

Bathtub-Related Drownings in the United States, 1979–81

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Abstract: We analyzed National Center for Health Statistics data on drownings in bathtubs and Consumer Product Safety Commission data on bathtub-related injuries for the years 1979–80 and 1979–81, respectively. Seven hundred ten persons drowned in bathtubs in 1979 and 1980, for a crude mortality rate of 1.6 per million persons per year. Although there was an excess of deaths in the spring, there was no important seasonal trend. Mortality rates in the Pacific and Mountain states were higher than in other states. Persons at the extremes of age were at greatest risk of death, with mortality rates of 5–6 per million per year. Black males aged 20–64

years had substantially elevated mortality rates compared to White males. The prevalence of personal risk indicators varied with age, with a frequent history of being left unattended among children less than 5 years old, a frequent history of seizures among persons 5–39 years old, a frequent history of alcohol or drug use among persons 40–59 years old, and frequent evidence of having fallen among those at least 60 years old. Bathtubs are potentially dangerous, and the prevention of drownings in them can be approached through a combination of passive and active strategies. (*Am J Public Health* 1985; 75:630–633.)

Introduction

Each year in the United States, at least 6,000 persons drown; most of these deaths occur in natural bodies of water and home swimming pools.^{1,2} The epidemiology of and risk factors for drowning in these bodies of water have been studied in detail.^{2–11} Drownings in the common bathtub, the second major site of drowning in the home,^{1,4,5} have been described in several case reports.^{12–19} To determine strategies for preventing this fatal home injury, we reviewed the deaths due to drowning in bathtubs that occurred in the United States from 1979 to 1981.

Methods

We obtained mortality data for bathtub-related drownings from two sources: the National Center for Health Statistics (NCHS), and the National Injury Information Clearinghouse of the US Consumer Product Safety Commission (CPSC). We analyzed NCHS data tapes (from all 50 states and the District of Columbia) concerning drownings in bathtubs (International Classification of Diseases, 9th Revision, Clinical Modification [ICD-9-CM], rubric E910.4) for calendar years 1979 and 1980.*

The CPSC death certificate file includes death certificates in which consumer products are likely to be involved; it is oriented to and organized by product and not by the underlying cause of death.²¹ The file includes 15,665 certificates for 1979, 15,866 for 1980, and 13,068 for 1981.** We reviewed the abstracts for the 912 reported death certificates from January 1979 to December 1981 in which the deaths were related to bathtubs, showers, and their enclosures

*The NCHS mortality statistics concerning the cause of death were based on state-coded medical data for 15 states and on medical data coded by the NCHS from the death certificates for the remaining states.²⁰

**The certificates are sent to the CPSC by the departments of health in all 50 states and four health jurisdictions (the District of Columbia, New York City, Puerto Rico, and the Virgin Islands), although not all states and health jurisdictions reported to the CPSC during each entire calendar year.

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(CPSC product codes 0609–0611 and 4030) and were due to drowning. Deaths related to outdoor hot tubs were excluded. We also reviewed the reports of four bathtub-related drownings not recorded in the death certificate file, but abstracted in the CPSC reported incidents file, a computerized compendium of product-related consumer complaints, newspaper accounts of product-related incidents, and reports of product-related deaths from participants in the Medical Examiners and Coroners Alert Program.²¹

Four personal risk indicators were recorded in 367 (40.1 per cent) of the CPSC abstracts, and we ranked them in terms of precedence as follows: 1) a history of a seizure disorder; 2) a history of or current alcohol and/or nonmedicinal drug use; 3) evidence of having fallen; and 4) a history of being left unattended.

To obtain the number of bathtub-related drownings for 1979 and 1980, we combined the NCHS-reported deaths due to ICD-9-CM rubric E910.4 with the CPSC-reported deaths coded with ICD-9-CM rubrics other than E910.4, for the 15 states for which the NCHS provided state-coded cause of death information. We assumed that all deaths due to ICD-9-CM rubric E910.4 reported by the CPSC were included in the deaths reported by the NCHS. Individual case records with identifiers were unavailable for review. Age group-specific population data for 1980 were obtained from the Bureau of the Census.

Seasonal trend was analyzed by using Roger's significance test for cyclic trends, in which the test statistic approximates the chi-square distribution with two degrees of freedom.²² Sex-, race-, and age-specific rates were compared between racial and sexual categories by using the Poisson distribution. Risk indicator prevalences were analyzed by using chi-square tests for independence, and age trends for each risk indicator were tested for significance by using Spearman's rank correlation coefficient.

Results

According to the NCHS, 373 persons drowned in bathtubs in 1979 and 333 drowned in 1980. An additional four deaths in 1979 and 1980 were identified from the CPSC death certificate file, for a total of 710 deaths and a crude mortality rate of 1.6 per million persons per year.

On the average, one person per day drowned in a bathtub in the United States. The greatest number of deaths occurred during the spring months (195, or 27.5 per cent); the winter months had the least number of deaths (153).

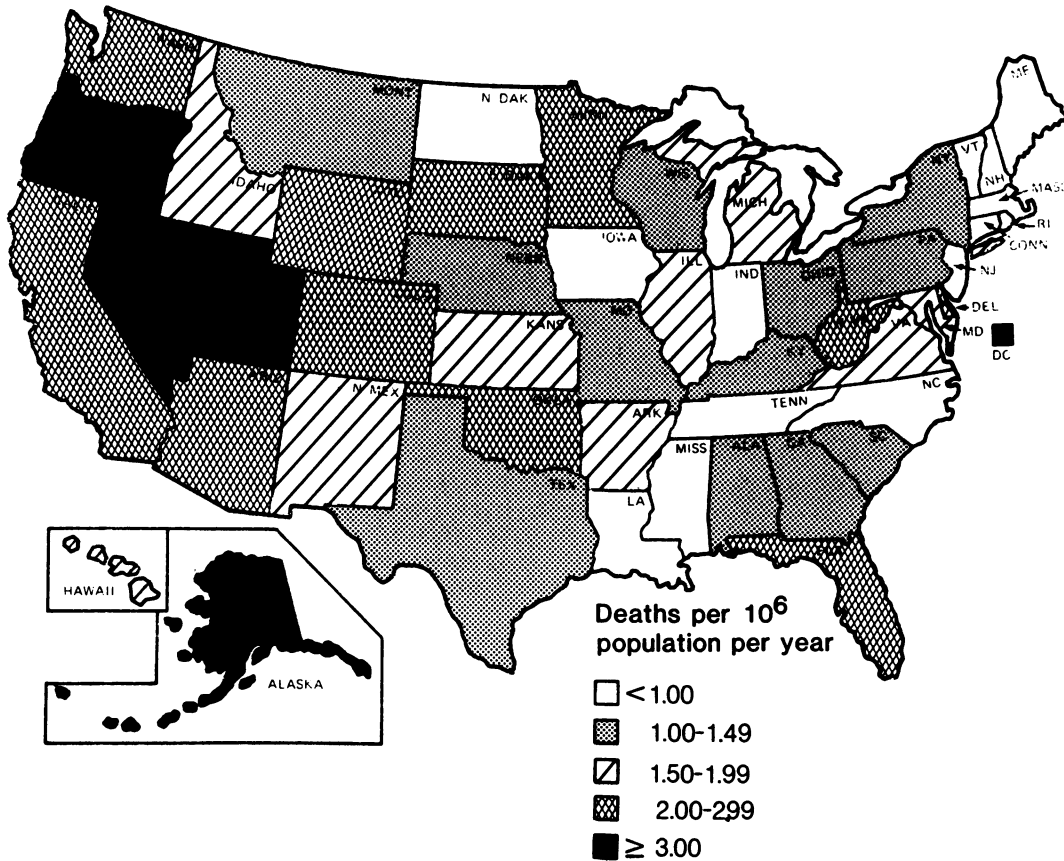


FIGURE 1—Bathtub-related Drowning Mortality Rates, by State, United States, 1979–80

Roger's test statistic of seasonal trend was 1.24 ($p = 0.55$).

Deaths were reported from 48 states (Maine and Vermont were the exceptions) and the District of Columbia. Seven states (California, Florida, Texas, New York, Illinois, Michigan, and Pennsylvania) accounted for half the deaths. The mortality rates were lowest in New England and highest in the Pacific and Mountain states (Figure 1).

Age-, sex- and race-specific mortality rates are presented in Figure 2. Children less than 5 years old, who accounted for 182 (25.6 per cent) of the deaths, and persons at least 75 years old, who accounted for 103 (14.5 per cent) of the deaths, had the greatest rates of bathtub-related drowning (5.6 and 5.2 per million persons per year, respectively). Overall 22,273 years of potential life to age 65 were lost by the 527 persons less than 65 years old who drowned in bathtubs in 1979 and 1980. Females accounted for 370 (52.1 per cent) of the deaths, Whites accounted for 568 (80.0 per cent) and Blacks for 123 (17.3 per cent) of the deaths. Black males ages 20 to 64 years old had substantially elevated mortality rates compared with White males.

Post mortem examinations were recorded as performed on 551 (77.6 per cent) and recorded as not performed on 144 (20.3 per cent).

Of the 916 CPSC-reported drownings in bathtubs from 1979 to 1981, 92.5 per cent were coded with ICD-9-CM rubric E910.4. The age, race, and sex distributions of these 916 deaths were similar to the distributions of the 710 deaths in 1979 and 1980 reported above.

The most common underlying personal risk indicator recorded in the 367 CPSC abstracts was having a history of a

seizure disorder, which was reported for 144 (15.7 per cent) of the deaths overall (Figure 3). A history of a seizure disorder was the most common risk indicator reported

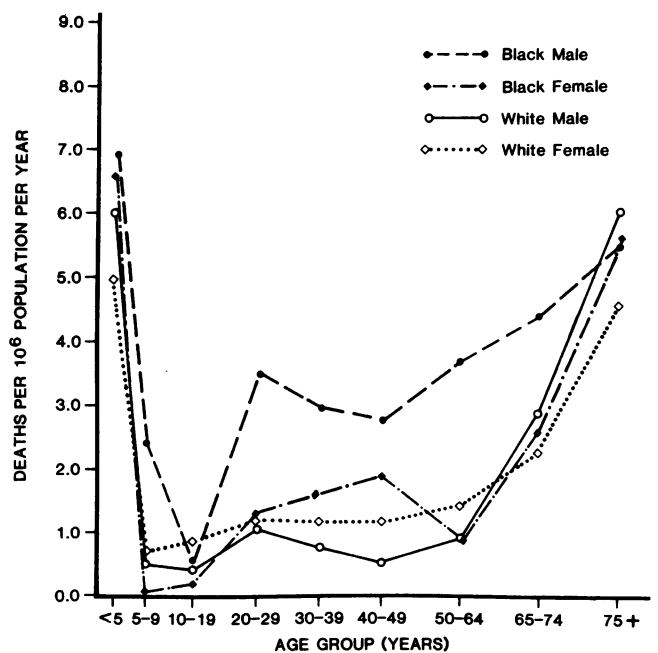


FIGURE 2—Bathtub-related Drowning Mortality Rates, by Age Group, Race and Sex, United States, 1979–80

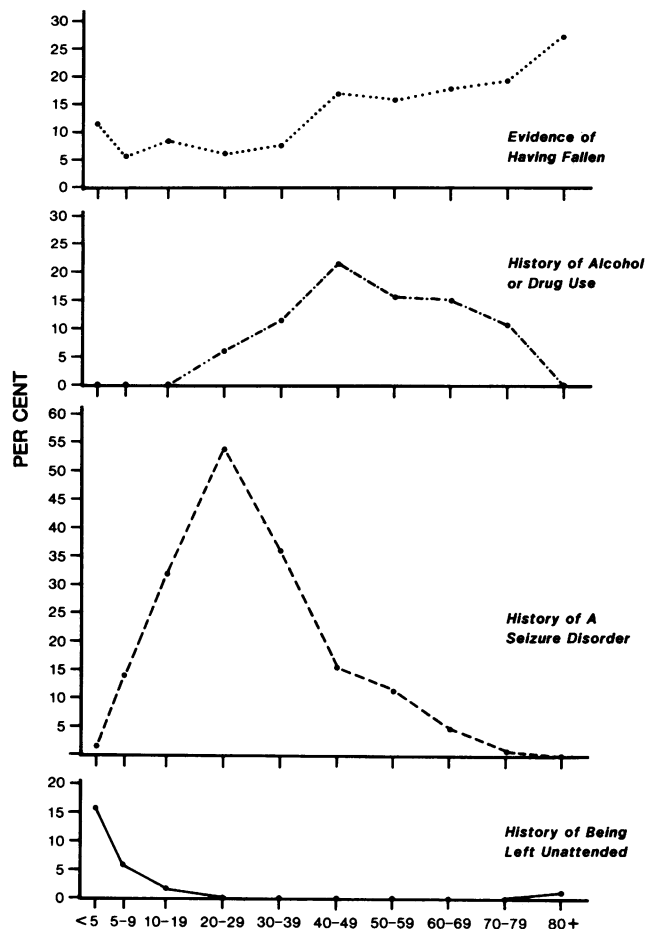


FIGURE 3—Prevalence of a History of Being Left Unattended, of Seizures, of Alcohol or Drug Use, and of Evidence of Having Fallen among Persons Drowned in Bathtubs, by Age Group, United States, 1979–81

among persons aged 5 to 39 years. Persons 10 to 39 years old who drowned had a greater prevalence of seizure history (42.7 per cent) than others who drowned.

Evidence of having fallen was the second most prevalent personal risk indicator and was reported for 125 (13.6 per cent) of the victims (Figure 3). An additional 15 victims with reported evidence of having fallen also had a history of either seizures or alcohol or drug use. Evidence of having fallen was the most common risk indicator reported among persons at least 60 years old.

A history of alcohol or drug use was reported for 65 (7.1 per cent) of the deaths, and was the most common risk indicator reported among persons aged 40 to 59 years (Figure 3). An additional four persons with a history of alcohol or drug use also had a history of a seizure disorder. Of the 65 deaths, 76.9 per cent had a reported history of alcohol use only, 7.7 per cent had a reported history of use of alcohol and another drug, and 15.4 per cent had a reported history of use of other drugs.

Thirty-eight (4.1 per cent) of the victims were specifically reported to have been unattended at the time of death (Figure 3). Of children less than 5 years old, 34 (15.7 per cent) had reportedly been left unattended, and 30 of them were less than 2 years old.

Discussion

The number of persons that we report who have drowned in bathtubs, 355 per year, is greater than previously reported. In 1971, about 100 persons reportedly drowned in the bath in the United States.^{5,6} A 1975 CPSC contract report stated that "over 100 persons drown in bathtubs every year,"²³ and the CPSC estimated in 1977 that 191 persons drowned in bathtubs in 1975.^{***}

There are several problems with the data, however. Errors due to the misclassification of cause of death on the certificates are possible, but seem unlikely; a large percentage of victims underwent post mortem examinations, although the death certificate may not reflect the findings of the post mortem examination. The data from the CPSC do not represent all states and health jurisdictions for each entire year. The personal risk indicators were tabulated retrospectively and are doubtless underreported.

We found no seasonal trend of bathtub-related drownings, although other forms of drowning occur more frequently during the warmer months.^{3,4,7} We did find a trend of rates increasing westward across the country, a trend similar to that for all fatal injuries.^{1,2}

Although the age-specific rates of bathtub-related drownings among males and females were similar, other forms of drowning are far more common among males.^{2,4,9-12} As in other drowning situations,²⁻⁷ Black males were at the greatest risk of drowning in bathtubs during most ages, a finding not accounted for by increased prevalence of any of the reported risk indicators among Blacks.

Those with the least control over their environments— young children and the elderly—had the greatest risk of drowning. Other investigators have noted the same among the young^{3,4,6,9,12,15,17} and among the elderly.^{4,12} Other risk indicators reported among children include being the youngest or second youngest in a large family that is of a lower socioeconomic status or that has a disrupted routine.^{15,24}

The risk of drowning in bathtubs by persons with a history of a seizure disorder has not been emphasized in the epilepsy literature; the problem was referred to in only one of 14 texts on epilepsy reviewed.[†] Such drownings, however, have been described in a number of case reports.^{7,9,14,18,19}

Alcohol use is a known risk factor for many injuries, including drowning.^{2,4,7,26} A history of alcohol use has been described among a number of adults who have been previously reported as having drowned in bathtubs.⁷ If post mortem blood testing had been reported for adults, it is possible that alcohol or drugs would have figured more prominently.

The deaths reported were classified as unintentional. Persons may be drowned intentionally in bathtubs, however. Four cases of child abuse by forceful immersion in bathtubs have been reported by Pearn and Nixon, and one of the children died.^{16,27} No pathognomonic findings distinguish intentional from unintentional drownings, although other findings consistent with child abuse may be present.

Bathtub-related drownings, like other injuries, depend on factors relating to the agent (the effective cause of the injury), the host or person affected, and the environment, both physical and social.^{7,28,29} In this case, the agent of

***US Consumer Product Safety Commission: personal communication.

†Bower notes the potential problem of bathtub-related injuries in a parenthetical phrase.²⁵

injury is the water. These factors interact before, during, and after the injury event.

Measures can be taken to lessen the mortality due to drownings in bathtubs. Passive measures^{30,31} such as slip-resistant surfaces and grab bars could be effective in preventing falls.²³ Health education and counseling are needed as well. Parents must not, under any circumstances, leave a young child alone in a water-filled bathtub. Having one young child watch another child in the bathtub is no substitute for having an adult present.^{13,17,18}

For persons with a history of a seizure disorder, a group in Maryland has made several recommendations on bathtub bathing.³² These include considering taking a shower instead of a bath; using hand-held manually controlled showering devices; avoiding breakable glass- or plastic-enclosed shower stalls; for older persons with epilepsy, maintaining a depth of no more than 7.5 cm of water in the bathtub and not showering alone, at least not in a standing position; and, for younger persons with epilepsy—as for other young children—not bathing alone. In addition, epileptics should ensure that the outflow drain is clear, so that water cannot accumulate. Although we do not know the actual temperatures of the water in the bathtubs in which the epileptics drowned, epileptics should consider avoiding baths with hot water,†† which may lower the seizure threshold.³³ Epileptics should have adequate blood concentrations of anticonvulsants.³⁴

In conclusion, the common bathtub is potentially dangerous. Because bathtub-related drownings occur suddenly and in a presumably protected environment, they may be more psychologically traumatic for families than are deaths from some other causes.^{27,28} By focusing on a specific etiologic and epidemiologic pattern, we have identified several risk indicators associated with bathtub-related drownings.

††To lessen both the incidence and severity of scald burn injuries, the Centers for Disease Control recommends that home water temperatures be no greater than 49 °C (120 °F) for all residences.

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