

# **Canadian Surveillance System for Water-Related Fatalities**

## **An Analysis of Drownings and Other Water-Related Injury Fatalities in Canada for 1999**

**VISUAL SURVEILLANCE REPORT: 2001 EDITION**



**McGill University**

## THE CANADIAN RED CROSS SOCIETY

The Canadian Red Cross Society is part of the International Red Cross and Red Crescent Movement and, together with over 175 national societies, they are focused on one strategic goal: *to improve the situation of the most vulnerable.*

### The Mission

To help people deal with situations that threaten:

- ◆ their survival and safety
- ◆ their security and well-being
- ◆ their human dignity

in Canada and around the world.

### The Aim of Water Safety Services

To prevent water-related injuries and fatalities.

### The Goal of Water Safety Services

To reduce drownings and water-related injuries by providing Canadians with:

- ◆ the awareness and knowledge to recognize and avoid dangerous water-related situations
- ◆ the knowledge and skills required to save their own lives
- ◆ the basic rescue skills to enable them to save others
- ◆ the knowledge and awareness to recognize hazardous aquatic environments and equipment in their communities and to provide solutions

To accomplish the aim and goal of the Water Safety Services, water safety training is delivered to over 1.2 million Canadians per year, leadership training is provided to over 32,000 Canadians per year, and safety promotion campaigns reach over 19 million Canadians per year. The development and maintenance of programs depend on having valid, reliable, and current information. The study of water-related deaths provides information that enables The Canadian Red Cross Society to address current issues and design prevention programs aimed at reducing drownings and other water-related injury fatalities.

### The Fundamental Principles

In common with Red Cross and Red Crescent Societies around the world, the CRCS is committed to upholding and advocating the principles of:

HUMANITY  
IMPARTIALITY  
NEUTRALITY  
INDEPENDENCE  
VOLUNTARY SERVICE  
UNITY  
UNIVERSALITY

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Data collectors included volunteers and staff of The Canadian Red Cross Society and the Lifesaving Society. Data collection was made possible through the assistance and co-operation of provincial coroners, medical examiners, their statistical staff, and the National Association of Coroners.

Financing of the work was done collaboratively by sharing resources and staff. Data collection mainly involved The Canadian Red Cross Society, the Lifesaving Society, and provincial coroners. Data coding, verification, and entry were supported by the two Societies and carried out by Isabelle Masson, Peter Barss, and Sophie Lapointe. Data analysis and report writing were by Peter Barss and Sophie Lapointe; this step was funded by The Canadian Red Cross Society. The Society also supported the editing, design, layout, translation and printing of the report, coordinated by Rosemary Hong with the assistance of Caroline Gagnon of The Canadian Red Cross Society. Translation into French was supervised by Monique Edwards of The Canadian Red Cross Society. Hospitalization data for near drownings were supplied by the Canadian Institute for Health Information (CIHI).

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# INTRODUCTION

This *Visual Surveillance Report, Edition 2001* for water-related fatalities includes the results of the analyses of the circumstances of drownings and other water-related injury deaths in Canada for 1999. The role of the Canadian Surveillance System for Water-Related Fatalities is to provide ongoing and consistent monitoring of the incidence and circumstances of all categories of unintentional water-related injury deaths. Surveillance data provide a sound basis for setting priorities, targeting of interventions, and monitoring outcomes over time.

*The Visual Surveillance Report has been developed to provide a self-explanatory graphical and tabular display of the main risk factors and incidence rates for different categories of drownings grouped by activity. It also includes detailed annex reference tables that present numbers and percents of water-related injury deaths by activity, purpose, age group, sex, year, and province/territories.* In order to provide essential data in a timely manner and also to ensure sustainability, text and subanalyses of minor categories have been kept to a minimum and the “stand-alone” graphics are fully labelled.

Readers who require greater detail may wish to refer to the 1996 *Comprehensive Surveillance Report* while using the Visual Report. Several *Special Topic Research Reports* are also based upon the same data source (The Canadian Red Cross Society, 1994b, 1994c, 1996a, 1996b, 1997a, 1997b). Special topic research reports pool data for several years.

An effort is made to retain major categories that were used in previous reports so that trends can be monitored from year to year. One of the annexes provides data for all major categories of incidents from 1991 to 1999, and thus includes information from the inception of the surveillance system. This annex is helpful as a reference point in assessing whether there have been real and statistically significant trends in specific subcategories of water-related injury fatalities over time and for a particular year. The tables on multiple-victim incidents in Parts 1 and 2 are also helpful in reviewing trends. Careful review of long-term trends helps avoid the danger of reading too much into random fluctuations, or changes due to a single incident with several victims.

This year's report continues Canada's unique collaboration among the Red Cross, the Canadian Coast Guard, and a population health injury epidemiologist, which began four years ago with the 1997 reports. This report contains detailed graphics, tables, and annexes for boating. We have included an overview of the 1999 data and trends between 1991 and 1999 in the discussion, together with certain key recommendations for 2001 and beyond. These recommendations are based upon progress, or lack thereof, in reducing the rates of specific subcategories of water-related injury deaths. Nevertheless, we have not reproduced details of use of the Haddon Matrix and the Ottawa Charter for Health Promotion for prevention of water-related injuries. The interested reader should refer to previous reports, as noted above.

*While drownings are often considered as a single cause of death, there are many different types of drownings.* Each tends to involve specific high-risk subgroups of the population by age and sex, such as toddlers or adult males, with different associated risk factors or determinants. This report provides the numbers and rates for the major subcategories of drownings, which are based upon the type of activity and its purpose.

*Personal, equipment, and environmental risk factors are presented graphically for each type of drowning and activity as well as for high-risk subgroups of the Canadian population and for special hazardous environments.* Detailed descriptions are limited to major categories with adequate numbers for analysis. Other water-related injury fatalities such as collisions of boats and hypothermia are also described.

The data are based upon coroners' reports and were obtained from the Canadian Surveillance System for Water-Related Fatalities. This system was developed by The Canadian Red Cross Society in collaboration with several other organizations, including the Lifesaving Society, the Injury Prevention Program of the Montreal Public Health Department, and the National Association of Coroners. *This comprehensive surveillance system for water-related fatalities is the first of its kind in the world and is a precious and unique resource for prevention.* The organizations and individuals that operate and sustain the system are guided by and work together towards the common goal of preventing the avoidable burden of water-related injury deaths in Canada. The vast majority of victims are children and adults in their productive years, so the societal impact of these deaths is disproportionate to their number.

The completion of most coroners' investigations for the preceding year generally takes between 6 and 12 months. At this time, data collection, verification, computer entry, analysis, design, and printing of the report can begin; these steps take about 10 months. Thus, while the analyses for this report were completed during 2001, the actual incidents occurred during 1999.

Unintentional injury deaths are included in this surveillance report, while intentional injuries such as homicides and suicides are excluded. Nevertheless, it is possible that a few drownings from non-aquatic falls into water or of unknown type may represent misclassified suicides. The term unintentional injury is used in preference to "accident". The word accident is frequently misused since it can apply to both an injury and the incident causing the injury, and to many people implies fate, bad luck, and non-preventability (Langley, 1988).

A public health definition of surveillance is as follows: "... the ongoing systematic collection, analysis, and interpretation of health data essential to the planning, implementation, and evaluation of public health practice, closely integrated with the timely dissemination of these data to those who need to know. The final link in the surveillance chain is the application of these data to prevention and control" (Centers for Disease Control, 1986). It is particularly important that health surveillance data be provided in a timely manner to individuals and organizations who are in a position to take action (Teutsch and Churchill, 1994; Teutsch and Thacker, 1995).

A major purpose of this surveillance report is to allow monitoring of trends in numbers, rates, and circumstances of various categories of water-related fatalities from year to year. It is essential to make this information available on an annual basis for The Canadian Red Cross Society, government agencies and organizations involved in water and boating safety, and for public health professionals and decision makers involved in injury prevention.

The major categories that are used for classifying surveillance data and for developing water safety initiatives have been planned in a coordinated manner, such that new information can be continuously and systematically incorporated into programmatic activities. These include not only targeted educational initiatives and promotional campaigns, but also support for municipal, provincial, and national legislation to provide automatic protection via safe and user-friendly equipment and environments.

Specific surveillance data on modifiable risk factors should encourage new interventions via lateral thinking processes at all levels of Canadian society (deBono, 1994). The use of a comprehensive multifaceted approach to injury surveillance and prevention helps clarify modifiable risk factors on a population basis as a positive alternative to unproductive and often destructive victim-blaming.

Surveillance data are also useful for evaluating control programs for water-related injury fatalities and changes in pertinent safety practices. With the help of valid and precise surveillance data, scientifically sound evaluation of programmatic impact on outcomes such as the annual rate of specific types of water-related fatal incidents is possible at both national and regional levels.

# METHODS

The principal data source for this report was the Canadian Surveillance System for Water-Related Fatalities. All unintentional drownings and other water-related injury deaths investigated by coroners or medical examiners in Canada and with a declared date of death during 1999 were reviewed.

Drownings are generally classified using World Health Organization external cause of injury code E910, which includes drownings during swimming, bathing, etc. as well as falls into water, and codes E830 and E832, which include boating transport immersion drownings due to overturning of boats or falls from boats (WHO, 1977). Drownings that occur when people voluntarily swim or jump from a boat are not counted as boating drownings and are classified under E910.

Other non-drowning injury fatalities related to water transport (E831; E833; E838) and immersion hypothermia without drowning were considered separately. Water-related injuries such as air embolism during scuba diving and blunt trauma as a result of diving or falling into shallow water are specifically requested by checklist from provincial coroners. Since land and air transport drownings tend to be classified with other non-water related transport deaths, these files are also included on the checklist.

The data collection form is the heart of the surveillance system and includes about 15 pages of highly structured questions designed to capture for computer entry and analysis all essential details of water-related deaths. The focus is on personal, equipment, and environmental risk factors for injuries associated with different activities. The form is improved each year based upon a detailed review of the results of data verification and analysis. The data are abstracted annually from coroners' reports by staff and volunteers of The Canadian Red Cross and the Lifesaving Societies. Data are collected for the previous year's deaths in the fall of the following year, by which time the majority of coroners' reports have been completed for the previous year.

Initial review, coding, classification, and grouping of data from provincial coroners were completed by a medically qualified injury epidemiologist in accordance with the principles of external-cause coding of the World Health Organization's *International Classification of Diseases* and with a practical view to prevention. Details of this process were described in the 1994 *Comprehensive Surveillance Report*.

Deaths attributed to both drowning and hypothermia by the coroner were classified as drowning complicated by hypothermia, while immersions with no autopsy evidence of drowning were classified as hypothermia deaths. "Diving" deaths of swimmers were attributed to diving only if there was evidence of head or spinal injury, since many persons who dove into water to swim appeared to have been swept away by current and drowned. Each year, there are several deaths that are classified as unintentional by a coroner, but where suicide has been suspected but unproven. Most of these deaths end up in categories with the activity and the purpose of activity classified as unknown; they are reported on in the section on non-aquatic falls into water. The purpose of activities of children less than 15 years old, including playing and walking, was categorized as recreational rather than daily living.

Population denominators for calculation of 1999 rates are based upon the 1999 estimates, which are projections from the 1996 census. For certain tables and graphics, population averages for the period 1991-1999 were calculated using an average of the 1991 census and the 1996 census. The population used as a basis for computing rates of aboriginal deaths was obtained by adding the 1993 population of registered Indians in Canada with the 1991 population of Inuit in Quebec and the Northwest Territories. While these data are somewhat dated, after comparison of other denominators, we believed that they were the most valid estimates at the time of writing. The First Nations and Inuit population in 1991-1993 was 589,206; this was reported as 588,480 in 1996. In view of the high birth rate among aboriginal peoples, this lack of increase is surprising and may reflect methodological differences in the population counts. Only registered Indians and Inuit were included, since the data collectors believed that victims identified as aboriginal by coroners or data collectors were nearly all registered Indians or Inuit, and not non-registered Indians or Metis. There is undoubtedly a degree of undercounting in both numerators and denominators, which would tend to reduce any error in rates.



In 1999, Nunavut was created from the eastern part of the NWT. Hence for the 1999 data, the terms NWT and Nunavut designate what was formerly known as NWT.

In the following summary, it has sometimes been necessary to make comparisons for slightly different time periods. This was necessary because while complete mortality data for drowning deaths are available in the database of the Canadian Surveillance System for Water-Related Fatalities for 1991-1999, hospitalization data are now accessed from the Canadian Institute for Health Information (CIHI), which took over managing such data from Statistics Canada in 1994. Data from earlier years are expensive to access from the pre-1994 archived Statistics Canada database and we have not attempted to do this for these annual reports, although in 1994 reports we did access those data from Statistics Canada in special research reports on 1991 and 1992 data (Canadian Red Cross Society, 1994b, 1994c).

CIHI retrieved data by use of the nature-of-injury code N994.1, “drowning and non-fatal submersion”, and then further categorized data using E-codes. CIHI was able to verify how many of these hospitalized victims had died in hospital. This avoids double counting of victims under deaths and hospitalizations. The main variables available in the database for near drownings are age, sex, province/territory and duration of the hospitalization. The E-codes for boating allowed near drownings to be classified into boating and non-boating incidents. However, classification by E-codes in vital statistics reporting by Statistics Canada of deaths is less accurate than in the Canadian Surveillance System for Water-Related Fatalities. In previous research, we noted that vital statistics misclassified 33 to 43% of boating drownings as non-boating (E910) (The Canadian Red Cross Society, 1994c). The extent to which such misclassification occurs in hospital data has not been verified; however, it is probably relatively frequent since many health providers and coders are unaware of the importance of specifying that an incident resulted from boating.

<p>NOTE: Percentages have been rounded to the nearest whole number. Hence the total percentage for some tables and graphics may add up to 99% or 101%.</p>
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