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Trends in childhood injury mortality in a developing country: United Arab Emirates

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Abstract

Objective: To describe the epidemiology of a leading cause of childhood mortality in Al-Ain, United Arab Emirates (UAE) – injury. To examine trends across types of injury, as well as the mechanisms of injury leading to death, by age groups, gender, citizenship, and explore mortality rates and make global comparisons.

Design: This is a retrospective, descriptive, statistical analysis of unlinked hospital data.

Setting: Al-Ain and Tawam Hospitals, and Preventive Medicine Department, Al-Ain, United Arab Emirates.

Subjects: All cases that met the conditions established for the study: fell within the age group of 0 to 14 years, suffered from injuries, and were admitted to either Al-Ain or Tawam hospitals and subsequently died within the studied time period of 1 January 1995 to 31 December 2004.

Results: A total of 7204 deaths were reported in children below 15 years during the studied time period. Of these cases, 2150 children died due to injury, comprising 29.8% of total deaths. Further analysis showed that road traffic injuries were the

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most frequent cause of injury leading to death (68.3%). Overall injury death rates were higher in non-citizens (54.5%) than in citizens (45.5%); and males had a higher incidence, specifically a 2.1:1 ratio, than females. Children 5 to 14 years had the highest frequency of injury deaths. Overall, injury mortality rates exhibited a decreasing, though fluctuating, trend during the studied period at a rate that is comparable to those in other developed nations such as New Zealand and USA.

Conclusion: The present study reveals that the burden of injury deaths among children below 15 years is significant; and injuries exist in every form and affect every age group, and gender. The high burden of injuries on children in the UAE demands the attention of the health community, including policy makers. An understanding of the trends such as those presented in this study, for instance that injuries from road traffic are prominent, will assist in the development of interventions to address this growing concern. Furthermore, similarities in rates of UAE with other developed countries signify the potential for appropriate responses to lower the burden of injuries on children in the future.

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Introduction

No town or city is safe from the adverse effects of injuries, and injuries present health care concerns in every country and continent of the world (WHO, 2001). Numerous studies and publications highlight the incredible number of deaths caused by injuries—more than five million each year and accounting for nearly 1 in every 10 deaths worldwide. Not only are injuries present in every corner of the world, they extend to people of every age group and economic class (Van Tuyl, 2003). Children, in particular, are primary targets of several different causes. Due to the increased risk of pedestrian injuries for children, injuries from traffic collisions are a major cause of childhood death, hospitalization, and disability throughout the world (Kendric, 1993; Peden et al., 2004). By 2020, road traffic injuries (RTI) are forecasted to become the second leading cause of both disability and lives lost in developing countries, creating an extremely daunting challenge for the global public health community to address in the next century (Krug et al., 2000).

Apart from road traffic injuries (RTI), injuries from falls, drowning, and burns also show some of the highest incidence among children as compared to other age groups (Kendric, 1993). According to the World Health Organization (Peden et al., 2002), falls ranked as the world's fifth leading cause of death among children of ages 5 to 14 in the year 2000 (Britton, 2005). Injuries that occur mainly in the home are other pervasive causes of mortality and disability in children and include exposure to smoke and fire (Hall et al., 2005), drowning (Brent and Weitzman, 2004), poisoning (Çekin et al., 2005), and electrocution (Tirasci et al., 2006).

Overall, injury surpasses all major disease groups as the leading cause of premature loss of

life (Waller, 1985). Injuries are also responsible for significant long-term disability, economic disaster, and other severe hardships for survivors and caregivers (Peden et al., 2004). On a global scale, injuries consume a substantial proportion of health sector resources in developing countries, depriving such nations of resources which are already scarce (Bishai et al., 2003). The present study aims to elucidate the details of trends in injury mortality among children in Al-Ain, United Arab Emirates (UAE), in order to focus the public health and policy-making efforts in addressing the effects caused by injuries.

Methodology

The study was retrospective and descriptive for all paediatric deaths, defined for this study in the UAE as children 0 to 14 years of age, between January 1, 1995 and December 31, 2004. All death cases registered during this period were included in the study, except those in which the child's death was unknown or was not recorded. The source of data included the following largely public-access sources: (1) aggregated unlinked data from both Al-Ain and Tawam hospitals; (2) the Death Certificate Registry of Preventive Medicine; and (3) annual reports of the Preventive Medicine Department, Ministry of Health, UAE. The Death Certificate Registry, which uses the International Classification of Diseases – Revision 10 codes to register the mechanism of injury was used for cause of death for this study (WHO, 1993).

To elucidate possible trends, patient data was categorized into five different age groups: 0 to 7 days, 8 to 28 days, 29 days to 1 year, 1 to 4 years, and 5 to 14 years. The subjects were also grouped

according to gender and nationality. The mechanisms of injury were characterized into the following groups: road traffic injuries, falls, drowning, homicides, fire (burns), and poisoning.

The data was entered and coded in Statistical Package of Social Sciences (SPSS) software, and the results were presented in terms of descriptive statistics. Absolute numbers and death rates were estimated by age, and type of injury. Trends in the data were then evaluated by using a Chi-square, goodness of fit test as a nonparametric statistical measure.

This study was secondary data analysis and conformed to the guidelines of the UAE Research Committee and approved by the National Health Authority, General Authority for Health Services. The data was unidentifiable, based on hospital reports with no personal identifiers. Most of the data was public-access, and there was no direct clinical involvement with human subjects.

Results

A total of 7204 paediatric deaths were reported among children between 0 and 14 years during the time period 1995–2004. 2150 of these children experienced fatalities due to injury, constituting nearly 29.8% of the total deaths. Within this group comparison of the number of deaths by type of injury and mechanisms of injury leading to death among all ages for each year is shown in Table 1. Childhood deaths from intracranial, internal, and neural injuries were significantly more prominent each year as compared to the other types of injuries. Road traffic, other injuries, falls and drowning were consistently the top four most prevalent causes throughout the time period of study. Among these, road traffic claimed the largest proportion of injuries each year, and this proportion grew to be even more distinct in the final year studied.

Further comparison of the injury deaths based on age group, citizenship, and type of injury is shown in Table 2. The proportion of injury deaths was slightly higher in non-citizens (54.5%) than in citizens (45.5%), while the overall number of deaths was considerably higher for males than for females (2.1:1 ratio). Children 5 to 14 years exhibited the highest frequency of injury, followed by children 1 to 4 years. Deaths from RTI were higher in boys than in girls among both nationals and non-nationals.

The trend of injury mortality rate per 10,000 population was assessed across the entire time period for the four most common mechanisms of

Table 1 Reported deaths by type of injury among children below 15 years in UAE (1995–2004)

	Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Deaths by type of injury (ICD 10:S00–T98)		n = 101	n = 112	n = 116	n = 73	n = 116	n = 78	n = 96	n = 111	n = 148	n = 113
Intracranial, internal, neural injuries		47(46.5)	53(47.3)	45(38.8)	26(35.6)	53(45.7)	36(46.2)	39(40.6)	41(36.9)	46(31.1)	59(52.2)
Other injuries		15(14.9)	27(24.1)	25(21.6)	22(30.1)	21(18.1)	18(23.1)	20(20.8)	25(22.5)	25(16.9)	18(15.9)
Fractures		16(15.8)	12(10.7)	20(17.2)	9(12.3)	16(13.8)	13(16.7)	20(20.8)	26(23.4)	47(31.8)	18(15.9)
Foreign object in bodily orifices		16(15.8)	15(13.4)	18(15.5)	12(16.4)	12(10.3)	8(10.3)	12(12.5)	14(12.6)	19(12.8)	16(14.2)
Burns		6(5.9)	4(3.6)	4(3.4)	2(2.7)	12(10.3)	3(3.8)	3(3.1)	3(2.7)	9(6.1)	1(0.9)
Poisons and toxins		1(1)	1(0.9)	4(3.4)	2(2.7)	2(1.7)	0(0)	2(2.1)	2(1.8)	2(1.4)	1(0.9)
Deaths by type of accident (ICD 10: V01–Y98)		n = 90	n = 111	n = 110	n = 102	n = 103	n = 97	n = 103	n = 103	n = 144	n = 123
Road traffic incidents		59(65.6)	68(61.3)	74(67.3)	76(74.5)	66(64.1)	66(68)	70(68)	73(70.9)	93(64.6)	97(78.9)
Other injuries, adverse effects		17(18.9)	16(14.4)	15(13.6)	5(4.9)	11(10.7)	11(11.3)	12(11.7)	9(8.7)	18(12.5)	3(2.4)
Falls		4(4.4)	15(13.5)	9(8.2)	6(5.9)	9(8.7)	15(15.5)	12(11.7)	10(9.7)	9(6.3)	12(9.8)
Drowning		6(6.7)	7(6.3)	7(6.4)	10(9.8)	0(0.0)	2(2.1)	6(5.8)	10(9.7)	9(6.3)	9(7.3)
Homicide		0(0.0)	2(1.8)	1(0.9)	2(2)	2(1.9)	1(1)	1(1)	0(0.0)	4(2.8)	1(0.8)
Exposure to fire		2(2.2)	3(2.7)	3(2.7)	1(1)	13(12.6)	2(2.1)	2(1.9)	1(1)	6(4.2)	1(0.8)
Poisoning		2(2.2)	0(0.0)	0(0.0)	2(2)	1(1)	0(0.0)	0(0.0)	0(0.0)	4(2.8)	0(0)

Table 2 Reported child deaths in UAE by age group and type of injury, 1995–2004

	Citizen <i>N</i> = 494		Non citizen <i>N</i> = 592	
	Male <i>n</i> = 340	Female <i>n</i> = 154	Male <i>n</i> = 394	Female <i>n</i> = 198
<i>Age group</i>				
0 to 7 days	0(0.0)	2(1.3)	6(1.5)	3(1.5)
8 to 28 days	3(0.9)	0(0.0)	2(0.5)	0(0.0)
29 days to 1 year	17(5.0)	7(4.5)	23(5.8)	17(8.6)
1 to 4 years	93(27.4)	66(42.9)	110(27.9)	83(41.9)
5 to 14 years	227(66.8)	79(51.3)	253(64.2)	95(48.0)
<i>Deaths by type of accidents (ICD 10: V01-Y98)</i>				
Road traffic	260(76.5)	111(72.1)	249(63.2)	122(61.6)
Other injuries and adverse effects	34(10)	16(10.4)	45(11.4)	22(11.1)
Falls	9(2.6)	5(3.2)	54(13.7)	33(16.7)
Drowning	25(7.4)	12(7.8)	22(5.6)	7(3.5)
Homicide	3(0.9)	1(0.6)	5(1.3)	5(2.5)
Exposure to fire	5(1.5)	8(5.2)	14(3.6)	7(3.5)
Poisoning	2(0.6)	1(0.6)	5(1.3)	1(0.5)

injury: road traffic, other injuries and adverse effects, falls, and drowning (Fig. 1). The injury mortality rates display a fluctuating trend for all causes of death. An overall decrease was seen in the rate of other injuries/adverse effects, while no discernible change was seen for drowning.

The injury mortality rate of children in UAE was compared to that in other developed and developing countries for the years 1991 to 1995 (Fig. 2). The overall UAE injury mortality rate (13.5 per 1,00,000) from injuries in children was found to be similar to countries such as Poland (13.4), New Zealand (13.7), and USA (14.1). UAE was higher than Sweden and the United Kingdom, and much lower than Mexico and Korea.

Discussion

Injuries among children are a major health hazard, leading to high rates of disability and mortality and, therefore, calling for critical attention from the public health community (Manciaux and Romer, 1991; Peden et al., 2004). The grave prominence of such injuries among the world's population of young children is being noticed in the international research field. The World Health Organization and UNICEF are recognizing injuries as one of the leading killers of children in developing countries (WHO, 2005). It has been reported to be the main cause of death for children between 1 and 17 years in Bangladesh. Injury death rates have been

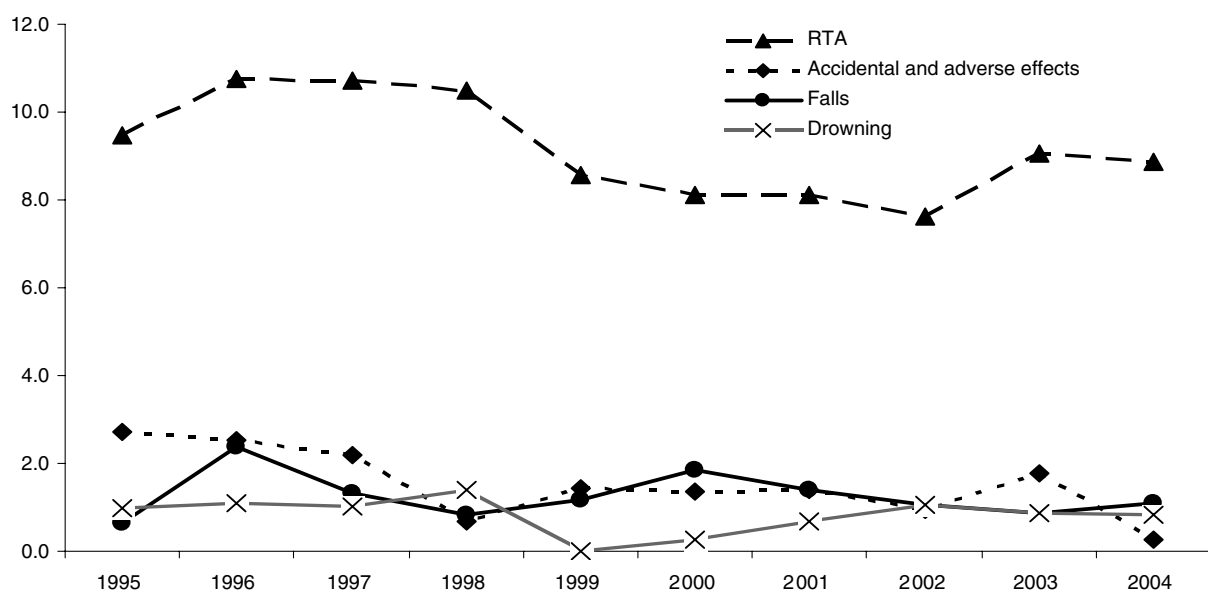


Figure 1 Injury mortality in children (per 10,000) by type of injury in UAE, 1995–2004.

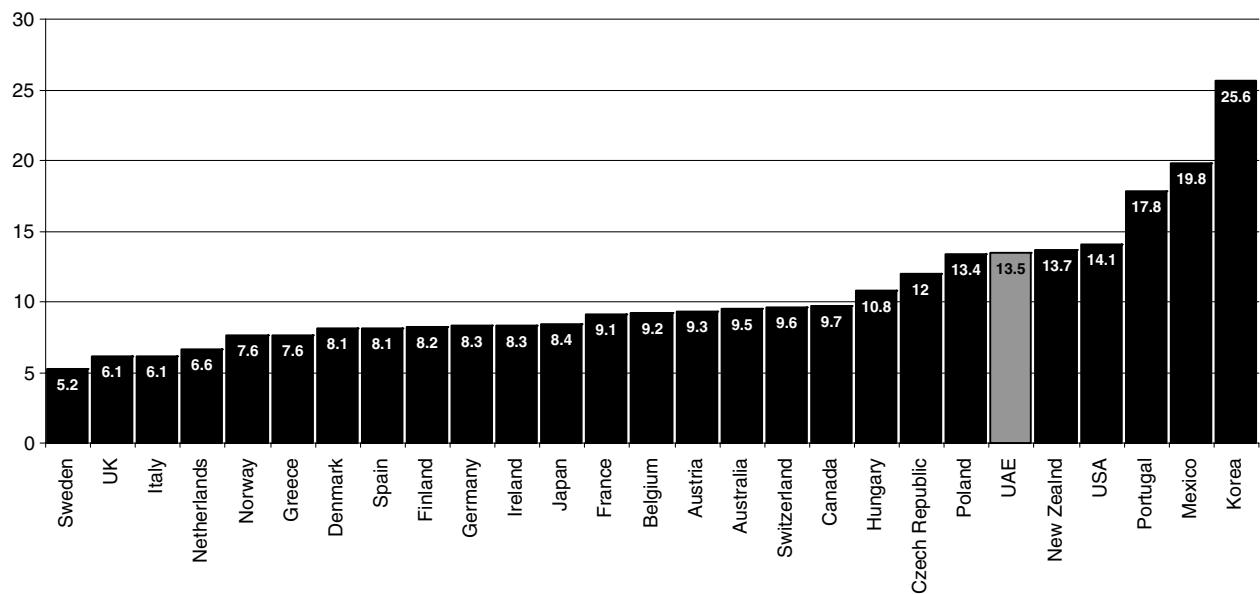


Figure 2 Injury mortality among children per 100,000 in UAE compared to other countries during the period of (1991–1995) [UNICEF, 2001].

decreasing for decades in high income countries but such a trend is not seen in developing countries (Pan et al., 2006; Philppakis et al., 2004).

A third of child deaths in this study from UAE were found to be caused solely by injuries showing the prominence of such deaths in this age group. Injuries need to be recognized as an important cause of child and adolescent mortality in the under-15 years age group in high-income and rapidly developing countries like the UAE. Road traffic injuries tend to cause a much higher proportion of deaths and together with falls and drowning, need to be the focus for child health interventions. Seatbelt legislation has been introduced in UAE in order to combat injury mortality, and increasingly efforts are being made to develop national plans to address this public health problem, (Bener et al., 1994; Klenk and Kovacks, 2003; Bener et al., 2003).

Worldwide injury mortality is two times higher for males than for females (Peden et al., 2004). Reports from the United States and other countries show that males are more commonly the victims of injury (NCIPC, 2003; UNICEF, 2001; Davis, 1995). The current study revealed that the male to female death ratio for all injury mechanisms are drastically staggered in the UAE with the majority being males. One possible explanation for this trend is that males are usually more exposed to risk factors for injuries than females, such as operating and travelling in motor vehicles. This poses an especially important issue in societies where gendered roles are strongly engrained and

male-dominated economic and social activities tend to dominate lifestyles.

In the UAE, injuries and especially falls were surprisingly higher among non-citizen children (nearly six times) than citizens. This difference, for example in falls, could stem from a wide variety of factors associated with non-citizens such as their greater involvement in outdoor or recreational activities, or exposure to higher risk play areas, or lower quality housing. Although more investigation is needed to identify a precise explanation for this difference, identification of this trend is important to explore the vulnerability of the large non-citizen population in UAE.

A previous study conducted in UAE by Bener et al. (1998), revealed that the primary source of trauma was due to road traffic injuries; and similar results were obtained in the neighbouring country of Saudi Arabia (Evbuomwan, 1994). As shown in the study, UAE shared similar mortality rates with some countries in Europe for the major causes of accidental injury. However, countries like Ireland with similar economic development measures have lower injury mortality rates – reflecting that UAE can do much better with additional investments for child and adolescent injury prevention and control.

This study used secondary analysis of existing hospital data for deaths in children 0–14 years old. Any deaths not reported to the Ministry of Health or the two hospitals were not captured, though it is expected that such numbers would be very low. In addition, the hospital records were

limited in the types and numbers of variables available for each death; thus a spectrum of risk factors and causative mechanisms for injuries could not be studied. It is obvious that a study focused on mortality would therefore not be able to address the morbidity and disability impact of injuries on children – which is believed to be substantial. The lack of economic data and inability to report on the social impact of these child deaths on their families could not be measured though such an impact is likely to be of great importance in the UAE.

Conclusion

The present study illustrates the important role of injury fatalities among children 0–14 years in UAE during the time period 1995–2004. This loss of healthy life demands the attention of policy makers from all sectors, including the Ministry of Interior and Ministry of Health, and requires the development of national plans for preventing and controlling child injuries. In addition, it also calls for further inquiry into the specific causes, risk factors and potential safety measures for children in the UAE.

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