

# Trends in childhood trauma mortality in the fast economically developing State of Qatar

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**Background:** The aim of this study was to explore the trends in injury mortality in children aged 0-18 years in the State of Qatar. No such study has been conducted previously in Qatar.

**Methods:** Univariate statistical analysis was used in this retrospective descriptive study. A total of 2934 children aged 0-18 years who died due to injuries in the period of 1 January 1993 to 31 December 2007 were studied.

**Results:** The leading causes of death were road traffic injuries (RTIs) (71.3%), drowning (9.3%) and accidental falls (6.0%). Injury death rates were higher in citizens (57.7%) than in non-citizens (42.3%). The children of 15-18 years old had the highest frequency of injury deaths (34.4%), followed by children of 10-14 years old (21.3%). The mortality rate of RTI per 100 000 population increased remarkably in the year 2005 compared to previous years.

**Conclusions:** The present study suggests that RTI is a major cause of childhood death. Injury mortality is higher in boys than in girls. During the period of 1993-2007, there was a dramatic increase in childhood mortality caused by RTI. This study highlights the burden of RTI caused mortalities in children, which requires immediate action.

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**Key words:** childhood injury; epidemiology; intentional injury; mortality; prevention; unintentional injury

## Introduction

Injuries are a global health and economic problem. [1] Publications highlight that injuries kill more than 5 million people every year worldwide, accounting for nearly 1 out of every 10 deaths globally. The most common injuries, whether intentional or non-intentional, include road traffic injuries (RTIs), drowning, falls, suicide and homicide. They affect people of all ages and socio-economic status of a nation. [2,3] Injuries are the leading cause of childhood death and significantly contribute to childhood morbidity, long-term disability, and healthcare costs in most industrialized countries. [2-9] In Canada, injuries are the leading cause of death for children over the age of 1 year, and in 1997 deaths due to injury accounted for 41.2% of deaths in children aged 1-17 years. [10]

Injuries due to traffic collisions are a major cause of childhood death, hospitalization and disability throughout the world. [11] Children are at an increased risk of pedestrian injuries. [4,5,12] In fact, it has been forecasted that by 2020, RTI will become the third leading cause of disability and that decreasing the burden of injuries is one of the main challenges for public health in this century. [13] Injuries from falls, drowning and burns are most common in children after RTI. [12] According to the World Health Organization, [3] falls ranked as the world's fifth cause of death in children aged 5-14 years in the year 2000, and are the most common type of unintentional injuries. [14] It is interesting to note that these types of injuries mainly take place at home since it is the major place where children spend most of their time. [15]

This study was undertaken to assess trends of injury mortality in children aged 0-18 years in the State of Qatar and to highlight areas which require immediate action.

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## Methods

We retrospectively reviewed all deceased children of 0-18 years old during the period of January 1, 1993 to December 31, 2007. The study was based on the Death Certificate Registry of the Preventive Medicine of National Health Authority in Qatar, which is the only source in the country for injury mortality records. The data for the cause of deaths were confirmed by the Death Certificate Registry which uses the ICD-10 codes to register the cause and mechanism of incidents. Injuries were coded according to the *International Classification of Disease*, 9th revised edition (ICD-9) (1979-1999) and 10th revised edition (ICD-10) (2000-2007). These codes were used to group injuries: unintentional, self-inflicted (suicide), assault, legal intervention/war, and undetermined. In addition, they were used to group injuries by mechanism: cut/pierce, drowning, fire/hot object/substance (burning), firearm, machinery, transport including RTI, natural/environmental, poisoning, and suffocation among others.

The ages of the children were categorized into five groups: less than 1 year, 1-4 years, 5-9 years, 10-14 years and 15-18 years. The causes of deaths were classified into the following categories: RTI, drowning, accidental falls, asphyxiation, electric shock, assault, poisoning, burns, suicide and effect of foreign body through orifices accidentally.

The children were divided into two groups: citizens and non-citizens. As a fast developing country, Qatar has a citizen population residing in the county permanently and a non-citizen ex-patriot population whose composition is constantly changing.

Childhood (0-18 years) mortality rates for total injuries and for cause of specific injuries from 1993 to 2007 were computed. The injury mortality rate of children aged less than 18 years was calculated by the number of deaths from each cause of injury in 100 000 children of the same age.

The trend of childhood mortality was evaluated using the Chi-square test as a nonparametric statistical test. The level of  $P < 0.05$  was considered as the cut-off value for significance.

## Results

Overall, 2934 deaths were reported in children less than 18 years old during the period of 1993 to 2007. Of these deaths, 614 were due to injury, accounting for 21% of the total deaths.

The deaths from injury were categorized according to age group and injury type among children aged 0-18 years during the period of 1993-2007 (Table 1). The leading causes of deaths were RTI (71.3%), drowning

(9.3%) and accidental falls (6.0%). The first two leading causes were consistently the top two causes across the years. RTIs were the largest category each year and there was an increasing tendency of RTI deaths in the period of 2003-2007.

Deaths among children of 0-18 years old were categorized by nationality and gender during the period of 1993-2007 (Table 2). Injury death rates were higher in citizens (57.7%) than in non-citizens (42.3%) ( $P > 0.001$ ). The male to female death ratio for all types of injury deaths was 3.4:1. Death rate from RTI was higher in boys than in girls among citizens (78.0% vs. 68.1%;  $P = 0.107$ ) and non-citizens (67.0% vs. 59.4%;  $P = 0.324$ ). Boys were at a higher risk to die from injury than girls ( $P < 0.001$ ). Children of 15-18 years old had the highest frequency of injury deaths (34.4%), followed by children of 10-14 years (21.3%).

There were four leading causes of injury deaths in children of less than 18 years old by the category of injury during the period (Fig. 1). RTI was the first leading cause of death among children across the years. No stable pattern was observed in the mortality rate of RTI per 100 000 population during the study period, but it started declining during the recent years since 2005.

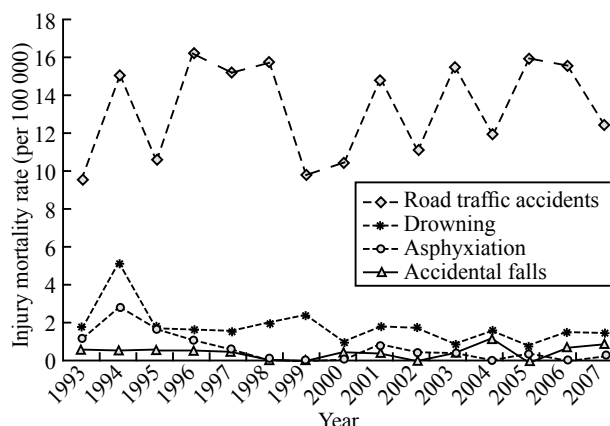
The mortality rate per 100 000 population in children from accidents in the State of Qatar was compared with that of other countries during the period of 1991-2005 (Fig. 2). The overall injury mortality rate from accidents in children in Qatar was 15.4%, which is similar to that in other countries like the United Arab Emirates (UAE) (13.5%), Poland (13.4%), New Zealand (13.7%), and USA (14.1%).

**Table 1.** Deaths from injury according to age group and its type among children aged 0-18 years during the period of 1993-2007

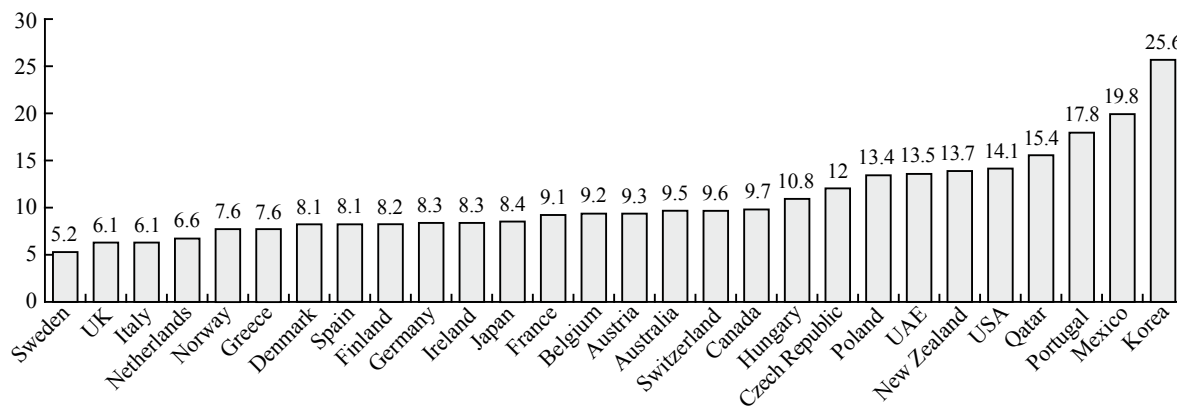
Variables	1993-1997 N=180	1998-2002 N=191	2003-2007 N=243
Injury deaths by age group, n (%)			
Under 1 year	28 (15.6)	26 (13.6)	13 (5.3)
1-4 years	49 (27.2)	29 (15.2)	36 (14.8)
5-9 years	25 (13.9)	39 (20.4)	27 (11.1)
10-14 years	31 (17.2)	39 (20.4)	61 (25.1)
15-18 years	47 (26.1)	58 (30.4)	106 (43.6)
Deaths by types of injury, n (%)			
Motor vehicle and traffic accidents	120 (66.7)	137 (71.7)	181 (74.5)
Drowning	21 (11.7)	19 (9.9)	17 (7.0)
Accidental falls	12 (6.7)	16 (8.4)	9 (3.7)
Asphyxiation	13 (7.2)	3 (1.6)	3 (1.2)
Electric shock	6 (3.3)	4 (2.1)	2 (0.8)
Assault	5 (2.8)	1 (0.5)	6 (2.5)
Accidental poisoning	1 (0.6)	7 (3.7)	6 (2.5)
Accidents caused by fire or flame	1 (0.6)	1 (0.5)	15 (6.2)
Suicide	0 (0.0)	1 (0.5)	4 (1.6)
Effect of foreign body through orifice	1 (0.6)	2 (1.0)	0 (0.0)

**Table 2.** Reported deaths among children aged 0-18 years by nationality and gender during the period of 1993-2007

Variables	Citizen (N=354)		Non-citizen (N=260)	
	Males (n=282)	Females (n=72)	Males (n=191)	Females (n=69)
<b>Injury deaths by age group, n (%)</b>				
Under 1 year	18 (6.4)	8 (11.1)	21 (11.0)	20 (29.0)
1-4 years	35 (12.4)	25 (34.7)	38 (19.9)	16 (23.2)
5-9 years	25 (8.9)	11 (15.3)	44 (23.0)	11 (15.9)
10-14 years	72 (25.5)	13 (18.1)	36 (18.8)	10 (14.5)
15-18 years	132 (46.8)	15 (20.8)	52 (27.2)	12 (17.4)
<b>Deaths by type of injury, n (%)</b>				
Motor vehicle and traffic accidents	220 (78.0)	49 (68.1)	128 (67.0)	41 (59.4)
Drowning	19 (6.7)	10 (13.9)	20 (10.5)	8 (11.6)
Accidental falls	14 (5.0)	2 (2.8)	18 (9.4)	3 (4.3)
Asphyxiation	7 (2.5)	1 (1.4)	5 (2.6)	6 (8.7)
Electric shock	6 (2.1)	2 (2.8)	3 (1.6)	1 (1.4)
Assault	2 (0.7)	3 (4.2)	7 (3.7)	0 (0.0)
Accidental poisoning	2 (0.7)	2 (2.8)	8 (4.2)	2 (2.9)
Accidents caused by fire or flame	11 (3.9)	0 (0.0)	2 (1.0)	4 (5.8)
Suicide	1 (0.4)	1 (1.4)	0 (0.0)	3 (4.3)
Effect of foreign body through orifice	0 (0.0)	2 (2.8)	0 (0.0)	1 (1.8)



**Fig. 1.** The first four leading causes of injury mortality of children aged 0-18 years per 100 000 population by type of accident during the period of 1993-2007.



**Fig. 2.** The mortality rate of children aged 0-15 years due to road traffic injuries expressed as per 100 000 population in the state of Qatar compared to other countries during the period of 1991-2005.<sup>[9]</sup>

## Discussion

In the present study, 21% of the total deaths in children aged 0-18 years were due to injuries. These injuries may cause long-term disabilities of children, economic burden for individuals, and hardship for survivors and family care-givers.<sup>[16-18]</sup>

Childhood injury death rates have been decreasing for decades worldwide. It is encouraging that both the frequency and the rate of death from all injuries have continued to decrease in recent years.<sup>[10]</sup> There is a marked reduction in the injury mortality rate per 100 000 population from accidental falls, drowning and asphyxiation. Our study results are similar to those reported in Western countries regarding a significantly decreasing trend in mortality rates due to total injuries and unintentional injuries among children of 0-17 years.<sup>[19]</sup>

The injury mortality rates of males are twice as high as that of females worldwide.<sup>[19,20]</sup> In the United States, boys were more commonly injured,<sup>[21]</sup> as we found in this study with a male to female death ratio of 3.4:1 for all types of injuries leading to death. This is similar to the study findings by several other studies.<sup>[9]</sup> This could be due to the fact that boys are more aggressive and adventurous than girls. In the UK, motor vehicle crashes are responsible for the higher rate of morbidity and deaths among boys (66.8%) than among girls (33.2%).<sup>[20]</sup>

Death rates from road traffic crashes, burns and drowning are particularly high in Africa and Asia, and death rates due to falls are the highest in Western Europe.<sup>[9]</sup> In Qatar, RTI is the most common cause of deaths in boys and girls.<sup>[4,5,16,17]</sup> A study from UAE<sup>[16-18]</sup> revealed similarly that the majority of injuries were RTIs. These were also found in our neighboring country of Saudi Arabia.<sup>[22]</sup>

Deaths of children were mostly due to RTI, falls, drowning, burns and fire in Qatar and other countries. In Qatar, for example, the leading causes of injuries

among children were motor vehicle and traffic crashes, drowning, falls and asphyxiation, as reported in the UAE.<sup>[16,17]</sup>

In Iran,<sup>[23]</sup> RTI (50%), burns (18%), falls (6%) and poisoning (6%) are the common causes of fatal injuries. In Canada,<sup>[10]</sup> motor vehicle injuries are the most common cause of death for children aged 0-14 years (36.4%), followed by suffocation (14.3%), drowning (13.5%) and burns (11.1%). The present study and the studies from Tehran and Canada all revealed that RTI is the major cause of deaths in children. In our study, deaths due to poisoning, fire & flame, suicide, and effect of foreign body through orifice are less common. Our study also revealed that the incidence of drowning is higher in boys than in girls of both citizens and non-citizens.

Intensive action should be taken to reduce or prevent childhood deaths due to traumatic injuries. It is necessary to strengthen injury fatal and nonfatal surveillance systems, advocating for a review of current legislation related to causes of such injuries, raise community awareness about prevention and management of childhood injuries resulting deaths and disabilities, and enforce the multi-sector national response and sub-regional collaboration in injury prevention response.

In summary, the present study indicates that RTI is a major cause of childhood death. Injury mortality is higher for boys than girls. During the period of 1993-2007, there was a dramatic increase in childhood mortality due to RTI. These results highlight the emerging trend of traumatic mortality in children in Qatar. We conclude that there is an immediate need for a strategic program to reduce childhood mortality due to trauma.

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