



衛生防護中心  
Centre for Health Protection

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## Health Tips

Most drowning incidents can be prevented if water safety rules are vigilantly observed and drowning protection measures are fully implemented, including continuous supervision of young children.

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## Epidemiology and Prevention of Unintentional Drowning

Drowning is a major but often neglected public health issue.<sup>1</sup> It is the third leading cause of unintentional injury deaths worldwide, after road traffic accidents and falls. The World Health Organization (WHO) estimated that there were about 305 900 unintentional drowning deaths globally in 2008, giving a crude death rate of 4.5 per 100 000 population. Of these deaths, 63.3% occurred in the WHO Western Pacific Region and South-East Asia Region; 34.0% were among children aged 14 and below; and 70.5% were among males (Table 1).<sup>2</sup> More importantly, drowning death is just the tip of the iceberg. For every drowning death, there are many more non-fatal drowning injuries that are serious enough for hospitalisations, often with profound disabling consequences.

**Table 1: Global estimates of unintentional drowning deaths by WHO region, age group and sex for the year 2008**

	Number ('000)	Rate (per 100 000 population)	Proportion (to total drowning deaths)
<b>By WHO region</b>			
Western Pacific	97.6	5.5	31.9%
South-East Asia	96.0	5.5	31.4%
Africa	42.3	5.3	13.8%
Europe	27.2	3.1	8.9%
Eastern Mediterranean	22.4	3.9	7.3%
The Americas	20.4	2.2	6.7%
<b>By age group</b>			
4 and below	46.9	7.4	15.3%
5 - 14	57.2	4.7	18.7%
15 - 29	68.5	3.9	22.4%
30 - 44	45.2	3.2	14.8%
45 - 59	39.4	3.9	12.9%
60 and above	48.7	6.8	15.9%
<b>By sex</b>			
Male	215.8	6.4	70.5%
Female	90.1	2.7	29.5%

Source: Global Burden of Disease, WHO.

## Risk factors of Drowning

Epidemiological studies have implicated a number of significant socio-demographic, behavioural and environmental risk factors that contribute to drowning.<sup>3</sup>

### *Age*

While drowning affects all age groups, children under 5 years of age are at significant risk of drowning; they also have the highest drowning mortality rate worldwide.<sup>2</sup> Among infants under one year of age, unintentional drowning is mostly the result of a child being left alone or with an unqualified carer (such as a young sibling) in or near water. For toddlers, who are able to walk around but lack cognitive capacity and physical ability to recognise and avoid drowning hazards, unintentional drowning often happens when they wander away from supervising adults and fall or climb into a nearby unprotected body of water.<sup>3</sup>

### *Sex*

Drowning occurs more often among males, with about twice the overall mortality rate of females. One of the reasons for such a gender gap is that males are more likely than females to participate in various water activities and engage in riskier behaviours, such as swimming alone and using alcohol or drug before swimming or boating.<sup>4,5</sup>

### *Socio-economic background*

Individuals with lower educational attainment, income and occupation status are at greater risk of drowning death, despite the fact that the role of socio-economic status in drowning is not well understood. A prospective study of 2.7 million Canadians reported that persons with no high school education, persons in the poorest income quintile and those with an unskilled occupation had a respective 64%, 63% and 62% increased risk of

drowning death compared to university graduates, individuals in the highest quintile and those in the professional or managerial positions.<sup>6</sup> In Bangladesh, the risk of drowning among children aged 1-4 years whose mothers were illiterate or had primary level education was about twice that of those whose mother had secondary and higher level of education.<sup>7</sup>

### *Ethnic minorities*

Ethnic minority groups generally have higher drowning death rates, possibly because they have fewer opportunities to learn to swim.<sup>8,9</sup> In the Netherlands, the risk of drowning death among ethnic minority groups were found to be 2.5 times that of native Dutch, after adjusting for age, sex, area income and urbanisation degree.<sup>9</sup> In the United States (US), the unintentional drowning death rate between 2005 and 2009 for blacks (1.40 per 100 000 population) was also significantly higher than that of whites (1.28 per 100 000 population).<sup>10</sup>

### *Underlying medical conditions*

Epilepsy is known to make drowning a lot more likely, most probably as a result of having a seizure in water. A retrospective population-based cohort study of all submersion injuries among children and adolescents aged 19 or below in a single county in the US found that for epileptic children and adolescents, the risk of drowning in a bathtub and a pool was respectively 96.0 and 23.4 times that of those who did not have epilepsy.<sup>11</sup> Another meta-analysis of 51 studies around the world also showed that the risk of death by drowning in people with epilepsy was 15 to 19 times that of the general population.<sup>12</sup> Apart from epilepsy, drowning among adults aged 65 and older are often attributed to other underlying medical conditions, such as heart related conditions and depression.<sup>4</sup>

### *Alcohol use*

Among adolescents and adults, alcohol use is a significant risk factor for drowning during aquatic activities. Alcohol not only impairs judgment and performance, but also affects survival once submersion occurs through physiologic effects (such as hypothermia). A meta-analysis that assessed the role of alcohol in drowning associated with recreational water activity revealed that 30%-70% of swimming and boating fatal drowning victims had a measureable blood alcohol concentration, and that 10%-30% of those deaths could be attributed specifically to alcohol use.<sup>13</sup>

### *Inadequate supervision*

Drowning in young children usually occurs when there is a lapse or absence of parental or adult supervision. An analysis of paediatric drowning deaths in Washington State of the US between 1999 and 2003 reported that neglect/poor supervision was considered a factor in 67.7% of the drowning deaths of children below 5 years of age.<sup>14</sup> In Australia, a retrospective case-series analysis of 339 unintentional drowning deaths of children aged 14 and below from 2000 to 2009 showed that a lack of adequate supervision was a significant contributing factor in 71.7% of all the cases.<sup>15</sup> In China, a study that examined 67 drowning deaths among children aged 1-14 in Xiamen city and suburbs between 2001 and 2005 also found that 88.1% of drowning fatalities occurred in the absence of a parent or another adult.<sup>16</sup>

### *Access to 'risky' water*

The presence of 'risky' water is strongly related to drowning. In low- and middle-income countries or rural settings, predominant water hazards include ponds, wells, ditches, lakes, rivers and irrigation

channels. In high-income countries, many drowning fatalities occur in swimming pools that are inadequately fenced.<sup>8</sup> Indoor water facilities like bathtubs, basins, toilets and even 5-gallon buckets also pose a major drowning risk for young children when they lean over to play with water contained in these vessels. An earlier population case-control study estimated the relative risk of home drowning by different bodies of water among preschool children aged 1-4 years in a metropolitan area of Mexico and reported that the risk of drowning among children living in homes with a water well and a swimming pool was nearly 7 times and 6 times respectively that of those in homes without.<sup>17</sup> In Japan, bathtubs are the major source of unintentional drowning, especially among young children and the elderly. This is probably due to the design of very deep bathtubs, the habit of taking frequent baths of long duration and the use of very hot water, which can provoke sudden death among older adults.<sup>4</sup>

### **Local Situation**

In Hong Kong, drowning death is not uncommon. Between 2001 and 2010, there were 383 registered deaths attributed to unintentional drowning, giving an average of about 38 drowning deaths per year. As shown in Table 2, the drowning mortality rate per 100 000 population from 2001 to 2010 varied from 0.3 (in 2008) to 0.8 (in 2006). Males outnumbered females with an overall male to female ratio of about 2.8 to 1. Analysed by age, 31.6% (121 out of 383 cases) were among people aged 60 and above (Table 3). Analysed by location, 290 (75.7%) drowning fatalities occurred in natural waters, 27 (7.0%) in swimming pools and 9 (2.3%) in bathtubs.<sup>18</sup>

**Table 2: Number (Rate\*) of registered deaths attributed to unintentional drowning by sex, 2001-2010**

Year	Male	Female	Total
2001	35 (1.1)	7 (0.2)	42 (0.6)
2002	26 (0.8)	9 (0.3)	35 (0.5)
2003	18 (0.6)	9 (0.3)	27 (0.4)
2004	36 (1.1)	9 (0.3)	45 (0.7)
2005	22 (0.7)	13 (0.4)	35 (0.5)
2006	43 (1.3)	13 (0.4)	56 (0.8)
2007	28 (0.9)	15 (0.4)	43 (0.6)
2008	17 (0.5)	4 (0.1)	21 (0.3)
2009	30 (0.9)	10 (0.3)	40 (0.6)
2010	26 (0.8)	13 (0.3)	39 (0.6)
<b>Total</b>	281	102	383

Note: \* Rate per 100 000 population of respective sex and year.

Sources: Department of Health and Census and Statistics Department.

**Table 3: Number (Rate\*) of registered deaths attributed to unintentional drowning by age group, 2001-2010**

Year	14 years and below	15-29 years	30-44 years	45-59 years	60 years and above
2001	4 (0.4)	9 (0.6)	14 (0.7)	7 (0.6)	6 (0.6)
2002	4 (0.4)	6 (0.4)	4 (0.2)	7 (0.5)	13 (1.3)
2003	2 (0.2)	5 (0.4)	5 (0.3)	7 (0.5)	7 (0.7)
2004	2 (0.2)	7 (0.5)	7 (0.4)	11 (0.8)	15 (1.4)
2005	5 (0.5)	4 (0.3)	7 (0.4)	4 (0.3)	11 (1.0)
2006	2 (0.2)	13 (0.9)	12 (0.7)	9 (0.6)	16 (1.5)
2007	2 (0.2)	7 (0.5)	3 (0.2)	14 (0.8)	15 (1.3)
2008	0 (0.0)	2 (0.1)	5 (0.3)	5 (0.3)	9 (0.8)
2009	2 (0.2)	8 (0.6)	6 (0.4)	9 (0.5)	14 (1.1)
2010	0 (0.0)	11 (0.8)	4 (0.2)	9 (0.5)	15 (1.2)
<b>Total</b>	23	72	67	82	121

Notes: Excluded 18 registered deaths with unknown age.

\* Rate per 100 000 population of respective age group and year.

Sources: Department of Health and Census and Statistics Department.

## Prevention of Drowning

Like many unintentional injuries, most drowning incidents can be prevented if water safety rules are vigilantly observed and drowning protection measures are fully implemented, including continuous supervision of young children (Box 1). Nevertheless, a survey of 564 parents of children aged 14 and below in the US on their knowledge, attitudes and behaviours concerning water safety showed that most parents (55%) felt it was acceptable for a child to swim unsupervised in some circumstances, such as if the child swims with a buddy or if the child is an excellent swimmer. Even when parents said they 'always' supervised their children while swimming, many admitted that they would talk to others (38%), read (18%), eat (17%) or talk on the phone (11%) at the same time.<sup>19</sup>

But the fact is, young children rarely scream, call out or splash for help when they are drowning. For a child to get drowned, it takes less than a minute. A child will lose consciousness two minutes after immersion. After 4-6 minutes, irreversible brain damage usually occurs. Drowning can happen silently and swiftly, even when a young child is left unsupervised at home for a moment, when there is access to nearby pools or even to a bathtub or bucket with only a few centimetres of water.<sup>19</sup> Therefore, parents and carers should never leave young children unsupervised in or around water, even for a moment. They ought to maintain continuous visual and auditory contact with children and stay close enough to be able to reach the children at all times. More importantly, parents and carers should not be distracted by other activities while supervising children in or near water, including socialising, tending household chores and reading books. Moreover, as immediate resuscitation at the site of a drowning incident is

associated with a significantly better outcome for children with submersion, parents and carers are urged to receive proper training in infant/child cardiopulmonary resuscitation (CPR), so that in case of a drowning incident they can start CPR on the child before emergency medical services personnel arrive.<sup>20</sup>

Since the hot summer season gets underway in Hong Kong, there is nothing better than a trip to the beach or a dip in the pool. The Department of Health urges members of the public to be extra vigilant about water safety in a bid to prevent drowning tragedies and minimise the risk of other water-related injuries.

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*(continued on page 7)*

**Box 1: Some water safety tips for prevention of drowning*****General tips:***

- \* Learn to swim, and it is never too late to do so.
- \* Never swim or dive alone in open waters or in pools without lifeguards; always do so with a buddy.
- \* Do not drink alcohol before or during swimming, boating, water skiing or diving. Drinking and swimming is as dangerous as drinking and driving.
- \* Be aware that water activities can be dangerous. Know your limits and do not overestimate your own swimming ability. Stop swimming when feeling tired, cold, overexerted, or far from safety. Avoid swimming or taking part in any water activities when feeling unwell.
- \* Select swimming sites that have life-guards whenever possible. Do not jump or dive into unknown bodies of water.
- \* Check weather conditions and forecast before swimming or participating in any water activities. Get out of water right away if you hear thunder or see lightning while swimming or participating in any water activities.
- \* Heed beach warning flags. Watch for dangerous waves and signs of rip currents, such as water that is choppy, foamy, murky or filled with debris.
- \* Wear a properly-fitted personal floatation device, such as a life-jacket, when boating and fishing. A US study observed that recreational boaters wearing a personal floatation device would have a 49% reduced risk of drowning death compared to those not wearing one.<sup>21</sup>
- \* Stay away from drains of pool or spa to protect against entrapment.
- \* Cover wells or open cisterns.

***Tips for prevention of drowning in children:***

- \* Educate children about water safety.
- \* Teach children to swim. A study on children aged 1-4 year showed that participation in formal swimming lessons could reduce the risk of drowning by 88%.<sup>22</sup> However, swimming lessons do not make children 'drown-proof'; this should not be a reason for substituting active parental or adult supervision.
- \* Ensure children swim only in designated and supervised swimming areas. Even when other adults or a lifeguard is present, parents and carers should also watch their children at all times. Never drink alcohol while supervising children.
- \* Empty home wading pools and buckets immediately after use. Keep toilet lids closed or use toilet seat locks. For households with a home pool or spa, make sure that isolation fencing is installed. Studies found that pool fencing that adequately prevents children from reaching the pool unsupervised could prevent about three-quarters of all pool drowning incidents in children.<sup>23</sup> In addition to fencing, consider additional barriers to prevent unsupervised access, such as rigid pool covers, pool alarms or automatic door locks.

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### Water Sports Centres of the Leisure and Cultural Services Department (LCSD)

To provide more opportunities for the general public to enjoy the great fun of water sporting activities, the Leisure and Cultural Services Department (LCSD) has established five water sports centres in the New Territories and on Hong Kong Island, namely:

(1) the Chong Hing Water Sports Centre adjacent to the High Island Reservoir Sai Kung; (2) Stanley Main Beach Water Sports Centre situated at Stanley Main Beach; (3) St. Stephen's Beach Water Sports Centre opposite Stanley Bay; (4) Tai Mei Tuk Water Sports Centre next to Main Dam of Plover Cove Reservoir, Tai Po; and (5) the Jockey Club Wong Shek Water Sports Centre at Wong Shek Pier, Sai Kung. These Centres also organise various training programmes to improve the water sports skills of the general public.

Each year, thousands of people make use of the facilities and attend the training programmes provided by these Centres. To know more about the facilities, activities training courses or package programmes provided by the water sports centres and the enrolment procedures, please visit the designated page under the LCSD website at <http://www.lcsd.gov.hk/watersport/en/index.php>.



## Data Brief

Sunburn is inflammation of the skin that occurs after excessive exposure to sunlight or ultraviolet (UV) light from other sources. In Hong Kong, the Behavioural Risk Factor Survey conducted by the Department of Health in April 2010 randomly telephone-interviewed over 2 000 community-dwelling adults aged 18-64 and reported that 9.9% of respondents experienced a sunburn (including any time having even a small area of skin reddened or sore for more than 12 hours) in the 12 months before enumeration. Males (14.3%) and people aged 25-34 (17.3%) were more likely than their respective counterparts to report so.

To reduce the risk of sunburn, members of the public are urged to be “UV alert” and limit sun exposure during midday hours (i.e. between 10am and 3pm). When staying outdoors, cover up yourself with long-sleeved, loose-fitting clothing and a broad-brimmed hat, and protect your eyes with a pair of UV blocking sunglasses. For uncovered skin, apply adequate amount of broad-spectrum (with protection against both UVA and UVB), water resistant sunscreen with sun protection factor 15 or above.

Rate of community-dwelling people aged 18-64 who reported having sunburn in the 12 months before enumeration by sex and age group

		Rate*
Sex :	Male	14.3%
	Female	6.1%
Age group :	18-24	14.4%
	25-34	17.3%
	35-44	7.5%
	45-54	6.5%
	55-64	5.6%

Notes: \* Rate per 100 people in respective group.

All respondents excluding those with unknown age.

Source: Behavioural Risk Factor Survey April 2010.

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