	4.5%
United States	75.7%	12.2%	5.2%	2.7%	0.4%	1.0%	3.2%

Source: 2000 U.S. Census Supplementary Survey

Mixed use development is land use development in which there are multiple uses- residential, commercial, light industrial- in the same development.

San Francisco, California and Pierce County, Washington were identified as peer counties to Multnomah County by the Health Resources and Services Administration of the U.S. Department of Health and Human Services. Peer counties are based on population composition and selected demographics and can be used to compare differences in a community’s health.

People who live in areas with **mixed use development** and good access to transit (bus, streetcar, light rail) are more likely to use alternative transportation. Mixed use development is land use development in which there are multiple uses in the

same development; this includes a commingling of residential, retail, commercial, light industrial, entertainment, and institutional development. In 1994, the Metro Regional Government surveyed 6,000 households in Clackamas, Multnomah, Washington and Clark Counties on their travel behavior. Households kept a two-day diary of activities and tracked how they traveled to those activities. The survey showed that areas with good transit and mixed-use development had a higher percentage of trips by walking or biking than did areas with good transit access and single use development (Table 9). Increasing physical activity through walking and biking as alternative forms of transportation can be supported through land use development and transportation design. The Healthy People 2010 objective is to increase the proportion of trips made by walking for adults by 25% and for children (age 5 to 15 years) by 50%. The objective to increase the proportion of trips made by bicycling is 2% for adults and 5% for children.

Table 9
Travel Behavior Survey Results (for all trip purposes),
Multnomah County, 1994

All Trips	Auto	Transit	Walk	Bicycle	Other
Good Transit/ Mixed use	58.1%	11.5%	27.0%	1.9%	1.5%
Good Transit Only	74.4%	7.9%	15.2%	1.4%	1.1%
All Land Use Types	79.0%	4.9%	12.0%	1.6%	2.5%

Source: Metro Regional Framework Plan, 1997

Motor Vehicle Accidents

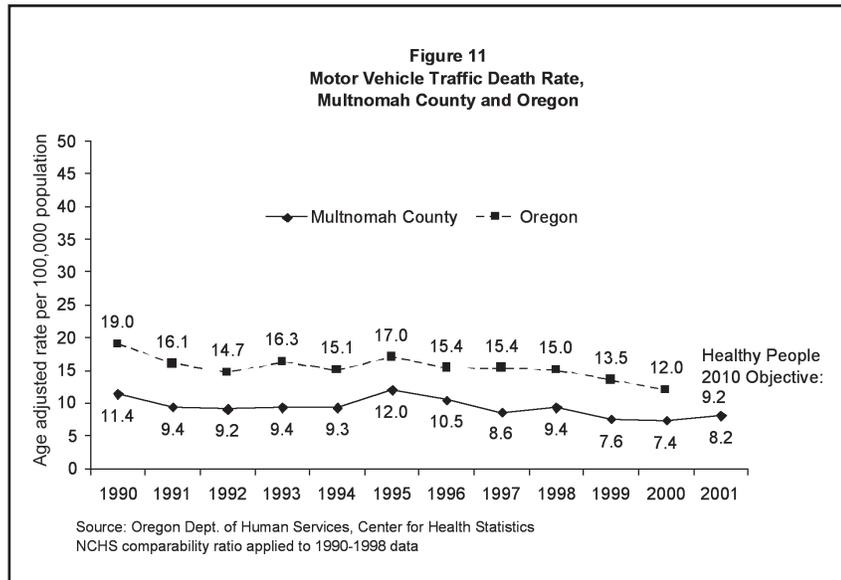
In Multnomah County and the Nation, the leading cause of unintentional injuries is motor vehicle accidents. Public health efforts to prevent motor vehicle injuries have been highly successful. According to the National Center for Injury Prevention and Control, 240,000 lives were saved between 1966 and 1990 because of improved motor-vehicle and highway design, increased use of safety belts and motorcycle helmets, and enforcement of laws regarding driving under the influence of alcohol and speeding.⁴

Most unintentional injury deaths are preventable. Compared to the United States, Oregon has a high motor vehicle safety restraint use, with 91% of adults and 69% of children aged 0-4 using safety restraints.⁵ A new “booster seat” law became effective in Oregon on January 1, 2002 and requires drivers to use approved booster seats for children aged 4-6 years or 40-60 pounds.

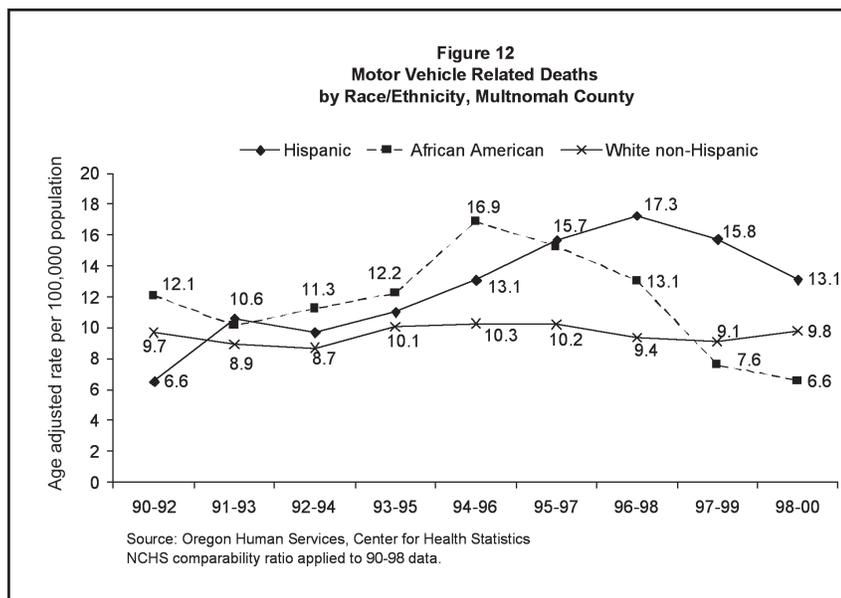
Motor vehicle traffic deaths. Data on motor vehicle traffic deaths comes from Oregon Department of Human Services vital statistics records, which are maintained and reported by the Center for Health Statistics. The rate of motor vehicle traffic deaths in Oregon has declined since 1995. Multnomah County is

In Multnomah County and the nation, the leading cause of unintentional injuries is motor vehicle accidents.

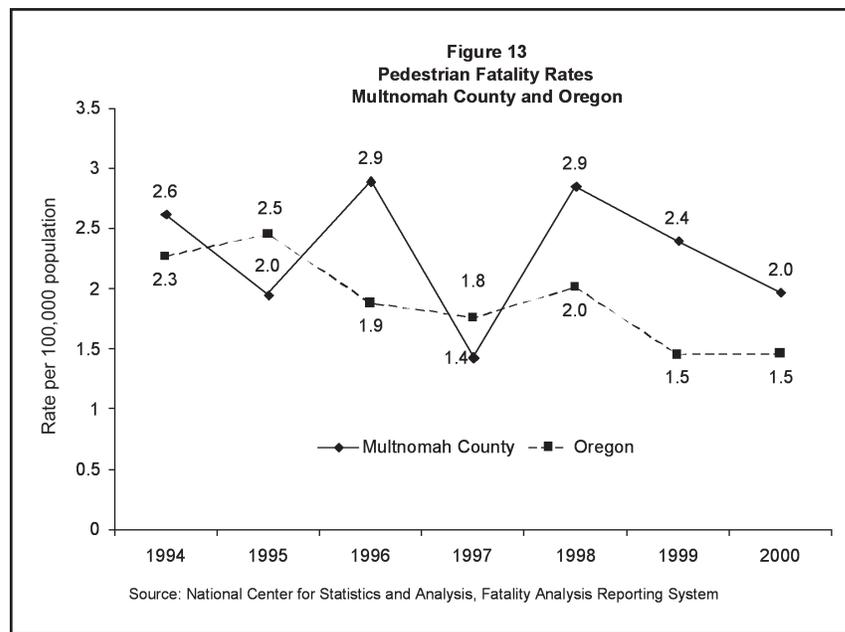
consistently lower in motor vehicle traffic deaths than Oregon and has met the Healthy People 2010 objective (Figure 11).



Motor vehicle-related deaths. Motor vehicle-related deaths include both traffic and non-traffic deaths. Traffic accidents are accidents occurring on a public trafficway, while non-traffic accidents are vehicle-related accidents occurring any place other than a public trafficway. Motor vehicle-related deaths among the Hispanic population increased in the early 1990's, but have decreased in recent years; such deaths among Hispanics are still higher than other racial and ethnic groups (Figure 12). The rates for African American and Asians have decreased, while the rates for White non-Hispanic have remained relatively steady. There were too few American Indian motor vehicle-related deaths to calculate rates.



Pedestrian deaths. Pedestrian fatalities resulting from a motor vehicle traffic accident are the second-leading cause of motor vehicle-related deaths, following occupant fatalities.⁶ Pedestrian fatalities are monitored by the Fatality Analysis Reporting system of the National Center for Statistics and Analysis. The Fatality Analysis Reporting system defines a fatality as a police-reported crash involving a motor vehicle in transport on a trafficway in which at least one person dies within 30 days of the crash. A crash is defined as an event that produces injury and/or property damage, involves a motor vehicle in transport, and occurs on a trafficway or while the vehicle is still in motion after running off the trafficway.⁷ Although pedestrian fatality rates have declined in Multnomah County since 1998, the rate is higher than the Healthy People 2010 objective of 1.0 pedestrian deaths per 100,000 population (Figure 13).

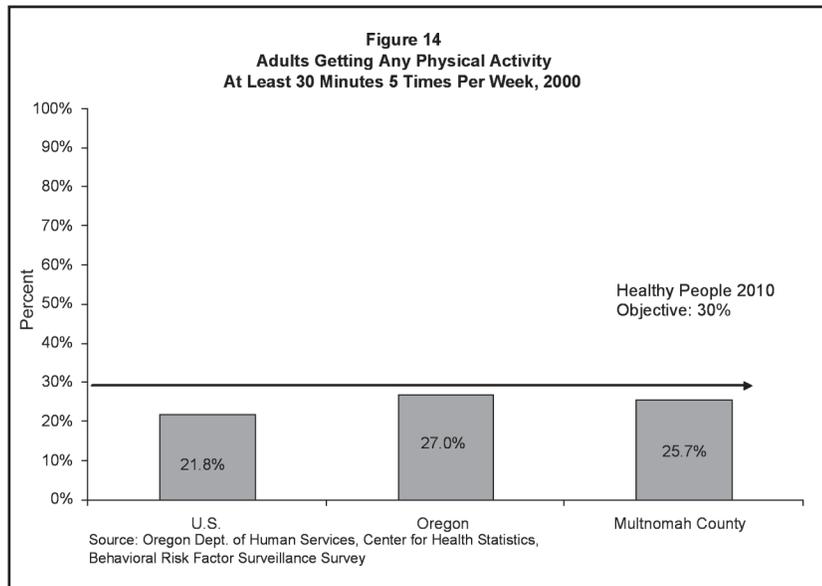


In Multnomah County, only one quarter of adults participate in regular physical activity.

Physical Activity

The design of the built environment can determine the ease of walking and biking and can have an effect on the amount of physical activity people engage in.

Physical Activity in Adults. The Behavioral Risk Factor Surveillance Survey (BRFSS) is a telephone health survey of adults developed by the Centers for Disease Control and Prevention and conducted at the state level. The BRFSS collects information on nutrition, activity, health status and other topics. The 2000 BRFSS reports that, in Multnomah County, one quarter of adults participate in physical activity at least 30 minutes 5 times a week (Figure 14). Although higher than the nation wide percentage, Multnomah County, does not meet the Healthy People 2010 objective.

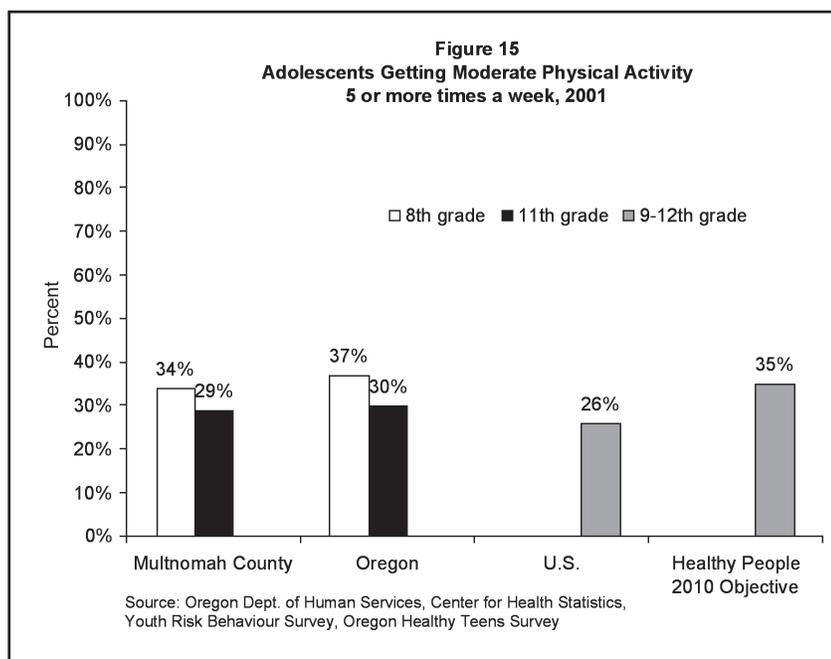


Moderate physical activity: Activities that use large muscle groups and are at least equivalent to brisk walking. Activities may include walking swimming, cycling, dancing, gardening and yard work.

Physical Activity in Adolescents. The Youth Risk Behavior Survey (YRBS) is a voluntary health survey of 9th through 12th graders developed by the Centers for Disease Control and Prevention, and carried out every other year by the State of Oregon prior to 2001. In 2001, the Oregon Department of Human Services developed the Oregon Healthy Teens survey, a yearly survey combining the YRBS and the Student Use Survey conducted by the former Office of Alcohol and Drug Abuse Prevention. Oregon Healthy Teens reports data on 8th and 11th graders.

Although the percentage of Multnomah County 8th and 11th graders participating in **moderate physical activity** for 30 minutes at least 5 days per week was somewhat higher than the national average in 2001, it did not meet the Healthy People 2010 objective and was lower than the state (Figure 15). Among the major barriers

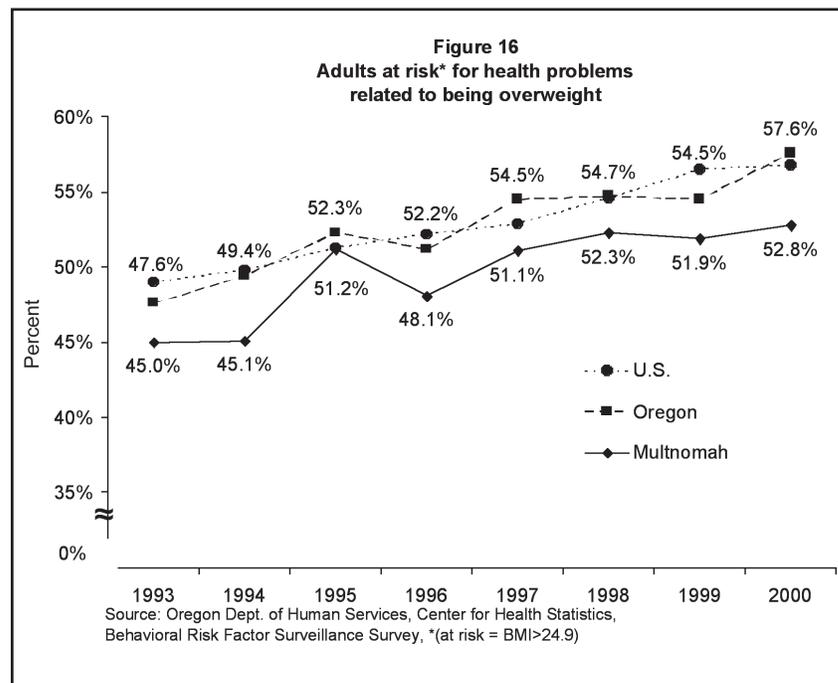
With over half of the adult population at risk for health problems related to being overweight, Multnomah County is far from reaching the Healthy People 2010 objective of 60% of adults at a healthy weight.



Healthy People 2010 identifies most adult and adolescent face when trying to increase physical activity are lack of time, lack of access to convenient facilities, and lack of safe environments in which to be active.

Body Weight

Body Mass Index. **Body mass index (BMI)** is a method of estimating fitness based on a person's height and weight. There is consensus that a BMI of between 18.5 and 25 is a healthy weight range for adults (World Health Organization, National Institutes of Health, Department of Health and Human Services, U.S. Department of Agriculture). A BMI of 25 or greater can lead to health problems associated with being overweight or obese. Although the proportion of adults in Multnomah County who are at risk of health problems related to being overweight is consistently lower than Oregon and the Nation, there has been a steady increase in all population groups (Figure 16). With over half of the adult population at risk for health problems related to being overweight, Multnomah County is far from reaching the Healthy People 2010 objective of 60% of adults at a healthy weight. Among adolescents in 2001, 8.1% of 8th graders were overweight and 7% of 11th graders were overweight. The Healthy People 2010 objective is to reduce the proportion adolescents who are overweight or obese to 5%.



Conclusion

Public health has an important role to play in supporting land use development, transportation design and fostering opportunities for parks and recreation - all of which promote an increase in physical activity with support of alternative forms of transportation.

While motor vehicle traffic fatalities account for the largest percentage of unintentional injury deaths in Multnomah County, the rate of motor vehicle traffic fatalities is lower than both Oregon and the U.S. Motor vehicle-related death rates of Hispanics have decreased in recent years, however, they are still higher than for White non-Hispanics.

Physical activity is important in preventing and reducing injury and illness, including many chronic diseases. In Multnomah County, adolescents are doing better than adults at meeting physical activity objectives. Although the proportion of adults in Multnomah County who are at risk of health problems related to being overweight is consistently lower than Oregon and the U.S., there has been a steady increase in all population groups. Only one quarter of adults in Multnomah County participate in physical activity at least 30 minutes 5 times a week, while 34% of 8th graders and 29% of 11th graders are getting moderate physical activity 5 times a week or more.

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Occupational Health

Fast Facts

- As of July 1, 2000, most businesses, including restaurants, are required to be smoke free throughout Multnomah County.
- There were a total of 6,115 accepted work related disabling claims in Multnomah County in 2001, down from a high of 8,366 claims in 1990.

Problem Statement

Workplace injuries and illness are significant issues in the United States. There were 3.8 deaths per 100,000 workers nationally, in 2000 and nearly 4 million American workers suffered disabling injuries on the job. Work injuries cost Americans \$131.2 billion in 2000.¹ This amount included the sum of lost wages, lost productivity, administrative expenses, health care, and other costs. A **work related injury** is any personal injury incurred by a worker while on or off the work site but engaged in work-related activities. Injuries include cases such as a cut, fracture, sprain, or amputation. Illnesses include both acute and chronic illnesses, such as a skin disease, respiratory disorder, or systemic poisoning.²

Occupational injury and illness rates drop:

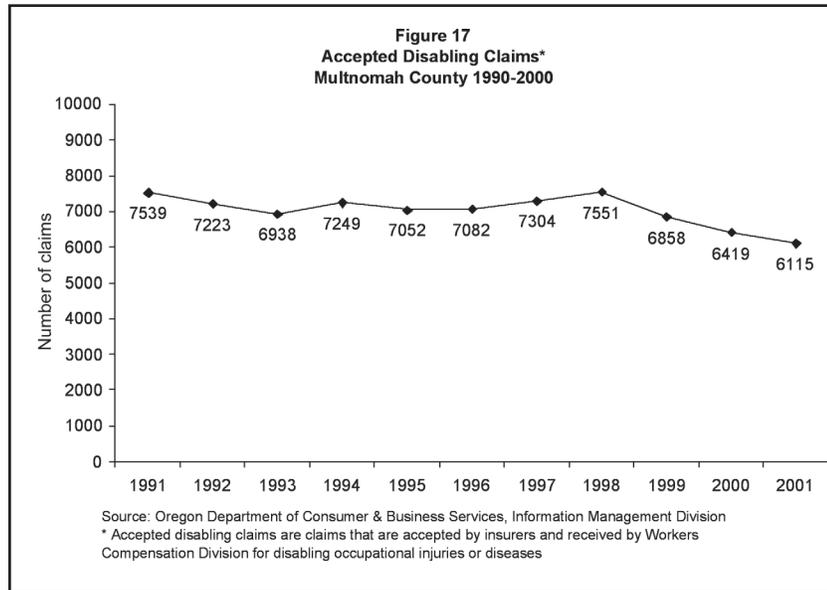
Nationally in 2000, occupational injury and illness rates dropped to their lowest level—6.1 injuries per 100 full time workers.

Researching and implementing effective prevention strategies to protect worker safety and health is an important public health function. In 2000, national occupational injury and illness rates dropped to their lowest level—6.1 injuries per 100 full time workers—since the data collection started. This drop continued an eight-year downward trend.³ In Oregon the occupational injury and illness rate was 6.3 per 100 full time workers in 2000.

Work-related Injury and Fatality

Disabling claims. Disabling claims information is provided by Oregon Workers Compensation Division as reported by the Oregon Department of Consumer and Business Services, Information Management Division. There were 6,115 disabling claims accepted by workers compensation insurers in 2001 for injuries occurring in Multnomah County. There has been a decline in accepted disabling claims in both Oregon and Multnomah County in recent years (Figure 17). The decline could be due to a number of factors: declining numbers of accepted disabling claims from an expanding pool of workers; workers compensation reforms; and changes in claims handling procedures and claims management by insurers and employers. There has also been a shift in Oregon's economy, with fewer workers in the hazardous wood products industry and more workers in comparatively safer high-tech and service industries. Finally, an increased emphasis on safety and health among employers and workers may also be a factor in the decline.⁴

The majority, 81%, of all disabling claims were in one of five sectors: services, manufacturing, retail trade, transportation/public utilities and construction in



the county (Table 10). These five sectors accounted for the largest number of claims for the State in 2001.

The specific industries in each sector are as follows:

- Services: hotel, legal, health, educational, social, and auto.
- Manufacturing: logging, furniture, metal industries, fabrication, and industrial machinery.
- Retail trade: automotive dealers, apparel, furniture, and eating and drinking establishments.
- Transportation/public utilities: railroad, trucking, air, electric, gas and sanitary services.

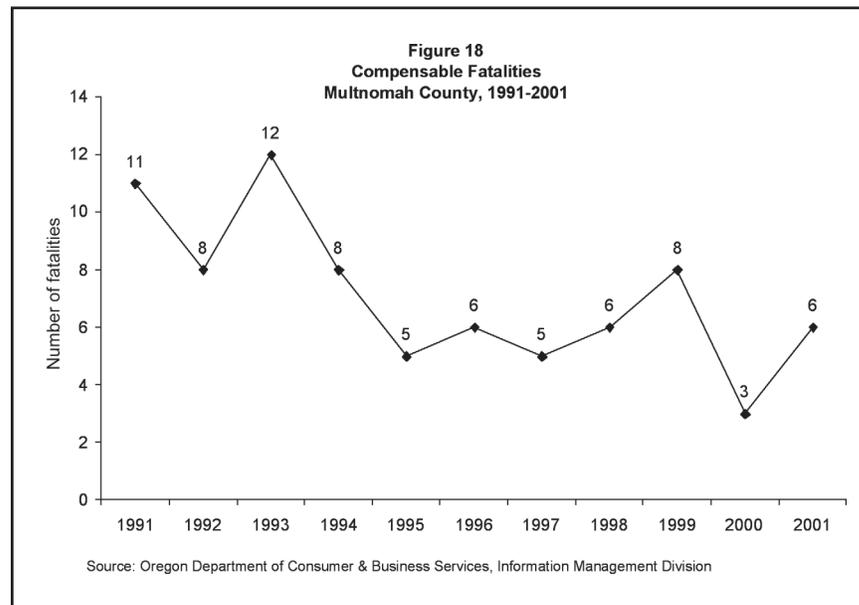
Table 10
Disabling Claims by Sector

Sector	% Disabling Claims 2001	% Average Covered Employment* 2000
Services	22.6%	30.9%
Manufacturing	19.2%	11.4%
Retail Trade	16.3%	16.4%
Transportation/ public utilities	14.1%	7.4%
Construction	8.5%	4.8%
% of Total	80.7%	70.9%

Source: Oregon Dept. of Consumer & Business Services, Information Management Division; Oregon Employment Dept. *Covered Employment refers to workers covered by unemployment insurance

While services, manufacturing, retail trade, transportation/public utility, and construction sectors make up 81% of injuries they also account for 71% of covered employment in the County in 2000. Covered employment refers to workers covered by unemployment insurance. There are twice as many claims as might be expected from the transportation/public utilities and construction sectors. Transportation/public utilities make up 7.4% of covered employment but their percent of disabling claims is 14% while construction makes up 4.8% of covered employment and 8.5% of disabling claims.

Workplace fatalities. There are very few deaths from work-related injuries in Multnomah County (Figure 18). Because the State does not calculate the total number of workers covered by workers compensation for each county, a county



fatality rate cannot be calculated. For Oregon in 2001, the rate of work related fatality was 3.1 per 100,000 workers. The U.S. rate in 2000 was 3.8 per 100,000 workers. The Healthy People 2010 objective for reducing deaths from work-related injuries is 3.2 per 100,000 workers aged 16 years and older.

Workplace Air Quality

Indoor air quality is associated with the environmental quality of a workplace. As of July 1, 2000, most businesses in Multnomah County, including restaurants, are required by county ordinance to be smoke free. The Countywide smoke free workplace ordinance exempts bars, bars in restaurants, bingo parlors, truck stops, racecourses, billiard halls, tobacco retail stores and rented hotel and motel sleeping rooms. The purpose of the ordinance is to protect workers from the known health dangers of secondhand smoke, which is classified by the EPA as a known human carcinogen. Compliance with the ordinance has been excellent. More than 47,000 businesses in Multnomah County are subject to the law. During the first year there were only 128 complaints. Most of these complaints were ameliorated by education resulting in only 19 citations. The following year, when fines were levied and implemented, there were 167 complaints resulting in only 5 citations. In 2002, a statewide smoke free workplace law went into effect on January 1. This statewide law further requires billiard halls, truck stops and racecourses in Multnomah County to be smoke free, thus enhancing smoke free workplace air quality. Efforts to promote voluntary smoke free workplace policies continue.

Conclusion

There has been a decline in accepted disabling claims in both Oregon and

Multnomah County in recent years. While the services and manufacturing sectors have the highest percentage of disabling worker claims and make up the largest percentage of covered employment in the county, transportation/public utilities and construction have twice the percentage of disabling claims as they do percentage of covered employment. As of July 1, 2000, most businesses, including restaurants, are required to be smoke free throughout the County.

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Outdoor Air Quality

Fast Facts

- Multnomah County has been in compliance with standards for select pollutants since 1997. By comparison, eight counties in Oregon, and 318 counties throughout the United States are not in compliance for select pollutants as of July 2002.
- Fourteen toxic outdoor air pollutants in the County exceed health-based benchmarks, with 6 pollutants more than 10 times the benchmark.
- Most of the County exceeds the federal cancer risk benchmark for toxic air pollutants, with many areas in North and Northeast Portland reaching cancer risk rates higher than 100 per million.
- Motor vehicles, especially cars, account for the vast majority of air pollutants in Multnomah County. In 1996 and 1999, they accounted for 52% of toxic air pollutants, and 77% of criteria pollutants, respectively.

Children, the elderly, and those living next to heavy traffic are especially vulnerable to diseases associated with bad air, including asthma.

Problem Statement

Air pollution can make people sick. It is estimated that up to 100,000 deaths per year in the United States are associated with air pollution.¹ Bad air has been linked to asthma, bronchitis, high blood pressure, heart disease and lung cancer.²⁻⁵ Children, the elderly, and those living next to heavy traffic are especially vulnerable to diseases associated with bad air. One scientific study found that ground-level ozone (created mostly by vehicle exhaust) may be a contributing factor in the development of childhood asthma.⁶ Cars and trucks are an important cause of air pollution. A recent study found that those living close to highways and major roads were twice as likely to die from heart and lung diseases as those who did not.⁷

According to the U.S. Environmental Protection Agency (EPA), more than 170 million tons of air pollutants are released into the air each year in the U.S., and more than 130 million people in 2001 lived in counties where air was unhealthy at times because of high levels of at least one of six principal air pollutants. Still, our air is cleaner now than in the past. Due in part to federal and state regulations designed to reduce air pollution, total emissions of select air pollutants in the U.S. between 1970 and 2001 have declined by 25%.⁸

Criteria pollutants:

Carbon monoxide, ozone, nitrogen dioxide, particulate matter, sulfur dioxide, and lead. All known to be unhealthy at high levels or with prolonged exposure.

Criteria Pollutants

The federal Clean Air Act of 1970 seeks to protect people from the harmful effects of poor air quality, and calls upon the EPA to regulate air pollutants. This act sets standards for six pollutants, called **criteria pollutants**, which are known to be unhealthy at high levels or with prolonged exposure (Table 11). These criteria pollutants have very well known health effects. Exposure to such pollutants can cause respiratory and cardiovascular problems such as asthma, aggravation of heart disease, and lung cancer. Two criteria pollutants that stand out are **ozone** and

Table 11
The Six Criteria Pollutants

Pollutant	Major Sources	Health Effects
Carbon monoxide	Motor vehicles	Aggravation of cardiovascular diseases; visual impairment
Ozone	Motor vehicles, factories	Chest pain, cough, asthma
Nitrogen dioxide	Motor vehicles, power plants	Respiratory problems, and long-term respiratory infections; irreversible lung damage
Particulate matter	Motor vehicles, power plants, industrial facilities,	Heart and lung diseases; aggravation of asthma, bronchitis
Sulfur dioxide	Industrial facilities, coal-fired power plants	Respiratory problems, aggravation of cardiovascular diseases
Lead	Industrial facilities	Kidney, liver, nervous system damage; decreased IQ; high blood pressure

Source: Oregon Department of Environmental Quality

particulate matter. The vast majority of areas in the U.S. that had bad air days exceeded safe levels of one or both of these pollutants.⁸

According to the Oregon State Department of Environmental Quality (DEQ), there are currently eight criteria air monitoring locations throughout Multnomah County, continually measuring levels of lead, particulate matter, carbon monoxide, and nitrogen dioxide (see map for locations).

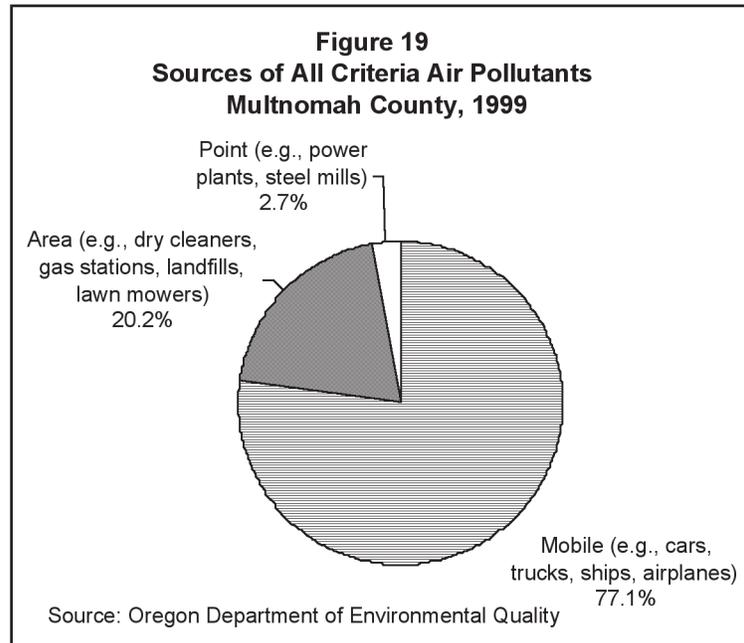


Nonattainment areas:
A locality where air pollution levels persistently exceed EPA's National Ambient Air Quality Standards.

Multnomah County has acceptable levels of criteria air pollutants and has been in compliance with criteria pollutant standards since 1997.

Levels of carbon monoxide, ozone, and large particulate matter have declined or not changed between 1990 and 1999 in the Portland-Vancouver area, despite significant population growth.

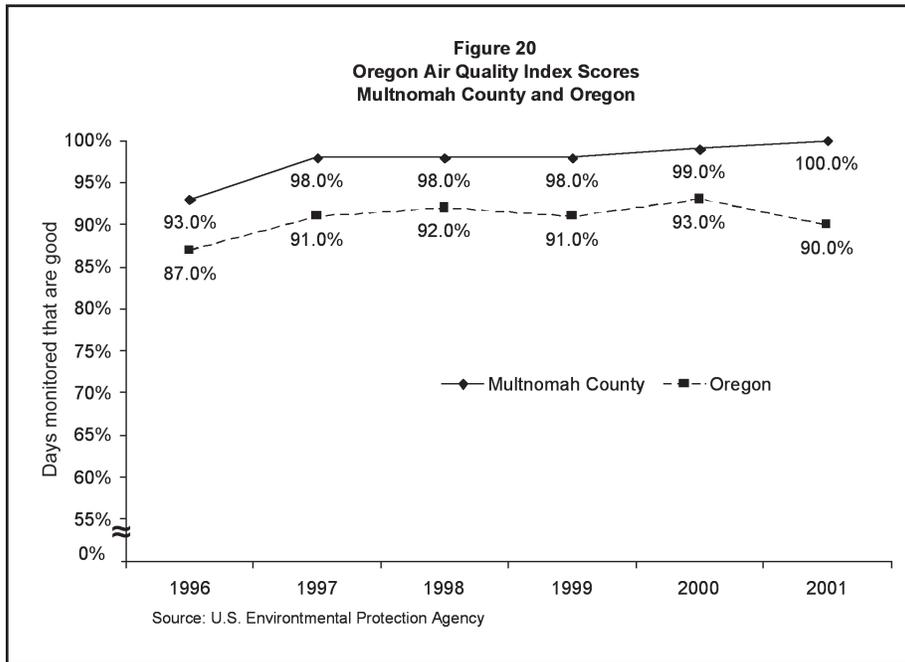
Sources. Oregon DEQ data indicate that almost 290,000 tons of criteria air pollutants were released in Multnomah County in 1999, representing 8% of the Oregon total. Criteria air pollutants in Multnomah County are grouped into three sources, with the vast majority (77%) in 1999 – over 220,000 tons – coming from motor vehicles such as cars, trucks, ships, and airplanes. Area sources such as dry cleaners and gas stations contributed over 58,000 tons, about 20% of total criteria emissions. Point sources from industries contributed only 3% of criteria emissions, about 7,800 tons (Figure 19).



Nonattainment areas. The Oregon DEQ and the EPA closely monitor criteria pollutants, and place strict standards on their levels. As a result of violations of criteria pollutants, EPA designates counties (or parts of counties) as **nonattainment areas**. As of July 2002, Multnomah County had acceptable levels of criteria air pollutants and has been in compliance with criteria pollutant standards since 1997. The County, therefore, meets national Healthy People 2010 objective for criteria air pollutants (the objective is that no residents should breathe criteria air pollutants above the EPA standard). Eight counties in Oregon have a nonattainment designation in parts of their counties, mostly for violations of particulate matter levels. Six counties in Oregon are designated as nonattainment counties due to violations of particulate matter levels, and two counties are not in compliance with ozone and **carbon monoxide** standards. Nationwide, more than 300 counties were designated nonattainment areas as of July 2002.

Air data for the Portland-Vancouver area for 1990 – 1999 indicate that levels of three of the criteria pollutants – carbon monoxide, ozone, and large particulate matter – are declining or not changing, despite significant population growth in the region. Carbon monoxide levels, for example, have declined 40% between 1990 and 1999.⁹

Air Quality Index. The **Air Quality Index** combines the criteria pollutants into one value, ranging from 0 to 500, for each day of the year. Index values below 100 are considered satisfactory, while higher values are considered unhealthy. Index values less than 50 are considered good. In 2001, 100% of days in Multnomah County were good. The number of good air days in the County has been increasing since 1996, when 93% of days monitored were good (Figure 20). Oregon's overall percentage of good days in 2001 reached 90%.



Air Toxics

Air pollutants other than criteria air pollutants are also tracked, and are called **air toxics** or **toxic air pollutants**. These pollutants are known or suspected to cause cancer, as well as respiratory, reproductive, and developmental problems. The EPA tracks 188 air toxics, with the goal of reducing or eliminating human exposure. Table 12 shows the health effects of four select air toxics.

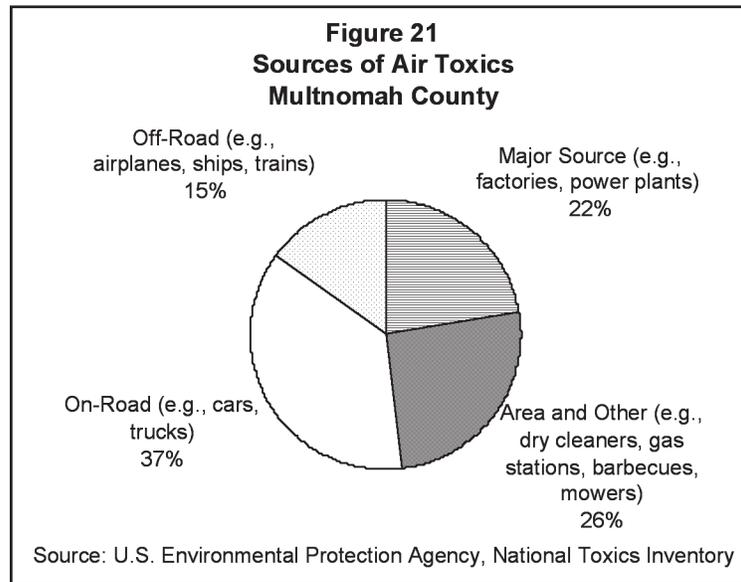
Air toxics: 188 pollutants tracked by the EPA known or suspected to cause cancer, respiratory, reproductive and developmental problems.

Table 12
Select Air Toxics

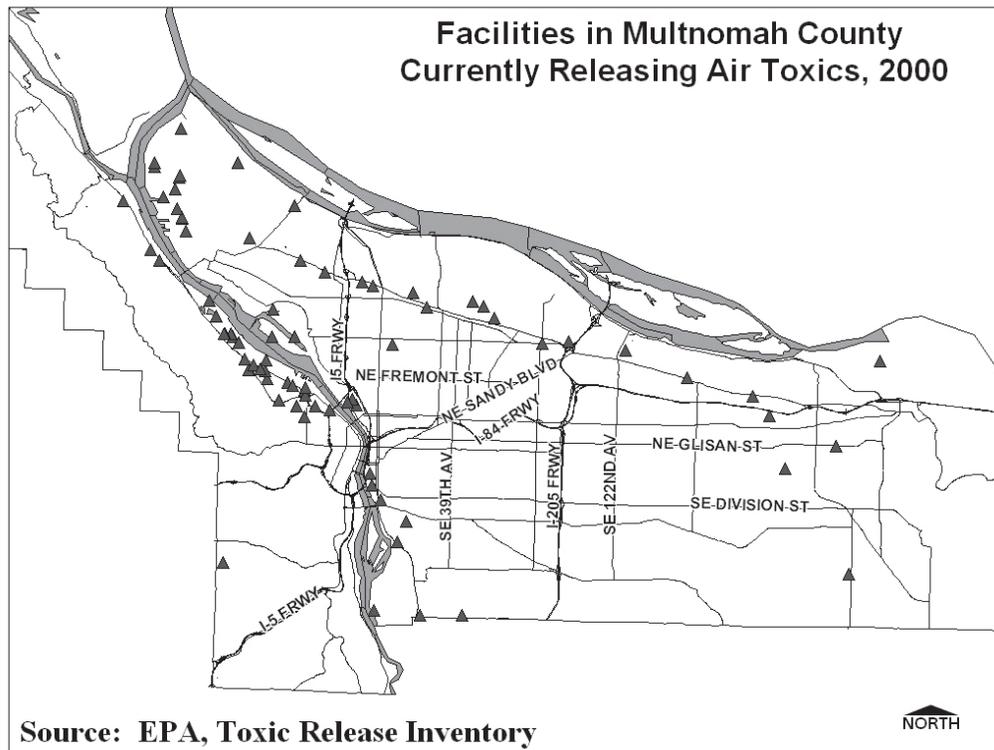
Pollutant	Major Sources	Health Effects
Benzene	Motor vehicle exhaust, gas fueling	Cancer, central nervous system depression
Formaldehyde	Motor vehicle exhaust, manufacturing, forest and wildfires	Cancer, respiratory damage
Acrolein	Motor vehicle exhaust, oil and coal burning, forest and wildfires	Kidney, liver, nervous system damage; decreased IQ; high blood pressure
Chloroform	Chrome plating, solid waste incineration, oil and coal burning	Cancer, central nervous system depression, liver damage

Source: Oregon Department of Environmental Quality

The highest percentage of air toxics in 1996 for Multnomah County comes from cars and trucks (Figure 21). Such vehicles are the cause of 37% of air toxics in Oregon.



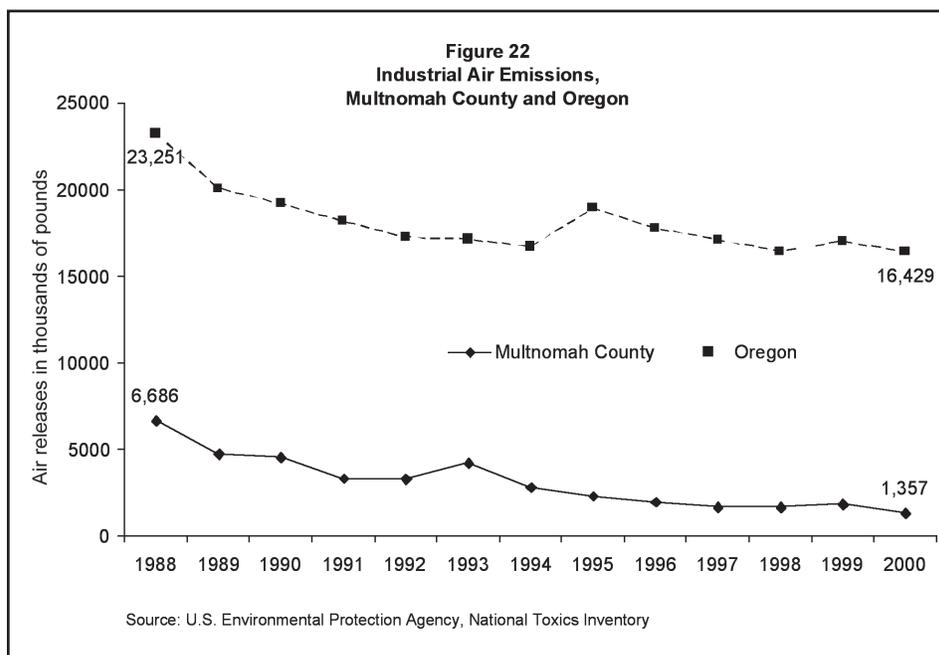
The **National Air Toxics Assessment (NATA)** provides risk estimates of hazardous air emissions for 32 of the most dangerous air toxics, many of which are known or suspected to cause cancer. The purpose of the assessment is to measure the human health risk from exposure to these 32 air toxics. Analysis of the NATA data shows that Multnomah County released more than 2,400 tons of such air



toxics in 1996, accounting for 11% of the Oregon total. Health risk calculations based on the NATA data are discussed in the “health effects” section below.

Industries – i.e., “major sources” – track their own air toxics on an annual basis, and report this information to the EPA. The EPA makes this information publicly available through the **Toxic Release Inventory**. The most recent available data show that 81 industrial facilities in the County released about 1.4 million pounds of air toxics in 2000.

Total air toxics from County industries have declined 80% since 1988 (Figure 22). There was a 30% decline in Oregon over the same time period (23.2 to 16.4 million pounds).



Other Air Quality Indicators

Cars and trucks are the largest source of air pollution in the County, and programs that regulate vehicle emissions may significantly reduce air pollution. The Oregon DEQ inspects vehicles for emissions in the Portland area, and requires newer cars to be inspected every two years. The **Vehicle Inspection Program** identifies those vehicles in need of maintenance to reduce air pollutants. In the years 1998-1999, more than 130,000 vehicles (13%) failed emissions control tests in the Portland area. In 2000-2001, 158,000 vehicles (15%) failed. DEQ estimates that repairs on failed vehicles for 2000-2001 reduced air pollutants by 76 tons per day.¹⁰

Another indicator of air quality is the number of outdoor air complaints by citizens of Multnomah County. The Oregon DEQ tracks such complaints. From 1997 to 2001, outdoor air complaints declined from 545 to 449. Such complaints peaked in 2000, at 784, a 100% increase from the previous year.¹¹

Health-based benchmark: Federal Clean Air Act guidelines based on a one in a million cancer risk for a specific air pollutant.

Health Effects of Air Pollution

Researchers throughout the world have shown that air pollution has many negative health effects. Although limited, available health indicators for the County may highlight possible areas of concern. There is evidence to indicate that non-whites and the poor are disproportionately affected by air pollutants¹², and such disparities will be discussed where data are available for Multnomah County.

Air Toxics. Air quality data with the clearest link to human health for Multnomah County is found in the National Air Toxics Assessment (NATA). The assessment was conducted with 1996 data; it is unclear how current air toxics levels have changed since that time. Also, such risk estimates do not reflect exposures and risks from all compounds (for example, diesel) and may underestimate human risk from air toxics. Nonetheless, these data are the only know estimates available summarizing risks to air toxics.

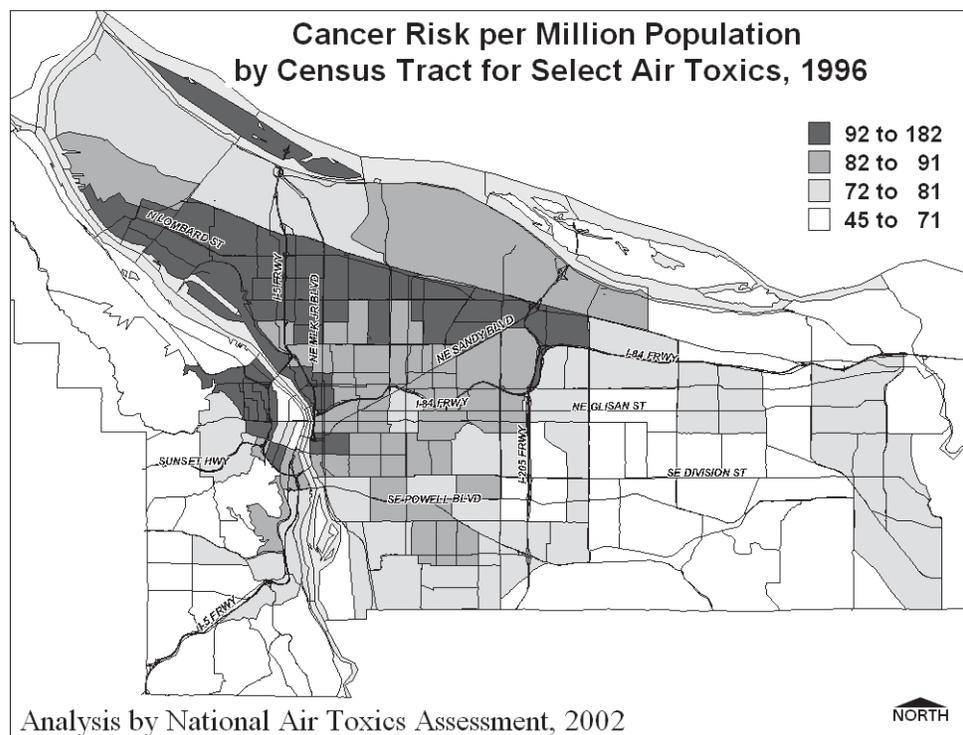
An examination of these data by the Oregon DEQ shows that 14 air toxics in the Northwest region of Oregon have been estimated to exceed **health-based benchmarks** (benchmarks are guidelines for safe levels). Multnomah is the only County in the region to exceed benchmarks for all 14 pollutants. In addition, emission levels in Multnomah County for six pollutants, including **benzene**, **chromium** and **chloroform**, are more than 10 times the benchmark. Four of these six pollutants can be traced mostly to motor vehicles such as cars, trucks, and airplanes.¹³

NATA also examines the cancer risk from air toxics. An analysis of 1996 emissions

14 air toxics in the Northwest region of Oregon have been estimated to exceed health-based benchmarks.

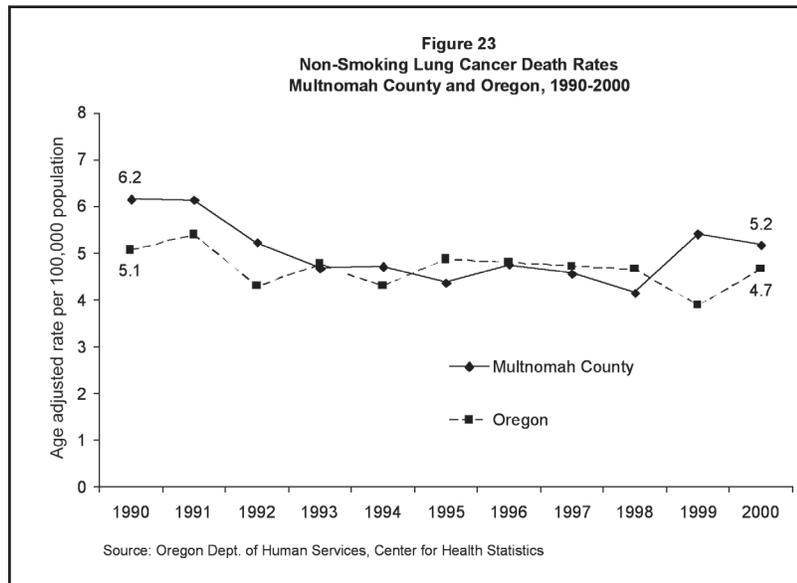
Of the 14 air toxics exceeding health based benchmarks - six are more than 10 times the benchmark and four of these can be traced to motor vehicle emissions.

Many areas in North and Northeast Portland have a higher cancer risk due to air toxics.

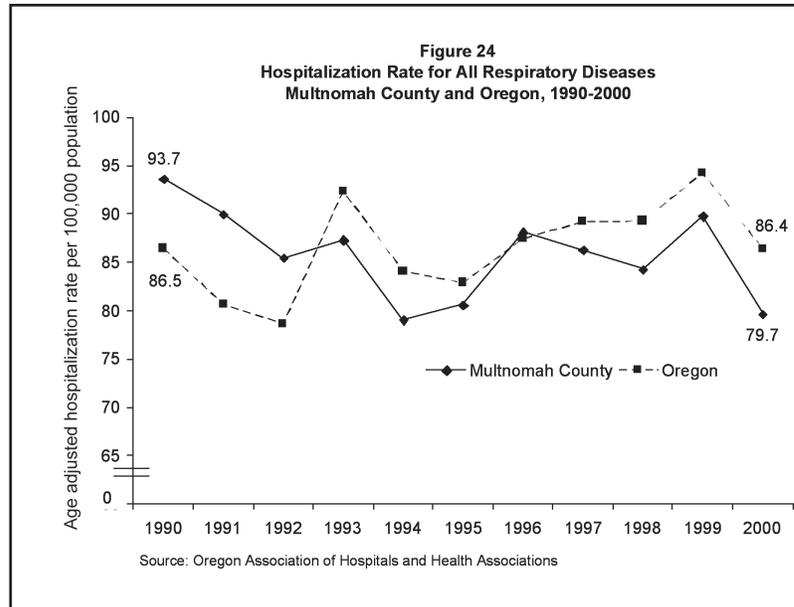


data released in 2002, shows that for 33 of the most dangerous air toxics, the median cancer risk for Multnomah County residents – 82 in a million – is twice that for all Oregon residents (39 in a million). The national rate is 45 in a million. All areas of the County examined exceed the health-protective guideline for air toxics established under the Clean Air Act of a one in one million cancer risk. Furthermore, the cancer risk to Multnomah County residents varies based on where they live. Many areas in North and Northeast Portland have a higher cancer risk due to air toxics. Several census tracts in North and Northeast Portland have a cancer risk rate more than 100 per million. The highest cancer risk rate exists in an area in North Portland (180 per million), and is 4 times the rate for the lowest cancer risk rate in the County (46 in a million). As non-whites and those in poverty live in higher proportions in North and Northeast Portland, it is possible that racial minorities and the poor are more severely impacted by air toxics than other County residents. (see map)

Hospitalizations and Mortality. Air pollutants have been shown to cause hospitalizations and deaths, especially for diseases of the respiratory and circulatory systems. Of particular concern are air pollutants — such as particulate matter and benzene — which are associated with lung cancer. Available data show no indication that air pollution in the County is increasing hospitalizations or death rates for lung cancer. There were more than 330 non-smoking lung cancer deaths in Multnomah County between 1990 and 2000, and the rate declined 16% from 1990 to 2000 (Figure 23). There was no indication in the data of health disparities by ethnicity and race. Nonetheless, the risk for cancer from air toxics is highest in the most diverse areas of the County.

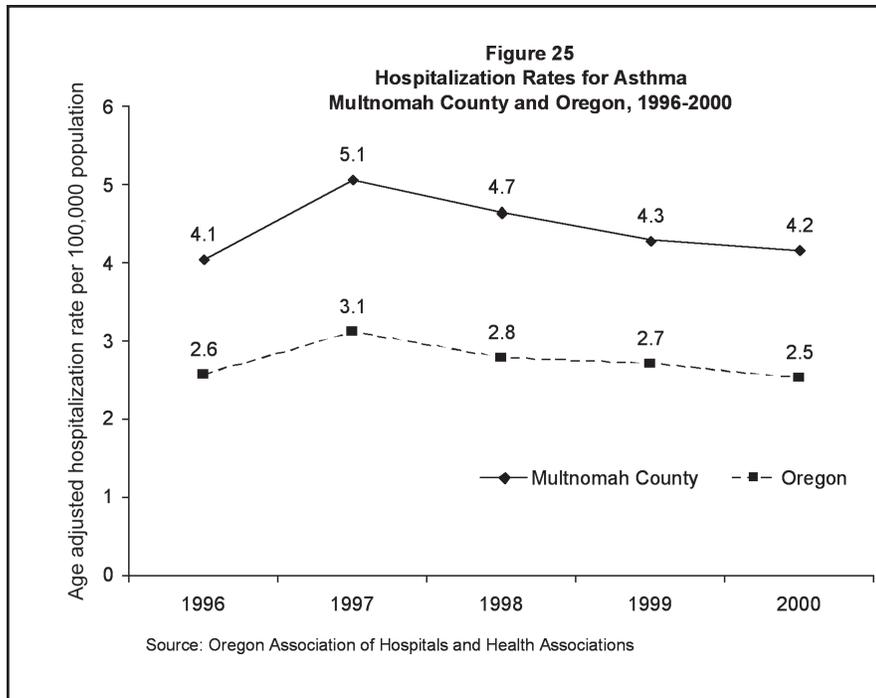


The rate of hospitalization for respiratory diseases in the County remained unchanged between 1990 and 2000 (Figure 24), while hospitalization rates for circulatory diseases declined 21% in the same period. Hospitalization data are not available by ethnicity and race, so health disparities are not explored.



Asthma. Researchers have found evidence linking air pollution to asthma attacks, and some research indicates that air pollution can cause the development of asthma. Asthma affects more than 4.8 million U.S. children (7.5%), making it the most common serious and chronic disease among children. Asthma affects racial and ethnic minorities more than whites. It is estimated that asthma is 26% more prevalent in African American children than in White children.¹⁴ In Multnomah County, an estimated 7% of children, and 9% of adults had asthma in 2000. There is some evidence to indicate that asthma rates are higher in areas of Multnomah County with poorer air quality. The Portland Neighborhood Survey - a recent survey of residents near the Northeast I-5 corridor in Portland (where NATA data shows that air toxics are emitted in higher concentrations) - has found that asthma rates are twice that of Multnomah County, Oregon (7.7%), and the Nation. Although these data should be viewed with caution due to small sample size, the survey found that 14.4% of residents had asthma. Nearly 50% of those reporting asthma in the survey were African American, possibly indicating that asthma rates for African Americans are higher in this area.¹⁵

According to data obtained from the Oregon Association of Hospitals, asthma hospitalization rates for asthma in Multnomah County are twice that for Oregon. Between 1996 and 2000, there were more than 1300 hospitalizations due to asthma (Figure 25).



Conclusion

Multnomah County has been in compliance for criteria pollutants since 1997, and has met Healthy People 2010 objective for criteria air pollutants. Air quality trends for the County indicate that air is better now than it was ten years ago. Similar to other large urban areas across the United States, air toxics remain a problem in Multnomah County. Finally, some evidence indicates that those living in North and Northeast Portland – areas where a higher proportion are poor or ethnic and racial minorities – may have poorer air quality, which may contribute to health disparities for these groups.

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Recreational Water Quality

Fast Facts

- Six of seven waterways examined in Multnomah County are ranked by the Oregon Department of Environmental Quality as poor or very poor. Five water bodies are in violation of federal and State water standards that protect beneficial uses.
- Combined-sewer overflow causes 3 billion gallons of rainwater and raw sewage to flow into the Willamette River every year.
- A section of the Willamette River, known as the Portland Harbor, is listed as a Superfund site.
- Rates for recreational waterborne disease are low for Multnomah County and the State. There were two outbreaks of waterborne disease in the County in the 1990s, affecting 149 people.
- The unintentional drowning rate in Multnomah County was 2.4 deaths per 100,000 in 2000, which does not meet the Healthy People 2010 target rate of 0.9 drowning deaths per 100,000.

Problem Statement

According to the U.S. Environmental Protection Agency (EPA), 40% of assessed rivers in the U.S. are “not clean enough to support uses such as fishing and swimming.”¹ Oregon is no different. Many miles of rivers and creeks – and some lakes – are in violation of federal clean water standards, and may pose a threat to human health. Chief among these threats is microbial contamination of water, which poses threats to swimmers; and contaminants in fish, which may pose health threats to those who eat fish from contaminated waters.

There are over 100,000 miles of rivers in Oregon, and more than 6,200 lakes. Oregon residents depend on these waters to be safe and free of contaminants. But, the Oregon Department of Environmental Quality has found that 26% of assessed rivers and 50% of surveyed lakes in Oregon are considered polluted.² And 44% of assessed rivers pose a health threat to swimmers. Lastly, Oregon has the 10th highest drowning rate in the country.

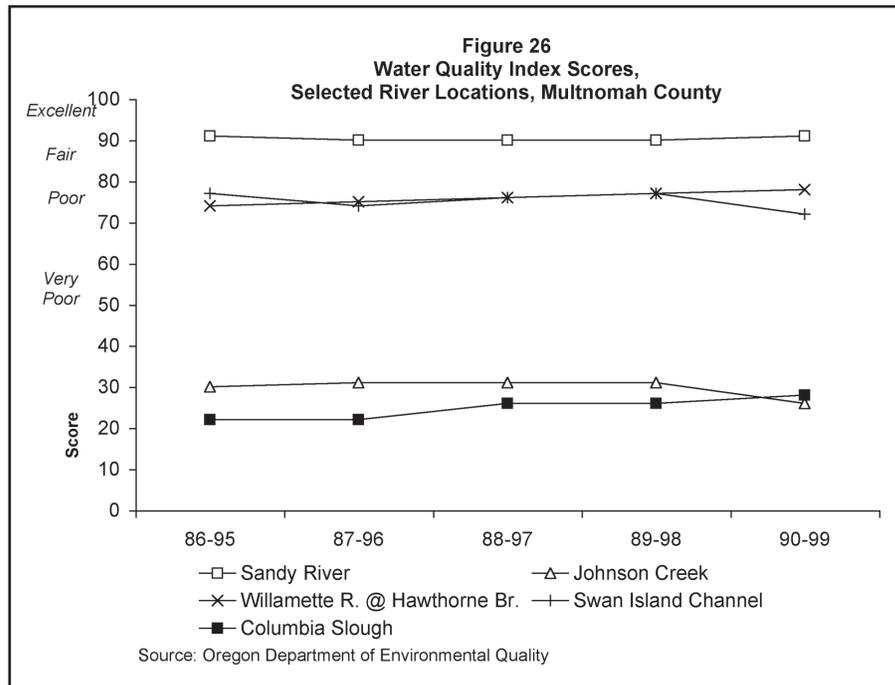
Recreational Water Quality

Recreational waters are regulated through the federal Clean Water Act, which sets standards for waters and waterways to ensure that they are, among other things, swimmable and fishable. The Oregon Department of Environmental Quality is responsible for setting and enforcing water quality standards for recreational waters, and develops lists of water bodies that do not meet federal and state standards. According to data from the Oregon DEQ, Multnomah County has lakes, creeks and rivers that do not meet water quality standards. Such water bodies in Multnomah County include Blue Lake, Smith and Bybee lakes, Columbia Slough, Fairview Creek, Johnson Creek, and the section of the Willamette River that runs through Portland.³

Water Quality Limited: Recreational water bodies that do not meet federal Clean Water Act standards.

Oregon’s 2000 Water Quality Status Assessment Report identifies rivers, streams and lakes in Oregon that are impaired – or **water quality limited** - and may pose health threats from swimming and fishing. Unfortunately, the report does not list impaired waterways by county. Data for Oregon show that over 80% of river miles assessed, and 60% of lakes, have contaminated fish -mostly from mercury, dioxin and pesticides- that may pose a health threat. The Columbia Slough and part of the Lower Willamette River are included in this list. Over 40% of assessed rivers in Oregon are not safe for swimming, and those who do so have an increased risk of catching waterborne diseases. The Lower Willamette River, Fairview creek and the Columbia Slough are among those unsafe for swimming.⁴ Unfortunately, only about half of river miles and lake acres have been assessed, so the actual extent of recreational water pollution in Oregon could not be calculated.

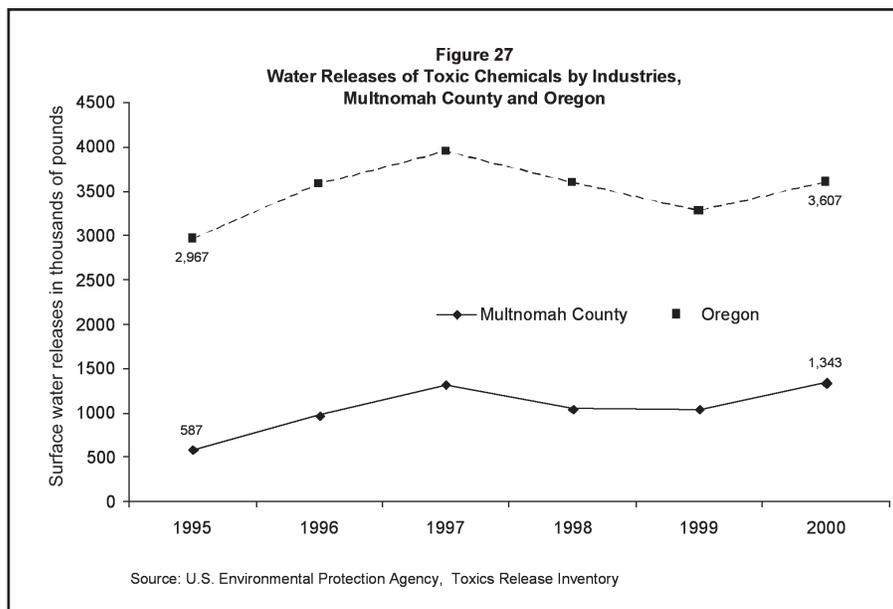
DEQ also tracks river systems using a water quality index, which combines many different measures of water quality into a general water quality score. The scores range from 10 (very poor water quality) to 100 (ideal water quality). Oregon DEQ data for the Willamette Basin indicate that seven waterways in Multnomah County are monitored and have been scored since 1986. Only one river is in excellent shape: the Sandy river at Troutdale bridge. Although the water quality index for the Columbia Slough has been increasing in quality between 1986 and 1999, water quality in the slough is the worst of all waterways measured for the County, and is ranked very poor. Johnson Creek is also ranked as very poor. Water quality in the Willamette River has changed very little in the time period examined, and the water quality in the Portland area is considered poor (Figure 26).



Water Pollution Sources

Pollution into Multnomah County water bodies is grouped into two categories. Non-point sources – from urban and agricultural runoff, primarily when it rains – are probably the most significant source of water pollution, but are difficult to quantify. It has been estimated that non-point sources account for 70-80% of recreational water pollution.⁵ Point sources of pollution – usually wastewater entering rivers and streams via pipes – are the second source of water pollution. Wastewaters from industries are one point source of pollution. The EPA requires that industries report discharges of approximately 600 toxic chemicals into recreational waters such as streams and rivers. Analysis of such data for Multnomah County and Oregon reveals that industries – mostly manufacturing facilities – released over 1.3 million pounds of toxic chemicals into recreational waters in 2000, an increase of 128% from 1995, when such chemicals were first tracked (Figure 27).⁶ Some have noted that industrial wastewater discharges are self-reported by industries, with minimal regulation to ensure accurate reporting, so wastewater amounts shown here may be an underestimate.

Combined sewer overflows (CSOs) are another point source of water pollution. Each year, about 2.8 billion gallons of CSOs - storm water mixed with raw sewage - flows into the Willamette River through 42 outfall pipes.⁷ Such pollution increases waterborne disease risks to swimmers.



Portland Harbor

The portion of the Willamette River - called the Lower Willamette - that runs through the center of Portland is a popular recreational area, especially for fishing. As mentioned above, the Lower Willamette is in violation of federal and state water quality standards, and has been given a poor quality ranking by the Oregon DEQ. In addition, six miles of the Willamette River - called the Portland Harbor

- are so heavily polluted that this stretch of river, roughly from the southern tip of Sauvie Island to Swan Island, is on the **National Priorities List** – commonly known as **Superfund**. It is a heavily industrialized section, and has high concentrations of metals, pesticides and industrial chemicals in its sediments. Such pollutants may make this section of the river unsafe for recreational use.

Public pools

The Multnomah County Health Department monitors water quality in public pools and spas to ensure that there are no contaminants (e.g., fecal contaminants) that would endanger public health. There were 543 inspections of public pools in Multnomah County in 2001, and 309 spa inspections. There were no closures of pools and spas in 2001 due to fecal contamination.

Waterborne disease outbreaks: Incidents of infectious agents or chemical poisoning in which two or more people experience a similar illness after consumption or use of water and evidence implicates water as the source of illness.

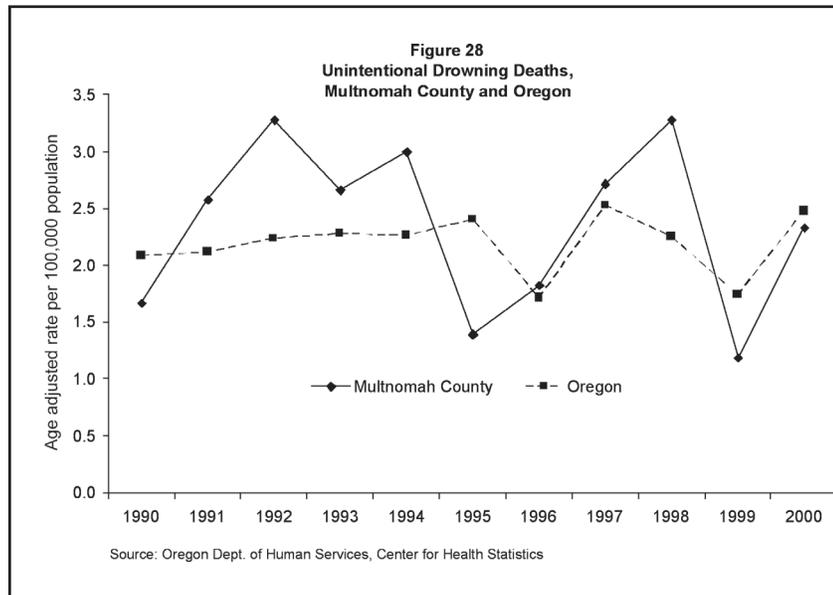
Health effects

Chronic disease. Recreational water pollution is difficult to link to specific chronic health problems such as cancer and liver diseases. The extent of chronic illness to Multnomah County residents from recreational water use – e.g., swimming and fishing – is unknown.

Waterborne disease. Waterborne disease outbreaks in recreational water usually cause gastrointestinal illnesses in humans, and are an acute health threat to those exposed. Such disease outbreaks are caused by bacterial contamination of water bodies. According to data from the U.S. Centers for Disease Control and Prevention, there were eight recreational waterborne disease outbreaks in Oregon between 1991 and 1998, affecting 800 people. Two of those outbreaks occurred in Multnomah County: one was an **E. coli** outbreak affecting about 80 people in Blue Lake in 1991, and the second was a **Cryptosporidiosis** outbreak at a community pool that affected 69 people in 1998. Rates of illness due to *E. coli* in Multnomah County declined 75% between 1991 and 2000, and were generally lower than Oregon for most years examined. In 2000, 11 cases of *E. coli* illness (1.7 cases per 100,000) were reported, compared to 41 cases in 1991 (6.8 per 100,000). Rates for *Cryptosporidiosis* have remained fairly stable since 1992, apart from the outbreak in 1998. There were 1.1 cases per 100,000 in Multnomah County in 2000, compared to 0.6 per 100,000 in Oregon in the same year.

Rates of illness due to E. coli in Multnomah County declined 75% between 1991 and 2000, and were lower than Oregon for most years examined.

Unintentional drowning. The Oregon State Center for Health Statistics tracks death data indicating there were 758 unintentional drownings in Oregon between 1990 and 2000, with 22%, or 165 cases, occurring in Multnomah County. The rate per 100,000 in Multnomah County for 2000 was 2.42, a 29% increase in unintentional drownings since 1990 (Figure 28). The drowning rate for Multnomah County and Oregon is higher than the national rate, and Oregon has one of the highest drowning rates in the Nation.⁸ Multnomah County does not meet the Healthy People 2010 target rate of 0.9 drowning deaths per 100,000.



The drowning rate for Multnomah County and Oregon is higher than nationally, and Oregon has one of the highest drowning rates in the nation.

In Oregon, 68 drownings, or 47% of drownings, occurred in natural waters (lakes, ocean, river, stream) between 1999 and 2000. In Multnomah County for these years, 42% or 10 drowning deaths occurred in natural waters. Unintentional drowning in swimming pools were rare events in Oregon for 1999-2000. There were four deaths in Oregon in 1999-2000, with none occurring in Multnomah County.

Water-related injury. The number of hospitalizations- obtained from the Oregon Association of Hospitals- for near drowning are low in Multnomah County and Oregon. There were 26 hospitalizations for near-drowning in Oregon in 2001, seven of these occurred in Multnomah County. The 26 near-drownings in Oregon in 2001 account for less than 1% of injury-related hospitalizations. Between 1996 and 2001, there were 32 hospitalizations for near drowning in Multnomah County, with eight related to recreational waters.

Hospitalizations related to boating accidents were low in number in Oregon and Multnomah County. There were 40 hospitalizations in 2001 for Oregon, seven from Multnomah County. Between 1996 and 2001, there were a total of 50 boating-related hospitalizations in Multnomah County.

Conclusion

Some water bodies in Multnomah County have poor water quality (particularly the Willamette River and the Columbia Slough), with real health risks to those swimming, boating, and fishing in recreational waters. Unintentional drowning in Multnomah County and Oregon remains unacceptably high, and does not meet Healthy People 2010 objectives. Water-borne outbreaks in recreational waters were rare events in the years examined, but there were two outbreaks in Multnomah County- one in a lake, the other in a public pool.

1. National Water Quality Inventory: 2000 Report. (EPA-841-R-02-001). U.S. Environmental Protection Agency: Washington, D.C. 2002.
2. Ibid., pp. 154-155.
3. *Water Quality Limited Streams: List of Waterbodies in the Lower Willamette Sub-Basin of the Willamette Basin*. State of Oregon Department of Environmental Quality. Accessed: 04/10/2003.
<http://www.deq.state.or.us/wq/303dlist/303dpage.htm>
4. Oregon's Water Quality Status Assessment Report: Section 305(b) Report. Oregon Department of Environmental Quality: Portland, Oregon. 2002.
5. *Willamette River Basin Water Quality Study 1995*. Oregon Department of Environmental Quality. Accessed: 04/10/2003.
<http://www.deq.state.or.us/wq/wqfact/willstddy.htm>
6. *Toxic Release Inventory database*. U.S. Environmental Protection Agency. Accessed: 04/09/2003. <http://www.epa.gov/tri/>
7. *Combined Sewer Overflows – The Cost*. City of Portland Environmental Services. Accessed: 04/10/2003.
http://www.cleanrivers-pdx.org/tech_resources/cso_costs.htm
8. Unintentional Drowning in Oregon. *CD Summary*. Former Center for Disease Prevention and Epidemiology. Oregon Health Division. July 21, 1998; Vol47: No.15.

Solid Waste and Wastewater Quality

Fast Facts

- Multnomah County is home to the St. Johns landfill, in operation for 50 years, and closed since 1991. It has known leaks of hazardous substances.
- 3 billion gallons of combined sewer overflow are released into the Willamette River each year.
- Portland's recycling rate is 54%, the best in the country. This rate meets the Healthy People 2010 objective of 27%.

Problem Statement

The control of infectious diseases, partly through proper disposal of solid waste and sewage, is considered a significant public health achievement of the twentieth century.¹ Still, much can be done in Multnomah County and Oregon to reduce the impacts that solid waste disposal and wastewater have on the environment and human health. Some of the public concerns involve aesthetics (looking at and smelling waste), but improper solid waste and wastewater disposal can pollute groundwater, rivers, and streams, and can attract vectors such as rodents and insects.³ Pollution of air and waterways through such waste can adversely affect human health.

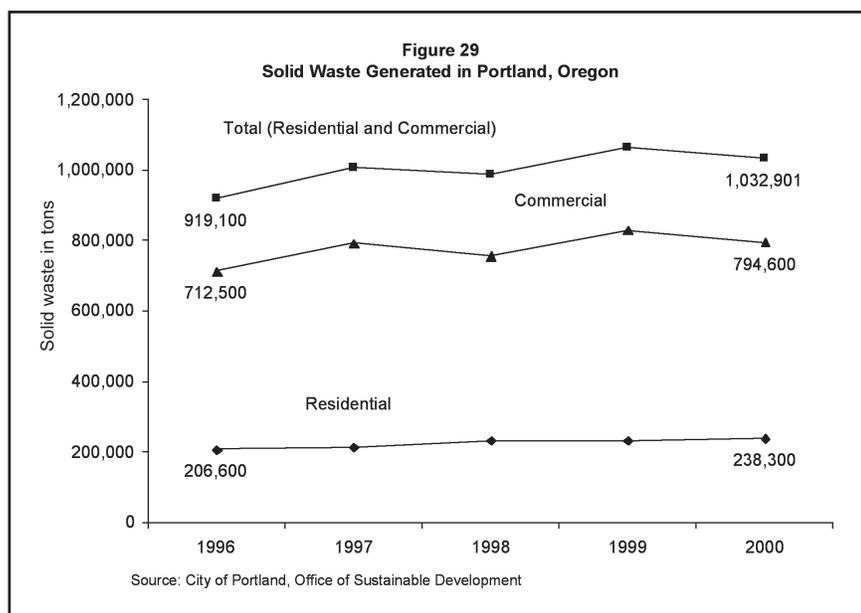
Solid waste:

Common garbage or trash generated by industries, businesses, institutions and homes.

Solid Waste

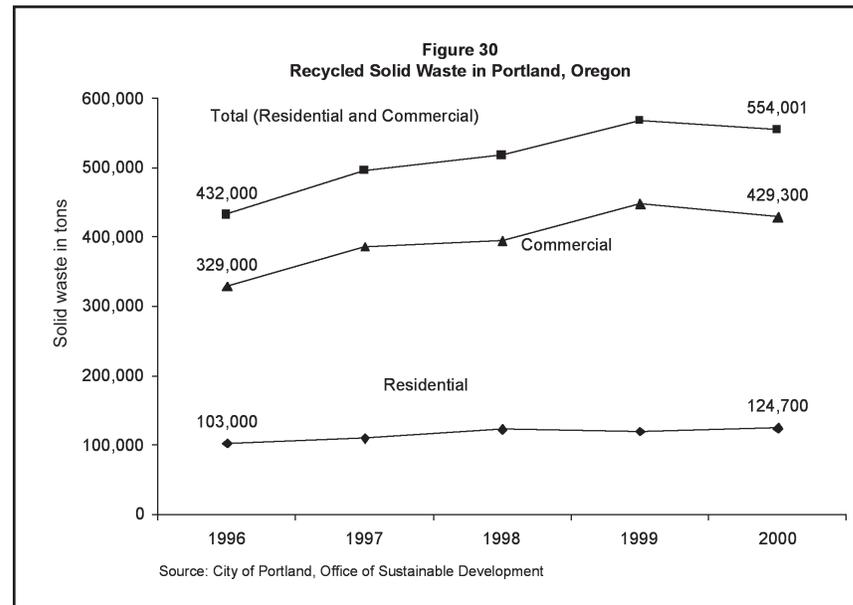
Solid waste (or garbage) for Multnomah County is disposed of mostly in landfills. In 2000, the tri-county region generated about 1.4 million tons of solid waste that was disposed of in landfills. In 2000, Portland residents and commercial activities generated more than 1 million tons of solid waste (Figure 29), up 12% from 1996. Almost 77% of the waste generated in 2000 can be attributed to commercial activity. Close to 54% of the solid waste in 2000 was recovered

Close to 54% of the solid waste in 2000 was recovered (recycled), which appears to be the best recycling rate in the country among the 20 largest metropolitan regions.



(recycled), which appears to be the best recycling rate in the country among the 20 largest metropolitan regions.² This rate meets the Healthy People 2010 solid waste recycling objective of 27%.

The amount of recycled material has risen steadily since 1996 (Figure 30), when only 47% of solid waste was recovered (and kept out of landfills).



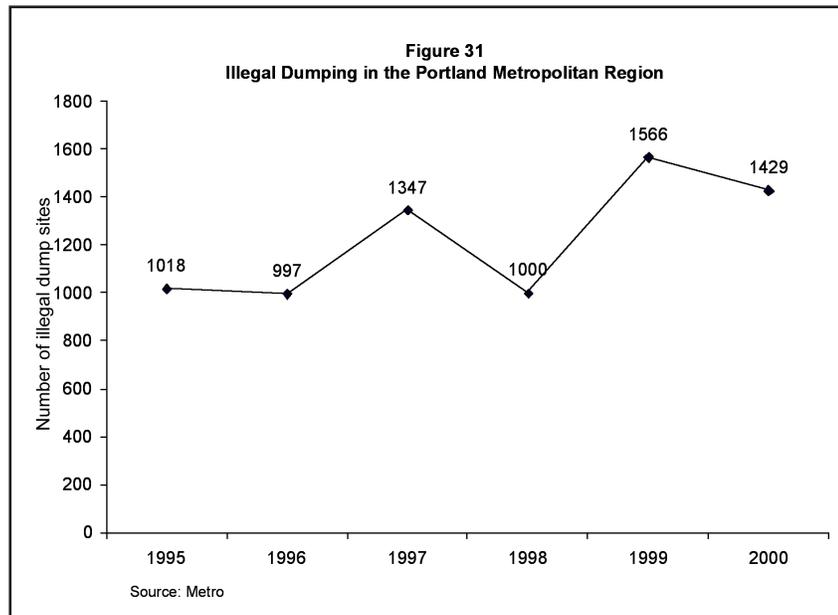
There are 12 solid waste facilities in Multnomah County, according to the Oregon Department of Environmental Quality. Of these 12, six are landfills, while the rest are transfer stations, treatment facilities, or material recovery facilities. Three are industrial waste landfills, two are construction landfills, and one is a municipal solid waste landfill - a landfill where residential garbage goes. All six Multnomah County landfills have groundwater monitoring that tests for leakages of hazardous substances from a landfill.

St. Johns landfill has confirmed leaks of hazardous substances, and some of these substances are making their way into the Columbia Slough.

The municipal solid waste landfill is located in St. Johns, near Smith and Bybee lakes and the Columbia Slough. It was the primary landfill for Portland's waste for 50 years until it closed in 1991. While in operation, this landfill accepted residential and industrial waste. Industrial waste included approximately 5,000 drums of pesticide manufacturing waste, disposed of in the early 1960's³. St. Johns landfill has confirmed leaks of hazardous substances, and some of these substances are making their way into nearby lakes (Smith and Bybee lakes), streams (e.g., the Columbia Slough), and groundwater. These hazardous substances are potentially harmful to human health.

Illegal dumping. Illegal dumping remains a problem in the County, as it does in counties throughout the U.S. Aside from the mess, illegal dumping can attract rodents and other animals, which can spread disease. In 1995, 1,018 illegal

dumpsites were identified in the tri-county area. In 2000, that number increased 40% to 1,429, representing more than 200 tons of waste (Figure 31).



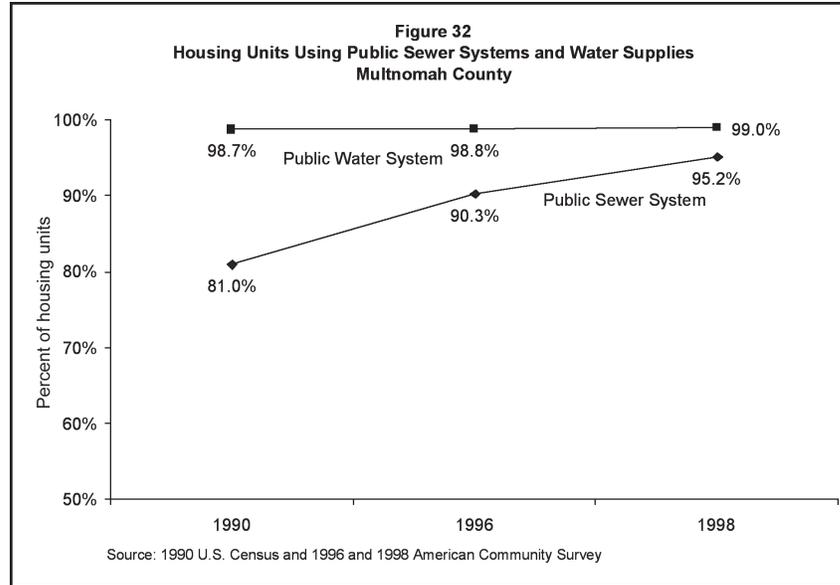
Wastewater

Wastewater, if not properly disposed of or treated, can contaminate drinking water and waterways, and can cause illness to those exposed. Therefore, it is essential that such waste be treated properly. One way to assure proper disposal of wastewater is to treat it at a public wastewater treatment facility. Private wastewater systems – commonly known as septic tanks – are considered more liable to cause illness, because they are more likely, for example, to leak into groundwater. Such contamination of groundwater can lead to waterborne illnesses such as Cryptosporidiosis. Many precautions must be taken to ensure that private septic systems are built correctly and maintained regularly to prevent illness. In 1990 an estimated 81% of Multnomah County housing units were connected to public sewer systems compared to 70% of the entire state. In 1998 this number increased to 95% in Multnomah County.

A higher number of housing units in Multnomah County are connected to public water systems. In 1998, 99% of housing units in the County were connected to public water systems, with an estimated 2400 housing units with individual wells (Figure 32). Therefore, the risk of contamination of groundwater by septic systems in Multnomah County is small.

According to data provided by the U.S. Geological survey, Multnomah County had 5 wastewater treatment facilities in 1999, which returned 92 million gallons per day of treated wastewater to the Willamette River and other waterways. Untreated wastewater is also being released into waterways in Multnomah County.

Combined sewer overflow: Discharge of a mixture of storm water and domestic waste when the flow capacity of a sewer system is exceeded during rainstorms.



The amount of combined sewer overflow in Portland was reduced from 6 to 3.4 billion gallons from 1991 to 2000.

Sewer water and storm water flow into the same sewer pipes creating a combined sewer system. When it rains, storm water combines with sewer water and can overflow directly to rivers and sloughs – this is called combined sewer overflow. There are 55 outfall pipes, or “relief valves,” which release this combined sewer overflow directly to the Willamette River and the Columbia Slough. The untreated waste carries many microbes that may cause illness, and is a threat to public health. According to the Oregon DEQ, “those people most likely affected by this sewage include water skiers, swimmers, people who fish, and other people involved in water contact sports.”⁴ In 1991, six billion gallons of combined sewer overflow went into Portland waterways. The city of Portland is currently working to eliminate combined sewer overflow, and is working to finish by 2011. Much work has already been done to reduce the amount of combined sewer overflow. By 2000, the amount of combined sewer overflow was reduced to 3.4 billion gallons, a decline of 43% from 1991.

Conclusion

The infrastructure in place in Multnomah County for treating and disposing of solid waste and wastewater has been working effectively to minimize public health threats for many years. However, problems still remain. Billions of gallons of combined sewer overflow (which includes untreated sewage) are released into the Willamette each year. Multnomah County is known to have at least one landfill - the St. Johns landfill - that is leaking hazardous substances, and is probably contributing to the contamination of the Columbia Slough and other waterways.

1. Achievements in Public Health, 1990-1999: Control of Infectious Diseases. Morbidity and Mortality Weekly Report (MMWR). Centers for Disease Control and Prevention. 1999;48: (29): 621-629.

2. Solid Waste and Recycling Division: Management Report for 2000 Activities. City of Portland, Office of Sustainable Development: Portland, Oregon. 2001
3. St. Johns Landfill: Cleanup Project Status Report. Oregon Department of Environmental Quality: Portland, Oregon. 2003.
4. Combined Sewer Overflows. Fact Sheet. Oregon Department of Environmental Quality: Portland, Oregon. 2001.

Vector-Borne Diseases

Fast Facts

- Multnomah County experiences only one or two cases of vector borne illness a year.
- As of the beginning of 2003, mosquitoes tested in Multnomah County had not been found to carry the West Nile virus, St. Louis encephalitis, or Western Equine encephalitis.
- In the nine years between 1991 and 2000, only four animals tested positive for rabies in the County.

Problem Statement

A vector (or carrier) is any organism capable of transmitting disease. Some examples of vectors are mosquitoes, rodents, fleas and ticks. Vectors are able to spread disease to humans by biting, burrowing or contaminating living spaces.

Some examples of vectors are mosquitoes, rats, fleas, and ticks.

West Nile virus is a disease new to the United States. It was first identified in the eastern U.S. in 1999, and it is moving across the U.S.¹ The virus has been found in mosquitoes as far south as Texas and as far north as North Dakota in early 2002. Multnomah County has surveyed for West Nile virus since 2001 and recently received funding to increase staff and materials for prevention, with additional surveillance and suppression activities of this virus.

Vector Control Activity

Mosquito Control. Diseases caused by mosquitoes can be prevented in one of two ways. The first is through personal protective measures, and the second is by public health measures to reduce the population of infected mosquitoes. Personal measures include: reducing time outdoors, particularly in early evening hours; wearing long pants and long sleeved shirts; applying mosquito repellent to exposed skin areas; and eliminating areas of standing water. Public health measures often require spraying of insecticides to kill juvenile (larvae) and adult mosquitoes.

Vector and Nuisance Control in the Environmental Health Section of the Multnomah County Health Department monitors and investigates complaints and conducts mosquito surveillance in the County. The **Vector Control** unit conducts adult mosquito surveillance between April and October. Mosquitoes are captured in traps baited with dry ice, which releases carbon dioxide and mimics the breathing of humans and other animals. The mosquitoes are collected, counted and identified to monitor the fluctuation in mosquito populations and species diversity. Some species of mosquitoes collected are then tested for St. Louis encephalitis, Western Equine encephalitis, and West Nile virus. St. Louis encephalitis, Western Equine encephalitis and West Nile virus are types of mosquito-borne viruses that most often cause no symptoms or a mild illness in an individual who has been bitten by an infected mosquito. In very rare instances,

a Western Equine encephalitis or West Nile virus infection can cause fatal illness or coma.

There are approximately 20 species of mosquitoes in Multnomah County. Each species differs in appearance and habitat preference. Multnomah County Vector Control currently treats approximately 3,000 acres for mosquitoes yearly. A large part of the treatment program centers on the floodplains along the Willamette and Columbia Rivers that seasonally fill with water when river levels rise due to snowmelt runoff, heavy rain, and controlled water release for salmon migration, typically April through June.

Known mosquito breeding sites are checked throughout the summer. Other typical sources checked and treated include roadside ditches, sloughs, marshes and all complaint calls from the public concerning mosquitoes. An active treatment program runs year round.

Rodent Abatement. Annually, Multnomah County Vector Control baits approximately 1,000 manholes for rodents and carries out other efforts in rodent control as well as responding to citizen rodent complaints. The number of rodent complaints fluctuates yearly. Rodent complaints by year from 1997 to 2001 are shown in Table 13. Rodent complaints peak April through October. Complaints are frequently property or sewer-related. Food sources such as pet food, wild animal food, or compost contributes to rodent infestation. In addition, broken or open sewer pipes or other building openings can provide rats access to property. Furthermore, debris or refuse accumulation as well as firewood or stored lumber can harbor rats.

Table 13
Rodent Complaints by Citizens,
Multnomah County

	1997	1998	1999	2000	2001
Number of complaints	1320	1939	1331	1257	1348
Rate per 1,000 population	2.1	3.0	2.1	1.9	2.0
Source: Multnomah County Health Department, Vector Control Population: PSU Population Research Center					

Vector Borne Disease Incidence. Multnomah County Communicable Disease Control Program monitors and reports vector borne disease incidence. There are only one or two cases of vector borne disease acquired in Multnomah County each year (Table 14). Vector borne disease is primarily acquired outside of Multnomah County and the predominate disease acquired is malaria.

Vector borne disease:
Illnesses that are transmitted to people by organisms, such as insects and rodents.

The Multnomah County Health Department and Multnomah County Animal Services respond to animal bites or exposures to humans from animals. The number and types of animal bites or exposures is shown in Table 15. Bites from dogs are consistently half of all bites reported. The health concern of animal bites is due to

Table 14
Vector Borne Disease Incidence, Multnomah County

	1993	1994	1995	1996	1997	1998	1999	2000	2001
Cases acquired in Multnomah County	0	0	1	1	0	2	2	2	1
Cases imported from elsewhere	4	4	12	12	7	6	11	25	6
Total	4	4	13	13	7	8	13	27	7

Source: Multnomah County Health Department, Communicable Disease Control

Table 15
Animal Bites or Exposure to Humans*, Multnomah County

	1998	1999	2000	2001
Bat	4	7	4	3
Cat	8	17	15	8
Dog	28	36	36	41
Ferret	2	1	0	0
Raccoon	3	6	0	2
Other	9	10	5	7
Total Cases	54	77	60	61

* Responded to by MCHD or Animal Control
Source: Multnomah County Health Department, Communicable Disease Control

the wide variety of bacteria found in animal saliva. The bacteria can be transmitted into a wound through the bite. The consequences of infection can range from mild discomfort to life-threatening complications. Nationally, as well as in the County, rabies cases are rare. In the nine years between 1991 and 2000, only 4 animals tested positive for rabies in the County.

Conclusion

Vector borne disease incidence is very low in the County. As of the end of 2002, mosquitoes tested in Multnomah County have not been found to carry the West Nile virus. However, Oregon and Multnomah County anticipate the presence of West Nile virus in 2003. In preparation significant effort is being performed to increase public awareness of mosquito-borne disease risk and what people can do to limit their risk, and to prepare for the county government's role in West Nile virus surveillance and control.

The Health Department responds to all citizen complaints about rats and performs rodent control efforts through the county. The number of rodent complaints by citizens has remained relatively steady between 1999 and 2001. The number of animal bites or exposures to humans from animals is low and dog bites consistently make up half of all bites reported.

1. *West Nile Virus*. Centers for Disease Control and Prevention. Accessed: 7/1/02. <http://www.cdc.gov/ncidod/dvbid/westnile/index.htm>

Glossary

Air toxics: Also known as toxic air pollutants, are 188 pollutants tracked by the EPA known or suspected to cause cancer, respiratory, reproductive and developmental problems.

Air Quality Index: An assessment that combines criteria pollutants into one value of air quality for each day of the year.

Benzene: A colorless volatile flammable toxic liquid used in organic synthesis, as a solvent, and as a motor fuel.

Blood lead level: The concentration of lead in a sample of blood. The concentration is expressed in micrograms per deciliter (ug/dL).

Body Mass Index (BMI): A method of estimating fitness based on a person's height and weight. $BMI = \text{weight in kilograms} / \text{height in meters}^2$.

Brownfields: Abandoned, idle, or underused industrial or commercial sites that raise concern in nearby community that any expansion or redevelopment could contaminate the environment.

Campylobacteriosis: An illness caused by bacteria that lives in the intestines of health birds that can make people ill if ingested.

Carbon monoxide: A colorless, odorless, poisonous gas produced by incomplete fossil fuel combustion.

Chloroform: A colorless volatile heavy toxic liquid with an ether odor used especially as a solvent or as a veterinary anesthetic.

Chromium: A heavy metal that can damage living things at low concentrations and tends to accumulate in the food chain.

Combined sewer overflow: Discharge of a mixture of storm water and domestic waste when the flow capacity of a sewer system is exceeded during rainstorms.

Community water system: A public water system that provides water to at least 15 service connections used by year-round.

Conditionally Exempt Generator: Any business that produces less than 2,200 pounds of hazardous waste, less than 2.2 pounds of acute hazardous waste, or less than 220 pounds of spilled hazardous waste per month. Conditionally exempt generators are not required by law to report their hazardous waste production.

Criteria pollutants: A set of six air pollutants which are known to be unhealthy at high levels or with prolonged exposure. Carbon monoxide, ozone, nitrogen dioxide, particulate matter, sulfur dioxide, and lead. Major sources of criteria pollutants are vehicles - cars, trucks, ships and airplanes.

Cryptosporidium: A protozoan microbe associated with the disease cryptosporidiosis. The disease can be transmitted through ingestion of drinking water, person-to-person contact, or other pathways.

Cryptosporidiosis: A gastrointestinal illness caused by the cryptosporidium parasite.

E. coli: A bacteria commonly found in cattle. E. coli is also infrequently found in drinking water.

Environmental tobacco smoke: Smoke given off by cigarettes, pipes, or cigars to which nonsmokers can be exposed.

Foodborne illness: Infection caused by microbial or chemical contaminants in foods. Some foodborne illness can be caused by a single helping or less of a food that contains a contaminant. Other foodborne illnesses result from eating compounds in foods over a long periods of time.

Foodborne disease outbreak: The occurrence of two or more cases of the same illness among people from different households resulting from the ingestion of the same food.

Giardia lamblia: Protozoan in the feces of humans and animals that can cause severe gastrointestinal ailments. It is a common contaminant of surface waters.

Giardiasis: A gastrointestinal illness caused by the giardia parasite.

Hazardous substances: any substance that possesses properties that can cause harm to human health and ecologic systems.

Hazardous waste: Potentially harmful substances that have been released or discarded into the environment.

Health-based benchmark: Federal Clean Air Act guidelines based on a one in a million cancer risk for a specific air pollutant.

Healthy People 2010: A report from the U.S. Department of Health and Human Services which provides 467 objectives in 28 focus areas to target national health improvement activities.

Household lead dust: Very fine particles containing lead that are usually caused by the deterioration of lead paint.

Indoor air quality: The overall state of the air inside a building as reflected by the presence of pollutants, such as dust, fungi, animal dander, volatile organic compounds, carbon monoxide, and lead.

Large Quantity Generators: Any business that produces more than 2,200 pounds of hazardous waste, more than 2.2 pounds of acute hazardous waste, or more than 220 pounds of spilled hazardous waste per month.

Mixed use development: Land use development in which there are multiple uses: residential, retail, commercial, light industrial, entertainment, institutional.

Moderate physical activity: Activities that use large muscle groups and are at least equivalent to brisk walking. Activities may include walking swimming, cycling, dancing, gardening and yard work.

National Air Toxics Assessment: Provides risk estimates of hazardous air emissions for 32 of the most dangerous air toxics.

National Priorities List: EPA's list of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term cleanup under Superfund.

Nonattainment area: A locality where air pollution levels persistently exceed EPA's National Ambient Air Quality Standards.

Ozone: In the stratosphere ozone is a natural form of oxygen that provides a protective layer shielding the earth from ultraviolet radiation. In the troposphere (the layer extending up 7 to 10 miles from the earth's surface), ozone is a chemical oxidant and major component of smog.

Particulate matter: Fine liquid or solid particles such as dust, smoke, mist, fumes, or smog, found in air or emissions.

Pathogens: Microorganisms (e.g., bacteria, viruses, or parasites) that can cause disease in humans, animals and plants.

Physical activity: Bodily movement that is produced by the contraction of skeletal muscle and that substantially increases energy expenditure.

Radon: A colorless, naturally occurring radioactive gas found in some soils and rocks.

Recreational waters: Recreational water bodies include lakes, rivers, streams, and public swimming pools.

Salmonella: A bacteria that is frequently found in birds as well as other animals.

Secondhand smoke: A mixture of the smoke exhaled by smokers and the smoke that comes from the burning end of the tobacco product.

Sedentary lifestyle: A person who is relatively inactive and has a lifestyle characterized by a lot of sitting.

Small Quantity Generator: Any business that produces between 100 and 2,200 pounds of hazardous waste per month.

Solid waste: Common garbage or trash generated by industries, businesses, institutions, and homes.

Superfund: A program operated under the legislative authority of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and Superfund Amendments and Reauthorization Act (SARA) that funds and carries out EPA solid waste emergency and long-term removal or remedial activities. Superfund sites are uncontrolled or abandoned places where hazardous waste is located.

Toxic air pollutants (air toxics): EPA's list of 188 pollutants known or suspected to cause cancer, respiratory, reproductive and developmental problems.

Toxic Release Inventory: EPA's list of more than 600 designated chemicals that threaten health and the environment. Authorized under the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986, this system requires manufacturers to report releases of these chemicals to EPA and State governments.

Vector borne diseases: Illnesses that are transmitted to people by organisms, such as insects.

Vector control: Control of any object, organism or thing that transmits disease from one host to another.

Vehicle Inspection Program: A vehicle emissions inspection program operated by the Oregon Department of Environmental Quality in the Portland and Rogue Valley areas. The program is intended to reduce vehicle emissions.

Wastewater: The spent or used water from a home, community, farm, or industry that contains dissolved or suspended matter.

Waterborne disease outbreak: Incidents of infectious agents or chemical poisoning in which two or more people experience a similar illness after consumption or use of water and evidence implicates water as the source of illness.

Water quality limited: Recreational water bodies which do not meet federal Clean Water Act standards.

West Nile virus: A mosquito-borne disease new to the U.S. that was first identified in the eastern U.S. in 1999. Most people who become infected with West Nile virus will have either no symptoms or only mild ones. However, on rare occasions, West Nile virus infection can result in severe and sometimes fatal illnesses.

Work related injury (fatal or nonfatal): Any personal injury incurred by a worker while on or off the worksite but engaged in work-related activities. Work-related injuries may be unintentional or intentional (i.e. homicide or assault).

Data Sources

Drinking Water Quality

Drinking Water Program. Oregon Department of Human Services.

www.ohd.hr.state.or.us/dwp/swp.cfm

U.S. Environmental Protection Agency *Envirofacts Data Warehouse*. U.S. Environmental Protection Agency.

www.oaspub.epa.gov/enviro/ef_home2.water

Acute and Communicable Disease Program. Oregon Department of Human Services.

www.dhs.state.or.us/publichealth/acd/about.cfm

National Water Use Information Program. U.S. Geological Survey.

www.water.usgs.gov/watuse/

City of Portland Water Bureau.

www.water.ci.portland.or.us/

Food Safety

Acute and Communicable Disease Program. Oregon Department of Human Services.

www.dhs.state.or.us/publichealth/acd/about.cfm

FoodNet. Foodborne and Diarrheal Diseases Branch. Centers for Disease Control and Prevention.

www.cdc.gov/foodnet/

Hazardous Waste

DEQ Environmental Profiler. Oregon Department of Environmental Quality.

deq12.deq.state.or.us/fp20/

Environmental Cleanup Site Information (ECSI). Oregon Department of Environmental Quality.

www.deq.state.or.us/wmc/ecsi/ecsiquery.htm

Agency for Toxic Substances and Diseases Registry. Centers for Disease Control.

www.atsdr.cdc.gov/

Superfund Program. U.S. Environmental Protection Agency.

www.epa.gov/superfund/

Housing and Indoor Air Quality

Summary File 3. 2000 U.S. Census. U.S. Census Bureau.

www.factfinder.census.gov/servlet/BasicFactsServlet

Lead-Based Paint Program. Oregon Department of Human Services.

www.ohd.hr.state.or.us/leadpaint/index.cfm

Regional Land Information System (RLIS). Metro Regional Government.

www.metro-region.org/article.cfm?articleid=593

U.S. Environmental Protection Agency.

www.epa.gov/iaq/radon/zonemap/oregon.htm

Radiation Protection Services, Oregon Public Health Services, Oregon Department of Human Services.

www.dhs.state.or.us/publichealth/rps/radon/county.cfm

Tobacco Prevention and Education Program. Oregon Public Health Services.
www.ohd.hr.state.or.us/tobacco/fctsheet/mult.htm.

Land Use and Community Design

Supplementary Survey. 2000 U.S. Census. U.S. Census Bureau.

Metro Regional Framework Plan. Metro Regional Government.

www.metro-region.org/

Vital Statistics. Center for Health Statistics. Oregon Department of Human Services.

www.ohd.hr.state.or.us/chs/vstats.cfm

Fatality Analysis Reporting System. National Center for Statistics and Analysis.

www-fars.nhtsa.dot.gov/

Behavioral Risk Factor Surveillance Survey. Center for Health Statistics, Oregon Department of Human Services.

www.ohd.hr.state.or.us/chs/brfsdata.cfm

Youth Risk Behavior Survey, Oregon Healthy Teens. Center for Health Statistics, Oregon Department of Human Services.

www.ohd.hr.state.or.us/chs/yrbsdata.cfm#yrbs

Occupational Health

Information Management Division. Oregon Department of Consumer and Business Services.

www.cbs.state.or.us/external/imd/

Covered Employment and Payroll. Oregon Employment Department.

www.qualityinfo.org/olmisj/CEP

Outdoor Air Quality

National Emissions Inventory. U.S. Environmental Protection Agency.

www.epa.gov/ttn/chief/trends/index.html

AirData. U.S. Environmental Protection Agency.

www.epa.gov/air/data/index.html

Air Quality Index (or Pollutant Standards Index). U.S. Environmental Protection Agency.

www.epa.gov/airdatamonpsi.html

Green Book. U.S. Environmental Protection Agency.

<http://www.epa.gov/oar/oaqps/greenbk/index.html>

DEQ Environmental Profiler. Oregon Department of Environmental Quality.

www.deq12.deq.state.or.us/fp20/

National Air Toxics Assessment. U.S. Environmental Protection Agency.

www.epa.gov/ttn/atw/nata/nsata1.html

Oregon DEQ Air Program. Oregon Department of Environmental Quality.

www.deq.state.or.us/aq/

Toxic Release Inventory. U.S. Environmental Protection Agency.

www.epa.gov/triexplorer/introduction.htm

Vehicle Inspection Program. Oregon Department of Environmental Quality.
www.deq.state.or.us/aq/vip/

Recreational Water

Water Quality Program. Oregon Department of Environmental Quality.

www.deq.state.or.us/wq/

Oregon Water Quality Index. Oregon Department of Environmental Quality.

www.deq.state.or.us/lab/wqm/wqimain.htm

Combined Sewer Overflow Program. Environmental Services, City of Portland.

[www.cleanrivers-pdx.org/what we do/cso program.htm](http://www.cleanrivers-pdx.org/what_we_do/cso_program.htm)

Water Quality Division. U.S. Environmental Protection Agency.

www.epa.gov/OWOW/monitoring/

Center for Health Statistics. Oregon Department of Human Services.

www.ohd.hr.state.or.us/chs/

Solid Waste and Wastewater Quality

Office of Sustainable Development. City of Portland.

www.sustainableportland.org/

Environmental Management Department. Metro Regional Government.

www.metro-region.org/pssp.cfm?ProgServID=1

Environmental Services. City of Portland.

www.cleanrivers-pdx.org/

Solid Waste Program. Oregon Department of Environmental Quality.

www.deq.state.or.us/wmc/solwaste/rsw.htm

Vector-Borne Diseases

Environmental Health Section - Vector and Nuisance Control. Multnomah County Health Department.

www.mchealthinspect.org/vector/

Communicable Disease Control. Multnomah County Health Department.

Website Resources

Oregon Dept. of Human Services, Acute and Communicable Disease Program	www.ohd.hr.state.or.us/acd
Centers for Disease Control and Prevention	www.cdc.gov
City of Portland Office of Sustainable Development	www.sustainableportland.org
Oregon Department of Environmental Quality	www.deq.state.or.us
Institute of Medicine.....	www.iom.edu
Metro.....	www.metro-region.org
Multnomah County Animal Control	www.co.multnomah.or.us/dscd/pets
Multnomah County Health Department	www.co.multnomah.or.us/health
Multnomah County Vector and Nuisance Control	www.mchealthinspect.org/vector
National Center for Statistics and Analysis, Fatality Analysis System	www-fars.nhtsa.dot.gov/
National Institutes of Health.....	www.nih.gov
National Center for Health Statistics.....	www.cdc.gov/nchs/
Oregon Association of Hospitals & Health Associates	www.oahhs.org
Oregon Department of Human Services	www.ohd.hr.state.or.us
Oregon Dept. of Consumer and Business Services	www.cbs.state.or.us/external/dfcs
Oregon Dept. of Human Services, Center for Health Statistics	www.ohd.hr.state.or.us/chs
Oregon Dept. of Human Services, Lead Paint Program	www.ohd.hr.state.or.us/esc/lead
Oregon Employment Department	www.emp.state.or.us
Oregon Workers Compensation Division	www.cbs.state.or.us/external/wcd
Pew Charitable Trusts.....	www.pewtrusts.com
Population Research Center, Portland State University	www.upa.pdx.edu/cprc
Portland Water Bureau	www.water.ci.portland.or.us
U. S. Census Bureau	www.census.gov
U. S. Department of Agriculture	www.usda.gov
U. S. Department of Health and Human Services	www.hhs.gov
U. S. Environmental Protection Agency	www.epa.gov
U. S. Food and Drug Administration	www.fda.gov
U.S. Geological Survey	www.usgs.gov/
World Health Organization	www.who.int



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