Other Issues in Environmental Health

Introduction

This chapter provides an overview of seven important environmental health issues not covered in other chapters. Some of these issues are emerging topics for which limited data exist to characterize the type and extent of the problems. Others are familiar environmental health issues, but assessing risk has been hampered by a shortage of information on the degree, duration, or route of exposure for Washington residents.

Lack of data should not be equated with a lack of concern. These issues are presented here so that they can be included in prevention plans that emerge from this report.

Area-wide Soil Contamination

Agricultural pesticide use and smelter operations have contaminated large tracts of land in Washington with hazardous chemicals. During the first half of the 20th century, lead arsenate was applied as a pesticide, mostly on orchards in the central and eastern parts of the state. In western Washington, past emissions of arsenic and lead from smelters contaminated soil in King, Pierce, and Snohomish counties. As the population in these areas continues to grow, some of these contaminated properties are being developed into residential and other uses, increasing potential exposure to harmful contaminants.

Long-term exposure to environmental arsenic may increase the risk of developing a wide variety of health problems including cardiovascular disease, diabetes mellitus, skin problems, and several forms of cancer.[1] Exposure to environmental lead can result in learning and behavioral difficulties in children.[2] Exposure of future generations is likely because some contaminants, such as lead and arsenic, tend to stay in the surface soil for many decades. Young children are of the most concern because they tend to have greater exposure to soil than adults and older children. The greatest likelihood of exposure is in home settings where children contact soil and dust as they play and where adults can be exposed through gardening and yard work. Also, contaminated soil at schools, child care facilities, and parks can contribute to the risk of exposure for many children.

Indicators

Hazard indicators. Soil samples collected from areas affected by smelter emissions and pesticide use can serve as hazard indicators. Sampling efforts by governments have focused on properties with schools, child care facilities, and parks, where many children may be exposed to contaminated soil. In 2005, the Washington Legislature passed a law requiring analysis of soil samples from schools and child care facilities that could have been affected by emissions from the Tacoma Smelter in western Washington, which operated for nearly 100 years. Soil samples from schools in central Washington have also been evaluated. In some of these samples, concentrations of arsenic and lead reveal that exposure to the soil could increase the risk of developing health problems. Data from soil sampling in Washington are very limited, covering only a small percentage of the properties suspected of contamination and only a small portion of people who may be exposed. It would be costly to characterize soil contamination across all potentially affected properties, a situation complicated by the fact that there can be significant variability in contaminant concentrations even for samples collected within a few meters of one another. More research is required to understand better the extent to which hazard indicators correspond to actual exposures.

Exposure indicators. Monitoring of blood lead levels may provide an indicator of exposure and of the risk of adverse health outcomes associated with lead-contaminated soils. Limited data are available for people living in areas where the contamination occurs.

Health outcome indicators. Tracking the number of cancer cases as a health outcome indicator of exposure to arsenic-contaminated soil is unlikely to be productive. Cancer is caused by multiple factors, and the contribution of arsenic-contaminated soil is expected to be relatively small and difficult to measure reliably. Detailed individual-level data on all sources of exposure to arsenic, potential confounding factors such as how long a person lived in an area, and potentially significant exposures to other carcinogens would be needed to measure adequately the effect of contaminated soil on cancer rates. Such a study would be prohibitively expensive and still might not yield conclusive results.

Future Directions

There is a substantial lack of data regarding the extent, location, and magnitude of soil contamination, especially in agricultural areas. The potential for exposure is increasing as more agricultural lands are converted to residential use. The Washington State Department of Health is working with the Washington State departments of Ecology and Agriculture and the Office of Community Development to assess the extent of the problem and to identify residential properties that might once have been orchards. Environmental sampling of areas likely contaminated by pesticide use or smelter emissions will be expanded during the next few years. Efforts continue to raise awareness among the public, business community, and regulatory agencies of the risks associated with exposure to soil that is contaminated with arsenic and lead.

Year 2010 Goals

No *Healthy People 2010* objective pertains to area-wide soil contamination.

See Related Chapters: Children's Environmental Health, Pesticide-Related Illness and Injury

For More Information

Washington State Department of Health, Office of Environmental Assessment:
http://www.doh.wa.gov/ehp/oehas/default.htm
(877) 485-7316

Washington State Department of Ecology's Dirt Alert website:

http://www.ecy.wa.gov/programs/tcp/sites/tacoma_smelter/ts_hp.htm

Washington State Area Wide Soil Contamination Project:
http://www.ecy.wa.gov/programs/tcp/area_wide/area_wide_hp.html

Agency for Toxic Substances and Disease Registry's Arsenic Fact Sheet: http://www.atsdr.cdc.gov/tfacts2.html

Washington State Department of Health, Office of Environmental Assessment: (877) 485-7316

Environmental Radiation

The Department of Health is responsible for protecting human health and the environment from the effects of nuclear radiation. Radiation protection involves monitoring and surveillance, maintaining laboratory capacity, responding to radiological emergencies, alerting Washington residents of radiation hazards, and recommending protective actions. Since 1961, the state has conducted environmental radiation monitoring. This program collects environmental samples to analyze for trace amounts of radioactive contaminants. The results are used to determine whether the public and the environment are safe from hazards associated with exposure to radioactivity. The department collects many different types of samples such as soil, vegetation, food, water, and air particulates. These are analyzed at the state's Public Health Laboratory located in Shoreline, WA.

The early environmental radiation assessment program primarily examined statewide atmospheric fallout from nuclear weapons tests. Current surveillance emphasizes major nuclear facilities with known or potential environmental radioactive contamination associated with each facility's operation, decommissioning, or clean-up. Most of the assessment effort relates to radiological surveillance in southeast Washington State at the U.S. Department of Energy's Hanford Site and at other, nearby nuclear facilities including Energy Northwest's Columbia Generating Station, US Ecology's (a private company) low-level radioactive disposal site, and Perma-Fix Northwest, Inc., a radioactive waste treatment facility. The Department of Health also monitors for radioactive contaminants in northeast Washington at Dawn Mining Company, a uranium mill site, and at the U.S. Navy submarine bases in Puget Sound. Lastly, the department responds to public concerns and conducts special

studies of problems such as accumulation of contaminants in sanitary sewage sludge from medical uses of radioactive material and improper disposal of these contaminants into landfills.

In most cases, department data represent a small portion of the information on radionuclide contamination collected by each facility. The department's emphasis has been on determining the capability of each facility to correctly measure contamination.

Indicators

Hazard indicators. Environmental samples of radiological contaminants that are above state and federal standards serve as a hazard indicator. Radiological hazards are assessed by reviewing the possible dose people might receive as a result of contamination released by a facility. The quality of information on contaminant releases reported by facilities is evaluated by comparing facility reports to independent laboratory results obtained by the Department of Health. The validated information is used to estimate the amount of radiation released into the environment that people could be exposed to. Additionally, the department evaluates the radioactive contaminants in samples over time, looking for trends.

Future Directions

The Department of Health will continue assessment of public health and environmental impacts of facility operations. As some sites are cleaned and closed, the department will reduce sampling and simply verify that site conditions don't change after clean-up. The department expects to expand its monitoring of the land and water surrounding Hanford with sampling focused on the Columbia River and other places where the public has the greatest potential to come into contact with radioactive contaminants released from the Hanford Site.

Emergency response and homeland defense capability will be increased. The department has the capacity to monitor and measure contamination following a radiological event such as a transport accident of radiological material, an act of terrorism, or an atmospheric test of a nuclear bomb. Capacity is being increased to provide sampling equipment and trained staff to respond to all types of nuclear emergencies.

Year 2010 Goals

No *Healthy People 2010* objectives specifically pertain to environmental radiation.

For More Information

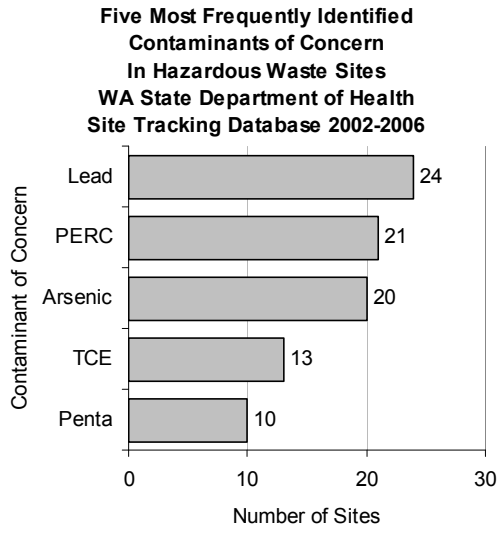
Washington State Department of Health, Office of Radiation Protection, Environmental Monitoring and Assessment:
http://www.doh.wa.gov/ehp/rp/environmental/default.htm#mission
(360) 236-3300

Hazardous Waste Sites

Few regulations for disposal of hazardous wastes were in place before 1970. Often these wastes were disposed of inappropriately. As a result, hazardous wastes leaked into the environment, contaminating the groundwater and soil. Environmental contamination can pose long-term risks to the public's health. Health risks from exposure to hazardous wastes depend on the extent and nature of the contamination, proximity to the waste site, potential exposure pathways, and characteristics of the people exposed.

Federal and state laws require hazardous waste sites to be identified, listed, and assessed for potential harm to human health and the environment. The U.S. Environmental Protection Agency (EPA) and the Washington State Department of Ecology both maintain lists of such sites.[3] Fifty active sites in Washington are on EPA's national priority list. In addition, the Department of Ecology has identified 3,115 sites currently undergoing investigation and/or clean-up.

The Department of Health evaluates a subset of these sites to determine if public health actions and interventions are required. From 2002 through 2006, the department evaluated human exposure to contaminants at 38 hazardous waste sites. Thirty-seven percent of these were determined to pose a human health hazard, and actions were required to reduce or eliminate human exposures. The most frequently identified contaminates of concern were lead, tetrachloroethylene (PERC), arsenic, trichloroethylene (TCE), and pentachlorophenol (penta).



Industrial and hazardous waste sites are often found in greater numbers in urban industrial areas. This pattern is evident in parts of south Seattle where more industrial and hazardous waste facilities are located than in other parts of the state.

Indicators

Hazard indicators. Environmental sampling can determine if contaminants are present at a level high enough to pose a risk to human health.

Health Disparities

Where people live can determine how exposed they can be to sources of pollution in the air, water, or soil. While most hazardous waste sites by themselves do not pose elevated health risks, the cumulative impact of living near multiple sites may lead to increased health risks, especially through air emissions. A 1995 Washington State Department of Ecology study found there is a disproportionately greater number of facilities such as contaminated sites, hazardous treatment, storage and disposal facilities, major water or air releasers, landfills, incinerators, and toxic release inventory facilities in low-income and minority areas than in non-low-income and non-minority areas.[4,5]

Technological barriers can prevent some people from accessing information. The Department of Health seeks to provide communities with culturally and linguistically appropriate information on hazardous waste sites. The goal is to help communities understand the level of health risk and what they can do to protect themselves.

Future Directions

The Department of Health will continue to evaluate human exposure to contaminants at individual hazardous waste sites, and it has begun to develop the capacity for assessing exposures from multiple sources. Clean-up of hazardous waste sites is key to eliminating exposure to hazardous chemicals in the environment. Future work needs to focus on preventing new hazardous waste sites.

Year 2010 Goals

A *Healthy People 2010* objective is to minimize the risks to human health and the environment posed by hazardous sites. Washington State contributes less than 1% to the number of national hazardous waste sites.

See Related Chapter: Outdoor (Ambient) Air Quality

Data Sources

Washington State Department of Ecology, hazardous waste sites

Washington State Department of Health, hazardous waste site contaminants and Site Tracking Database

For More Information

Washington State Department of Health, Office of Environmental Health Assessments, Site Assessment Section: http://www.doh.wa.gov/ehp/oehas/sas.htm (877) 485-7316

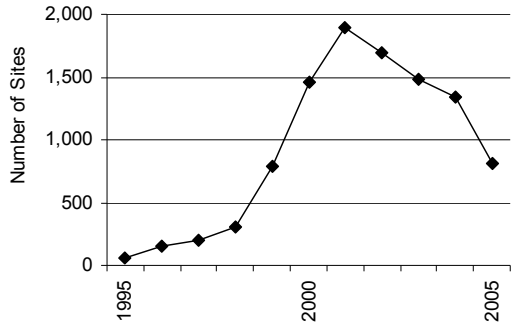
Illegal Drug Manufacturing Sites

Unlike industrial processes that are conducted in dedicated facilities, methamphetamine is produced in private residences, in the backs of cars, and in makeshift facilities in county parks or remote forests. The production of methamphetamine can involve the use of toxic, corrosive, flammable, and explosive chemicals. These illegal drug manufacturing sites are known as Clandestine Drug Labs (CDLs). People making methamphetamine are exposed to these chemicals and the wastes from the manufacturing process. Other people—those living at the site or persons that may later occupy the site—can also be exposed to residues of these chemicals left on surfaces at the site. Children are at particular risk because they are more likely to come in contact with such residues on floors and walls and because they are more susceptible to the neurotoxic effects of methamphetamine and chemicals used in the manufacture of the drug.

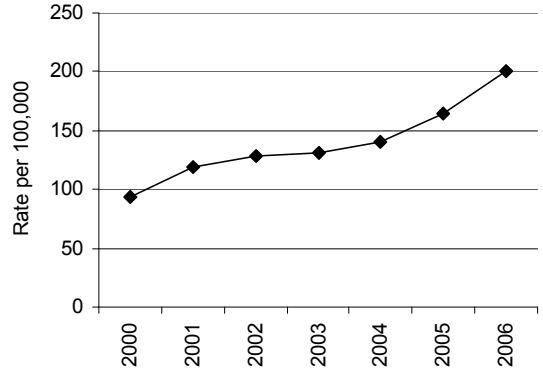
When a CDL or dump site from methamphetamine production is found, the state Department of Ecology responds to dispose of the hazardous materials. Proper cleaning and remediation of clandestine drug labs helps assure the safety of future occupants. The Department of Health sets performance standards for the clean-up process and certifies workers and companies that provide CDL clean-up services. Local health jurisdictions (LHJs) oversee the clean-up and remediation of CDLs in their communities, and they certify when a former CDL is fit for occupancy.

The number of CDLs increased from 1995 to 2001 and has declined since (see graph). Since 2000, more restrictive laws limiting the sale of over-the-counter cold remedies containing chemicals needed for the manufacture of methamphetamine (i.e., ephedrine and pseudoephedrine) may have contributed to the decline. But cross-border traffic in illegal drugs continues to supply methamphetamine users.

Drug Labs and Dump Sites
WA State Department of Ecology, 1995-2005



Adult Admissions for Methamphetamine Dependency Treatment
WA State Department of Social and Health Services, 2000-2006



Although the number of CDLs has been declining, addiction to methamphetamine remains a community health problem. From 2000 to 2006, admission rates for methamphetamine dependency treatment climbed from 93 to 201 per 100,000 Washington residents 18 and older.

Future Directions

Working with the State Board of Health, the Department of Health is establishing standards and required training for third parties who collect samples to measure chemical residues after remediation of a CDL to assure sufficient knowledge and skills.

Year 2010 Goals

No *Healthy People 2010* objectives pertain to clandestine drug labs.

See Related Chapters: Drug Abuse and Dependence, Children's Environmental Health

Data Sources

Washington State Department of Ecology, Environmental Report Tracking System, Meth Incidents Responded to by County

Department of Social and Health Services, Admission rates for methamphetamine dependency

For More Information

Washington State Department of Health, Office of Environmental Health and Safety, Clandestine Drug Lab Program: http://www.doh.wa.gov/ehp/ts/CDL/pubs-cdl.htm (888) 586-9427.

U.S. Centers for Disease Control and Prevention (2005). Acute public health consequences of methamphetamine laboratories—16 States, January 2000–June 2004. *Morbidity and Mortality Weekly Report*, 54(14),356-359. available at http://www.cdc.gov/mmwR/preview/mmwrhtml/mm5414a3.htm

Persistent, Bioaccumulative, and Toxic Chemicals

Chemicals released into the environment that are long-lived (persistent), accumulate in wildlife and up the food chain (bioaccumulative), and are toxic to wildlife and people present unique environmental problems. Persistent, bioaccumulative, and toxic (PBT) chemicals can be widely dispersed in the environment, making their control and clean-up difficult and resulting in potentially long-term environmental and human health impacts. In December 2000, the state Department of Ecology released Washington's PBT Strategy with the goal of reducing environmental and health risks from PBTs.[6] In 2006, the Department of Ecology finalized the PBT Rule (Chapter 173-333 WAC),

which provides a list of PBTs and describes the process for selecting PBTs for evaluation. The current list of PBTs includes metals, banned and in-use flame retardants, combustion by-products, banned pesticides, and other banned or in-use chemicals with various uses.

Implementation of the PBT Strategy involves developing Chemical Action Plans (CAPs) for each PBT. The CAP identifies sources of the PBT and actions that can be taken to reduce its use and environmental release. In collaboration with the Department of Ecology, the Department of Health provides information on human health exposures and risks associated with each PBT evaluated.

PBT exposures can result in a variety of toxic effects including interference with normal brain development and increased risk of cancer. Since PBTs accumulate in animals and up the food chain, a main route of exposure for the general public can be from eating fish, beef, dairy products, and other animal-derived foods. The Department of Health issues fish consumption advisories when high concentrations of pollutants are found. Some PBTs (methyl mercury and polychlorinated biphenyls) are known to affect the developing fetus, and fish advisories related to these chemicals emphasize protection of pregnant women or women of childbearing age.

Indicators

Hazard indicators. Environmental sampling data are used to provide information to identify locations of high concentrations of PBTs, to monitor trends, and to evaluate the effectiveness of regulations and other control activities. Some PBTs have been studied for years, resulting in extensive data on their presence in the environment and in wildlife. Other PBTs are emerging contaminants for which data are lacking to characterize their levels in the environment. Many of the PBTs are included in ongoing environmental monitoring programs conducted by the Department of Ecology and other state and federal environmental agencies.

Exposure indicators. Monitoring levels of PBTs in human tissues (biomonitoring) can provide measures of exposure to these chemicals. Many PBTs have been detected in human tissue samples, and biomonitoring data generally provide information on the total amount of exposure from all routes of intake (ingestion, inhalation, and skin contact). For PBTs with established toxicity benchmarks or "safe" levels, biomonitoring data can identify people who are over-exposed and at risk for developing health problems as a result.

The U.S. Centers for Disease Control and Prevention (CDC) began biomonitoring for a broad list of environmental chemicals in 1999 as part of its National Health and Nutrition Examination Survey (NHANES) of the U.S. population. Several PBTs are evaluated.

Lead in blood is a "notifiable condition" in Washington State (WAC 246-101), and clinical laboratories must report the results of all blood lead tests to the Department of Health.

Health outcome indicators. Tracking the number of illnesses or cancer cases is not a useful indicator of the potentially harmful effects from exposures to PBTs. Many factors play a role in the formation of cancer, and exposures to individual PBTs are expected to make only a small contribution to overall cancer risk. Neurodevelopmental effects from exposures in utero or in childhood might result in subtle changes in learning and memory that are difficult to test for and track.

Future Directions

The Department of Health will continue to work with the Department of Ecology to develop activities and policies to monitor and reduce the release of PBTs into the environment. This involves continuing to track the levels of PBTs in the environment and to track human exposures. Additionally, the Department of Health will continue to engage in a national dialogue on improving U.S. chemical policy to prevent future problems with PBTs. Such improvements would include revising the Toxics Substances Control Act to increase access to toxicity testing data for new and existing chemicals from manufacturers. Access to testing data for chemicals would provide users of these chemicals, government, and the public more information with which to make decisions about the products they use.

Year 2010 Goals

The national *Healthy People 2010* goals include two goals related to PBTs. Objective 8-10 is to reduce the potential human exposure to persistent chemicals by decreasing fish contaminant levels so that no more than 13.8% of river miles and no more than 29.6% of lake acreage is under advisories about potential human exposure to persistent

chemicals in sport fish. In 2005 and 2006, 100% of Washington's river miles and lake acres were under advisory for mercury, and so it is unlikely that Washington will meet this goal.[7] The high levels of mercury in Washington's lakes and rivers that have led to the statewide advisory may be due to global mercury admissions.

Objective 8-25 includes reducing exposure of the population to pesticides, heavy metals, and selected environmental chemicals as measured by blood and urine concentrations (biomonitoring). Individual objectives are included for several PBTs (cadmium, lead, mercury, PCBs, dioxins, furans, chlordane, dieldrin, and DDT). This objective uses the CDC's National Report on Human Exposure to Environmental Chemicals as the data source. National targets for a 30% improvement from baseline for biomonitoring measurements for cadmium, lead, mercury, dieldrin, and DDT have been set. Currently there are Washington State data for children tested for blood lead and limited data for mercury, but there are no data for the other chemicals (see Children's Environmental Health chapter for lead data).

See Related Chapter: Children's Environmental Health

For More Information

Washington State Department of Ecology's PBT website:
http://www.ecy.wa.gov/programs/eap/pbt/pbtfaq.html

U.S. EPA PBT Chemical Program website:
http://www.epa.gov/pbt/

CDC NHANES Report on Human Exposure to Environmental Chemicals:
http://www.cdc.gov/exposurerepord/3rd/

U.S. Chemical Policy Issues: Lowell Center for Sustainable Production, Chemicals Policy Initiative:
http://www.chemicalspolicy.org/index.shtml

Recreational Waterborne Illness

Swimming is the most popular recreational activity among children in the United States and the second most popular exercise activity for all ages.[8] Recreational waterborne illness results from exposure to contaminated water through activities such as swimming. The 2005 Behavioral Risk Factor Surveillance System Survey indicated that 25% of adults and 43% of children in Washington report swimming or wading in a swimming pool, spa, or hot tub at least once in the past month. From June through September, 11% of adults and 17% of children swam or waded in salt water, and 22% of adults and 41% of children swam or waded in fresh water such as lakes, ponds, or rivers at least once in the past month.

Waterborne pathogens—bacteria, protozoa, and viruses—pose a health threat when users come in contact with contaminated recreational water. Exposure can occur through ingestion, inhalation, or skin contact with contaminated natural (ocean, lakes, and streams) or artificial (swimming pools, spas, or water parks) recreational water.

Cryptosporidiosis, gastroenteritis of unknown origin, dermatitis, respiratory illness, and eye, ear, nose, and throat infections are the most common illnesses resulting from exposure to contaminated recreational water. The very young, the elderly, and people with weakened immune systems are most susceptible to recreational waterborne illness.

In Washington State from 1996 to 2001, 363 people were affected in confirmed recreational waterborne illness outbreaks. From 2002 through 2005, no outbreaks were reported. The largest outbreaks have occurred on small lakes during peak use. Bathing water outbreaks have not been reported for several years. But with increasing population growth and no improvement in the capacity of beaches to handle additional people, the potential for outbreaks on warm summer days during heavy use periods is present. Typically, children are the most affected because they are more likely to swim at recreational sites, and their limited swimming abilities increase exposure to more highly contaminated sediments during shoreline play. Smaller children are more at risk for unintentional ingestion of water and sediments.

Recreational Waterborne Illness Outbreaks
WA State Department of Health, 1996–2005

Year	Outbreaks	Cases	Pathogen
1996	1	18	Pseudomonas
1997	0	0	
1998	2	306	Viral
1999	1	36	E.coli O157:H7
2000	0	0	
2001	1	3	Pseudomonas
2002	0	0	
2003	0	0	
2004	0	0	
2005	0	0	
Total	5	363	

The Department of Ecology cooperates with LHJs to monitor water quality at approximately 70 marine beaches each week during the swimming season. The EPA's Beaches Environmental Assessment and Coastal Health (BEACH) Program provides funding grants to states to monitor coastal recreational waters adjacent to beaches. Because of limited funding, not all beaches are monitored. Marine beach monitoring sites are chosen based on two factors, the extent of use and the potential for fecal bacteriological water contamination. Beaches monitored change from year to year. Monitoring methods and frequency for the marine beaches are uniform.

Marine Beach Advisories or Closures
WA State Department of Health
October 2005–June 2006

Time Period	Beaches Monitored	Beaches Issued Advisories or Closed
May–August 2003	34	4
May–August 2004	72	10
May–August 2005	74	12
May–August 2006	75	31
May–August 2007	66	12

The state of Washington does not have a fresh water monitoring program that systematically tracks and reports on the health trends of rivers and lakes for fishing or recreation. A few local agencies monitor selected freshwater beaches. Monitoring methods and frequency of freshwater beaches (rivers and lakes) vary as to the water quality indicator, the level of monitoring, and action levels.

All LHJs regulate and monitor commercial pool facilities (pools, spas, and water parks). They may close pools and beaches to protect public health. On average, more than 500 pools are closed each year by LHJs. The main reason for closure is failure to comply with water quality standards. Where public beaches are monitored, usage advisories or closures are posted, based on the seriousness of the risk.

Indicators

Hazard indicators. Bacterial levels measured in natural recreational waters determine possible contamination by pathogens. For artificial recreational waters, disinfectant levels, water clarity, and overall facility maintenance are indicators of water quality. Closures of recreational waters resulting from failure to meet monitoring standards are an indicator of potential hazard. Even water that meets water quality standards may not be safe. Variations in how different organisms respond to disinfectants, the presence of bathers who are infected with pathogens, and the potential for microorganisms to be shielded in slime layers are just a few factors that can create a potential for infection. Incidents of waterborne illness are known to have occurred in water that meets bacteriological standards.

Health outcome indicators. Recreational waterborne illness cases and outbreaks are tracked by both the Department of Health and LHJs. Prompt investigation of illness reports allows early identification of contaminated recreational waters and prevention of new cases or secondary transmission of disease. Not all outbreaks or cases are recognized and reported, however.

Year 2010 Goals

Healthy People 2010 has two goals related to beaches. Objective 8-8 is to increase the proportion of assessed rivers, lakes, and estuaries that are safe for fishing and recreational purposes to 58% of rivers and streams and 66% of lakes, ponds, and reservoirs. Washington State does not have data to address this objective. Objective 8-9 is to increase the proportion of days that beaches are open and safe for swimming. Washington does not have data to adequately address this goal. Because of limited funding, the number of beaches sampled each year is decreasing.

See Related Chapters: Drowning, Shellfish Safety

Data Sources

Washington State Department of Health, Annual Communicable Disease Report 1996–2005

For More Information

Washington State Department of Health, Office of Environmental Health and Safety, Water Recreation Program, http://www.doh.wa.gov/ehp/ts/WaterRec/default.HTM (888) 586-9427

Washington State Department of Health Beach Environmental Assessment, Communication and Health program: http://www.doh.wa.gov/ehp/ts/WaterRec/beach/default.htm or http://www.ecy.wa.gov/programs/eap/beach/

CDC Healthy Swimming http://www.cdc.gov/healthyswimming/

Washington State Department of Ecology, information on lake monitoring: http://www.ecy.wa.gov/programs/eap/lakes/wq/index.html

and water quality assessment:
http://www.ecy.wa.gov/programs/wq/303d/2008/index.html

Zoonotic Disease

Zoonotic diseases (zoonoses) are caused by the transmission of infectious bacteria, viruses, and parasites from animals to people. From 2001 through 2005, about 15 zoonotic-related illnesses were reported each year in Washington.

Animals that can infect people include pets, livestock, and wildlife. Disease may be transmitted directly from an animal to a person or may be transmitted from an animal to a person by an infected "vector" such as a tick, mosquito, flea, or mite.

Direct contact with infected animals or contact with surfaces contaminated by their feces may be the source of some zoonotic diseases. Family pets such as reptiles, lizards, snakes, and turtles can spread salmonella. Public settings such as fairs, farm tours, petting zoos, and schools can be a source of contact with animals. Adequate hand-washing is crucial to prevent disease transmission through animal contact.

Inhalation of dust containing contaminated urine, dander, or feces is another way microbial agents cause zoonotic diseases. For example, hantavirus can be transmitted by feces and urine of deer mice. Prevention education that focuses on avoiding exposure during clean-up of contaminated materials can reduce infection acquired by inhalation.

Bites and scratches from wild and domestic animals are another source of zoonotic infections. Nearly always fatal in people, rabies can be transmitted by infected bats. Human rabies is extremely rare in the United States due to comprehensive prevention efforts that include rabies vaccinations for pets, follow-up of animal bite incidents, treatment for people who have been exposed to rabid animals, and public education efforts.

Bites from infected mosquitoes, ticks, and fleas can pass certain infectious agents to people. Tick-borne diseases include Lyme disease and tick-borne relapsing fever. Tularemia infections have been associated with tick or deer fly bites. Mosquitoes can carry viruses that cause encephalitis (inflammation of the brain). In Washington, surveillance for West Nile virus in mosquitoes, wild birds, sentinel chickens, and horses serves as an early warning signal that can trigger control and prevention measures to protect communities.

The highly pathogenic H5N1 avian influenza virus occurs naturally in wild birds and has been responsible for outbreaks among domestic birds in Asia, Africa, and Europe. About 300 human cases have been reported since 2003, mostly in Asia. The mortality rate from H5N1 influenza infection in humans is greater than 50%. In Washington, environmental surveillance for avian influenza in wild birds, primarily migratory water fowl and shorebirds, is conducted by the Department of Fish and Wildlife. The Department of Agriculture conducts surveillance for this illness in domestic poultry.

Public education is the best defense against zoonotic diseases. People should be aware of zoonoses common to their environments and times of year when they are at greatest risk. This is important for people with occupational exposures and those who participate in outdoor recreational activities.

Indicators

Hazard indicators. Environmental surveillance for zoonotic infection in animal populations is an indicator of environmental hazard. Veterinarians have an important public health role in the identification, reporting, and control of zoonoses.

The Department of Health coordinates surveillance for West Nile virus infection in mosquitoes, wild birds, chickens, and horses throughout the state.

Health outcome indicators. The number of reported cases in people is the most common health indicator. Many zoonoses are notifiable conditions. But both notifiable and non-notifiable zoonoses, especially rarely observed conditions, are often underreported by health care providers and the public.

Future Directions

Experts predict increasing incidence of zoonotic transmission of disease as people come in close contact with animals. Animal exhibits are popular, hobby farms and backyard chicken flocks are common, and nontraditional pets—particularly wild, exotic, and imported animals—are also popular. As more people live, work, or recreate in areas inhabited by wildlife, exposure to natural vectors is likely to increase. In response to these trends, public health agencies will continue environmental monitoring and case reporting.

Year 2010 Goals

No *Healthy People 2010* objectives pertain to zoonotic diseases.

See Related Chapters: Emerging Infectious Diseases, Foodborne Illnesses

Data Sources

Washington State Department of Health, Annual Communicable Disease Reports, 2001–2005

Human Salmonellosis Associated with Animal Pet Treats–United States and Canada 2005. June 30, 2006, MMWR

For More Information

Washington State Department of Health, Office of Environmental Health and Safety, Zoonotic Disease Program: http://www.doh.wa.gov/ehp/ts/zoo
(888) 586-9427

Washington State Department of Agriculture: http://agr.wa.gov

Washington State Department of Fish and Wildlife: http://wdfw.wa.gov

U.S. Centers of Disease Control and Prevention (CDC): http://www.cdc.gov/index.htm

U.S. Government Avian and Pandemic Flu Information: http://www.pademicflu.gov/

Endnotes

[1] Agency for Toxic Substances and Disease Registry. (2005). *Toxicological Profile for Arsenic*. Available at: http://www.atsdr.cdc.gov/toxguides/toxguide-2.pdf.

[2] Agency for Toxic Substances and Disease Registry. (2005). *Toxicological Profile for Lead*. Available at: http://www.atsdr.cdc.gov/toxguides/toxguide-13.pdf.

[3] EPA Sites in Washington: http://yosemite.epa.gov/r10/cleanup.nsf/webpage/Washington+Cleanup+Sites
Ecology sites:
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