Drowning

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Key facts

• Drowning is the 3rd leading cause of unintentional injury death worldwide, accounting for 7% of all injury related deaths.
• There are an estimated 388 000 annual drowning deaths worldwide.
• Global estimates may significantly underestimate the actual public health problem related to drowning.
• Children, males and individuals with increased access to water are most at risk of drowning.

Drowning is the process of experiencing respiratory impairment from submersion/immersion in liquid; outcomes are classified as death, morbidity and no morbidity.

Scope of the problem

In 2004, an estimated 388 000 people died from drowning, making drowning a major public health problem worldwide. Injuries account for nearly 10% of total global mortality. Drowning is the 3rd leading cause of unintentional injury death, accounting for 7% of all injury-related deaths.

The global burden and death from drowning is found in all economies and regions, however:

• low- and middle-income countries account for 96% of unintentional drowning deaths;
• over 60% of the world's drowning occurs in the WHO Western Pacific Region and WHO South-East Asia Region;
• drowning death rates are highest in the WHO African Region, and are more than eight times higher than in Australia or the United States of America (USA);
• China and India have particularly high drowning mortality rates and together contribute 43% of the world's drowning deaths and 41% of the total global DALYs\(^1\) (disability-adjusted life years) lost related to drowning.

Despite limited data, several studies reveal information on the cost impact of drowning. In the USA, 45% of drowning deaths are among the most
economically active segment of the population. Coastal drowning in the USA alone accounts for US$ 273 million each year in direct and indirect costs. In Australia and Canada, the total annual cost of drowning injury is US$ 85.5 million and US$ 173 million respectively.

There is a wide range of uncertainty around the estimate of global drowning deaths. It is important to point out that the global problem is much greater than the above figures reveal; due to the way data are classified, global numbers exclude drowning due to floods (cataclysms), boating and water transport mishaps. Non-fatal drowning statistics in many countries are not readily available or are unreliable.

**Who is at risk?**

**Age**

Age is one of the major risk factors for drowning. This relationship is often associated with a lapse in supervision. In general, children under 5 years of age have the highest drowning mortality rates worldwide. Canada and New Zealand are the only exceptions, where adult males drown at higher rates.

Child drowning statistics from a number of countries are particularly revealing:

- Australia: drowning is the leading cause of unintentional injury death in children aged 1-3 years.
- Bangladesh: drowning accounts for 20% of all deaths in children aged 1-4 years.
- China: drowning is the leading cause of injury death in children aged 1-14 years.
- USA: drowning is the second leading cause of unintentional injury death in children aged 1-14 years.

**Gender**

Males are especially at risk of drowning, with twice the overall mortality rate of females. They are more likely to be hospitalized than females for non-fatal drowning. Studies suggest that the higher drowning rates among males are due to increased exposure to water and riskier behaviour such as swimming alone, drinking alcohol before swimming alone and boating.

**Access to water**

Increased access to water is another risk factor for drowning. Individuals with occupations such as commercial fishing or fishing for subsistence, using small boats in low-income countries are more prone to drowning. Children who live near open water sources, such as ditches, ponds, irrigation channels, or pools are especially at risk.

**Other risk factors**

There are other factors that are associated with an increased risk of drowning, such as:

- in many countries lower socioeconomic status, being a member of an ethnic minority, lack of higher education, and rural populations may be associated;
• infants left unsupervised or alone with another child in a bathtub;
• unsafe or overcrowded transportation vessels lacking flotation devices;
• alcohol use, near or in the water;
• medical conditions, such as epilepsy;
• tourists unfamiliar with local water risks and features;
• floods and other cataclysmic events like tsunamis.

Prevention
Drowning prevention strategies should be comprehensive and include:
engineering methods which help to remove the hazard, legislation to
enforce prevention and assure decreased exposure, education for
individuals and communities to build awareness of risk and to aid in
response if a drowning occurs, and prioritization of research and public
health initiatives to further define the burden of drowning worldwide and
explore prevention interventions.

Engineering methods to eliminate exposure to water hazards are the most
effective strategy for drowning prevention. Measures included in this
strategy focus on draining unnecessary accumulations of water or altering
the environment to create barriers to open water sources. Examples
include:

• development and implementation of safe water systems, such as
drainage systems, piped water systems, flood control embankments in
flood prone areas;
• building four-sided pool fences or barriers preventing access to standing
water;
• creating and maintaining safe water zones for recreation;
• covering of wells or open cisterns;
• emptying buckets and baths, and storing them upside-down.

Legislation can be a preventive strategy. For instance, mandating a four-
sided fence around a pool can decrease risk of drowning. Nevertheless,
laws and regulations requiring pool fencing by themselves are insufficient.
Adequate enforcement and verification of closure systems is often
necessary to achieve reductions in drowning rates.

Other laws or regulations which target risk factors for drowning but for
which there is currently insufficient evidence include laws requiring regular
safety checks of transportation vessels, and laws on alcohol use while
boating or swimming. However, the availability of properly-fitted and
appropriate personal flotation devices in boats is an effective drowning
prevention strategy.

Individual and community education on drowning awareness, risks
associated with drowning and learning waters survival skills appear
promising strategies to prevent drowning. Similarly, ensuring the presence
of lifeguards at swimming areas also appears to be a promising strategy to
prevent drowning.
Ensuring immediate resuscitation by increasing the capability of first responders to provide first aid in cases of drowning can decrease the potential severity of outcomes.

Some other strategies for which there is currently insufficient evidence and for which further research is needed are:

- learning to swim programmes for school children and adults;
- supervision of children in and outside the home and establishing parent groups or other child care mechanisms in rural communities, especially around harvesting;
- educating children on not entering fast-flowing streams and not swimming alone.

**WHO response**

Prioritizing research and public health initiatives to determine the burden and risk factors for drowning worldwide is crucial. Defining clear objectives such as quantifying the magnitude of the problem, identifying vulnerable populations, risks, exposures, and strengthening emergency response services is necessary, while focusing prevention interventions and advocacy on those populations most affected.

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The disability-adjusted life year (DALY) extends the concept of potential years of life lost due to premature death to include equivalent years of “healthy” life lost by virtue of being in states of poor health or disability.