

Drowning

Definition: Drowning occurs when breathing is impaired because a person's airway is blocked by water or another liquid. Drowning hospitalizations for 1989–2005 and deaths for 1980–1998 include all records with an ICD 9 code including E830, E832, or E910. For deaths during 1999–2005, the applicable ICD 10 codes include W65-W74, V90 or V92.

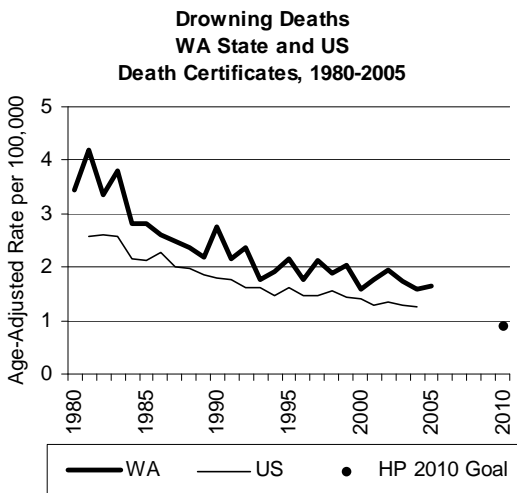
Summary

Swimming, boating, and other forms of water recreation are among Washington State residents' most popular pastimes. Sometimes, these activities can be dangerous or even fatal. In 2005, 104 Washington residents died from drowning including incidents that were related to boating.

Drowning is a complex issue, and no single strategy prevents all cases. Water safety requires knowing the water, understanding the environment and providing supervision, safety gear, and education.

Time Trends

Washington's drowning rate declined steadily from 1980 to 1987. Since 1988, drowning rates have declined only slightly. Historically, Washington's drowning rates have been higher than the nation as a whole. The only study on declining drowning rates and alcohol found that less use of alcohol around water explained 50% of the decline in unintentional drowning deaths



in King County from 1975 to 1995. Better treatment and improved access to care did not account for any decline in these deaths.¹ Successful interventions might explain the national decreases.²

Year 2010 Goals

The national *Healthy People 2010* goal is to reduce the drowning rate to 0.9 drownings per 100,000 population. In 2005, the drowning rate in Washington was 1.7 per 100,000 population. If current trends continue, drowning rates will be lower than they are currently, but Washington will probably not meet the national target without intensified drowning prevention efforts.

Geographic Variation

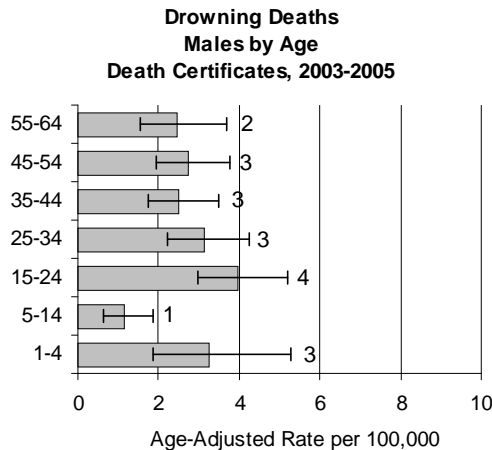
As shown in the map below, people living in the Bellingham area were about 18 times more likely than other Washington residents to die from drowning.



Age and Gender

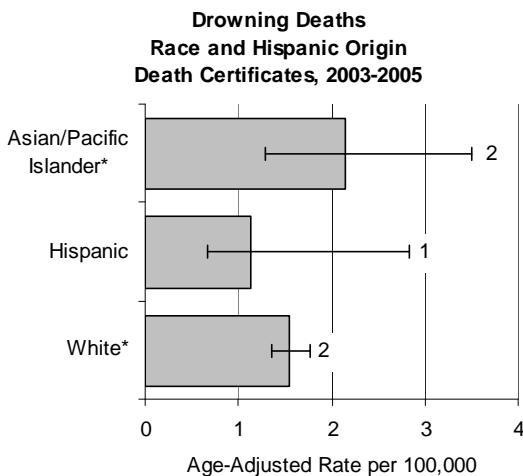
From 2003–2005, Washington males were more likely than females to die from drowning. The highest death rates were for males 15–24 and 85 years old

and older. Females in all age groups and males younger than one and 65 years and older had [fewer than 20](#) deaths. Death rates for these groups fluctuate even when combining three years of data, and the following chart does not include them.



Race and Hispanic Origin

In Washington during 2003–2005, blacks and American Indians and Alaska Natives had fewer than 20 drowning deaths. Death rates for these race groups are unstable even when combining three years, and the following chart does not include these groups. No racial group with stable rates had death rates different from whites. Nationally, blacks and American Indians and Alaska Natives have higher rates of drowning compared to the other race groups.³ The interaction of race, Hispanic origin, poverty, and education with drowning rates has not been widely researched.

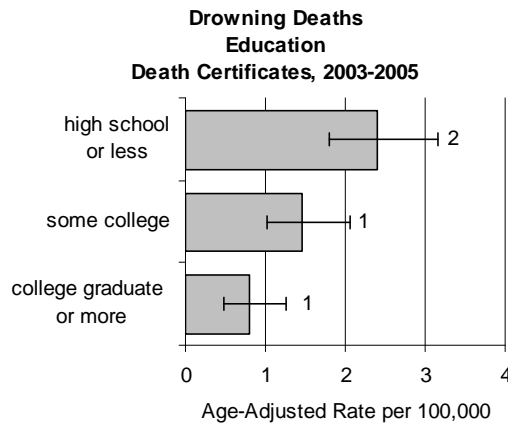


* Non-Hispanic

Income and Education

In Washington during 2003–2005, [age-adjusted](#) drowning rates were highest among people with a high school education or less and lowest for those who had completed at least four years of college.

There are no direct measures of the relationship between an individual's income and drowning deaths for Washington. But in 2000–2002, age-adjusted drowning rates increased as poverty increased.⁴



Other Measures of Impact and Burden

Hospitalizations. In 2005, 54 people were hospitalized for submersion incidents. A submersion incident often produces extensive brain damage. Estimated costs of medical care for an initial stay in the hospital for a drowning victim range from \$2,000 to \$80,000. The lifetime costs of long-term care for a submersion incident that results in brain damage can be more than \$4.5 million.⁵

Boating-related deaths. In Washington from 2003–2005, there were an average of 17 boating-related deaths per year. This is about double the rate nationally.⁶ There were six drownings of commercial fisherman during these three years.

Risk and Protective Factors

Supervision. Lack of adequate supervision is a risk factor for drowning among young children and people with pre-existing medical conditions, such as seizure disorders.

Among people with seizure disorders, drowning is the most common cause of unintentional injury death, and the bathtub is the site of the highest drowning risk.⁷

In Washington from 1999 to 2001, infants were also most likely to drown in the bathtub. About half of the drowning deaths of children ages one through four occurred in open water. Most swimming pool deaths occurred in this age group.⁸ Young children who drowned in pools were often last seen in the home, had been out of sight less than five minutes, and were in the care of one or both parents at the time of death.⁹

One in five parents believes that when lifeguards are present, that person is responsible for supervising children in the water. While lifeguards provide effective oversight of a water area, they should be considered an adjunct to supervision by a parent or other caregiver. The typical swimmer-to-lifeguard ratio at public swimming areas might be as high as 25 swimmers per lifeguard.⁹

Alcohol. Drinking alcohol while engaged in water recreation activities is a major risk factor for drowning.⁷ The likelihood of drowning death increases with increasing blood alcohol levels.¹⁰ Alcohol use is involved in about 30% to 70% of adolescent and adult deaths associated with water recreation.¹¹ Alcohol influences balance, coordination, and judgment, and its effects are heightened by sun exposure and heat.¹²

Pool barriers. The lack of barriers around all four sides of a pool or improperly designed and maintained barriers, especially around residential pools, increases the risk of drowning for young children.

Personal flotation devices (PFDs). In 2004, 90% of boating-related fatalities in the United States involved victims who were not wearing a PFD or lifejacket.¹³ Only about a fourth of Washington residents in small boats wear PFDs.¹⁴ In the 2006 Washington State [Healthy Youth Survey](#), only 39% ($\pm 2\%$) of 8th grade students, 30% ($\pm 2\%$) of 10th grade students, and 25% ($\pm 2\%$) of 12th grade students reported always wearing a life vest when boating.

Environmental factors. Cold water or dark, unclear water, riptides with ocean currents, and fast-moving waters that appear still or quiet are risk factors for drowning. Difficult water conditions are especially dangerous when combined with adverse weather or changes in weather conditions.

Intervention Strategies

To date there have been few systematic evaluations of interventions designed to change

risk factors associated with drowning. The only well-researched effective intervention is isolation fencing of swimming pools.^{7, 15}

Program evaluation is needed to assure that interventions are effective and to identify the best methods for implementation. Some of the strategies that have been attempted or considered include the following:

Promote installation and maintenance of pool barriers. Pool fencing significantly reduces the risk of drowning, and isolation fencing, which isolates the pool from the house, is superior to perimeter fencing (three-sided fencing with the house as the fourth side), because the latter type allows access to the pool via the home.

- Work with the building industry to enforce Appendix G of the International Residential Building Codes for Washington State and provide responsible information on pool safety, barriers, and supervision when selling and installing pools.

Encourage policies and regulations that emphasize water safety.

- Continue to implement drowning-related policies and regulations including boating laws, state and local Board of Health pool, spa, water park, and bathing beach regulations, and the most recent building codes outlining new barrier standards.
- Develop and pass a State Board of Health Washington Administrative Code (WAC) to improve safety at public bathing beaches. Review and update this code as necessary.
- Establish a risk management program, recommended by Washington State Parks, to include drowning prevention in ranger training, restore the lifeguard program at selected swim beaches, and establish authority to close dangerous waters under its jurisdiction.¹⁶

Promote close supervision of children in and around all bodies of water.

- Require lifeguards and appropriate warning signs at water recreation areas.¹⁷
- Appoint a designated “water watcher” who is responsible for watching children.
- Keep a phone nearby in case of an emergency.

Promote the use of life jackets.

- Enforce the Washington State law that requires children younger than 13 to wear life jackets while in boats.

- Promote the use of life jackets by people of all ages in boats (especially boats less than 19 feet long).
- Provide life jackets using Life Jacket Loaner Boards to boaters and swimmers.
- Make life jackets available for use at no cost at public water recreation facilities.
- Promote adult role-modeling that is known to increase life jacket use.¹⁴
- Promote the use of life jackets by swimmers in all open bodies of water.

Discourage the use of alcohol while in or around water.

- Mandate and enforce legal limits for blood alcohol levels during water recreation activities.
- Enforce current “boating under the influence” regulations to decrease the use of alcohol while boating.
- Provide public service announcements about the danger of combining alcohol with water recreation.

Other education and health promotion measures.

- Raise community and personal awareness of drowning risk factors and prevention strategies.
- Provide funding for effective public education and media campaigns. Focus strategies on high-risk groups, especially young men ages 15–24.
- Support standardized drowning death investigation procedures to improve data collection efforts statewide.
- Tailor messages and outreach programs to different cultural, racial, and ethnic groups.

Data Sources (For additional detail, see [Appendix B.](#))

Washington State Death Certificate Data: Washington State Department of Health, Vital Registration System Annual Statistical Files, Deaths 1980–2005, released December 2006.

Washington Hospitalization Data: Dataset compiled by the Washington State Department of Health, Center for Health Statistics from the Washington Comprehensive Hospitalization Abstract System, Oregon Hospital Discharge data, and Veterans Hospital Administration datasets, December 2006.

Washington Healthy Youth Survey: Office of Superintendent of Public Instruction, Washington State Departments of Health, Social and Health Services, and Community, Trade, and Economic

Development, the Family Policy Council, and RMC Research, 2006.

National data: U.S. Centers for Disease Control and Prevention, National Center for Health Statistics. Compressed Mortality File 1999-2004. CDC WONDER On-line Database, compiled from Compressed Mortality File 1999-2004 Series 20 No. 2J, 2007. Accessed at <http://wonder.cdc.gov/cmfi-icd10.html>.

For More Information

Department of Health Injury and Violence Prevention Program, (360) 236-2855
<http://www.doh.wa.gov/hsqa/emstrauma/injury/>

Drowning Prevention and Water Safety Information, prepared by the Washington State Drowning Prevention Network and by Seattle Children’s Hospital and Regional Medical Center, <http://www.seattlechildrens.org/dp/>

Harborview Injury Prevention and Research Center and University of Washington. Best Practices in Prevention Oriented Child Death Review: Drowning. http://depts.washington.edu/cdreview/intmain.php?top_id=1

SafeKids Worldwide Water Safety Campaign
<http://www.usa.safekids.org/water/>

U.S. Coast Guard—Boating Safety
<http://www.uscgboating.org/>

Endnotes

¹ Cummings, P., & Quan, L. (1999). Trends in unintentional drowning. The role of alcohol and medical care. *Journal of the American Medical Association*, 281, 2198-2202.

² Branche, C. M. (1999). What is happening with drowning rates in the United States? In J. R. Fletemeyer & S. J. Freas (Eds.), *Drowning: New Perspectives on Intervention and Prevention* (pp. 31-42). Boca Raton: CRC Press.

³ U.S. Centers for Disease Control and Prevention, National Centers for Injury Prevention and Control. (2007). *Web-based Injury Statistics Query and Reporting System (WISQARS)*. Retrieved August 20, 2007 from www.cdc.gov/ncipc/wisqars.

⁴ Washington State Department of Health. (2004). Drowning chapter, *The Health of Washington State 2004 Supplement*. Olympia, WA. Retrieved January 2, 2007 from <http://www.doh.wa.gov/HWS/HWS2004supp.htm>.

⁵ Ellis, A. A., & Trent, R. B. (1995). Hospitalization for near drowning in California: incidence and costs. *American Journal of Public Health*, 85(8), 1115-1118.

⁶ U.S. Centers for Disease Control and Prevention, National Centers for Injury Prevention and Control. (2007). *Web-based Injury Statistics Query and Reporting System (WISQARS)*. 2004 data. Retrieved August 22, 2007 from www.cdc.gov/ncipc/wisqars.

⁷ Quan, L., Bennett, E., & Branche, C. (2006). Interventions to prevent drowning. In L. Doll, S. Bonzo, J. Mercy & D. Sleet (Eds.). *Handbook of injury and violence prevention* (pp. 81-96). New York, NY: Springer.

⁸ Washington State Department of Health. (2004, September). *Washington State Childhood Injury Report*. Retrieved September 26, 2007 from <http://www.doh.wa.gov/hsqa/emstrauma/injury/pubs/wscir/default.htm>.

⁹ Cody, B. E., Quraishi, A. Y., Dastur, M. C., & Mickalide, A. D. (2004, April). *Clear danger: A national study of childhood drowning and related attitudes and behaviors*. Washington, DC: National SAFE KIDS Campaign. Retrieved on January 9, 2007 from <http://www.usa.safekids.org/NSKW.cfm>.

¹⁰ Smith, G. S., Keyl, P. M., Hadley, J. A., Bartley, C. L., Foss, R. D., Tolbert, W. G., & McKnight, J. (2001). Drinking and recreational boating fatalities: A population-based case-control study. *Journal of the American Medical Association*, *286*(23), 2974-2980.

¹¹ Driscoll, T. R., Harrison, J. A., & Steenkamp, M. (2004). Review of the role of alcohol in drowning associated with recreational aquatic activity. *Injury Prevention*, *10*, 107-113.

¹² Smith, G. S., & Kraus, J. F. (1988). Alcohol and residential, recreational, and occupational injuries: A review of the epidemiologic evidence. *Annual Review of Public Health*, *9*, 99-121.

¹³ U.S. Coast Guard, Department of Homeland Security. (2005). *Boating Statistics 2004*. Retrieved April 11, 2006 from www.uscgboating.org/statistics/Boating_Statistics_2004.pdf.

¹⁴ Quan, L., Bennett, E., Cummings, P., Trusty, M., & Treser, C. (1998). Are life vests worn? A multiregional observational study of personal flotation device use in small boats. *Injury Prevention*, *4*, 203-205.

¹⁵ Thompson, D. C., & Rivara, F. P. (2000). Pool fencing for preventing drowning in children. *Cochrane Database of Systemic Reviews*, CD001047.

¹⁶ Loss Prevention Review Team, Washington State Parks and Recreation Commission. (2005, November). *Drowning Prevention: A report to the director of the Office of Financial Management*. Retrieved on January 4, 2007 from <http://www.ofm.wa.gov/rmd/lprt/parksfinalrpt.pdf>.

¹⁷ Branche, C., & Stewart, S. (Eds.). (2001). *Lifeguard effectiveness: A report of the working group*. Atlanta, GA: U.S. Centers for Disease Control and Prevention, National Center for Injury Prevention and Control.