



## FIREARM-RELATED INJURIES AND DEATHS AMONG CHILDREN AND ADOLESCENTS IN CAPE TOWN — 1992 - 1996

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**Objective.** To determine the epidemiological profile of firearm-related injuries among children and adolescents in Cape Town during recent years in order to further understand the epidemic of firearm violence as a public health problem in South Africa.

**Design.** A retrospective study was conducted of hospital, medico-legal laboratory (mortuary) and police data.

**Setting.** Metropolitan Cape Town, 1 January 1992 - 31 December 1996.

**Study population.** All children and adolescents (under 19 years of age) with firearm injuries living in the Cape Town metropole during the study period.

**Results.** During the study period at least 1 736 children and adolescents were victims of firearm-related incidents; of these, 322 died (19%). The incidence of firearm injuries among this group almost tripled from 20.2/100 000 in 1992 to 58.1/100 000 in 1996. The firearm mortality rate also almost tripled during the period under review from 3.8/100 000 in 1992 to 10.3/100 000 in 1996. Approximately 60% of victims were coloured males, with 86% between 13 and 18 years of age. Twenty-one per cent of all victims aged over 12 years who died were intoxicated. Other characteristics of the victims and the circumstances surrounding the incidents are presented.

**Conclusions.** These findings demonstrate the escalating epidemic of firearm-related injuries and deaths among children and adolescents in Cape Town. In addition, the study indicates the need for an integrated injury and death reporting system. Further research is needed to understand firearm-related injuries among children and adolescents in South Africa, and to develop policies and programmes for prevention that are effective in this setting.

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Recent studies in South Africa have shown that unintentional and intentional injuries are major causes of morbidity and mortality in children.<sup>1,4</sup> Within the broad spectrum of injury, firearm-related injuries are thought to be an emerging problem.

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However, little is known about the extent of the problem and the factors associated with firearm-related injuries in this country, particularly among children and adolescents.

### METHODS

A retrospective study of hospital, mortuary and police record data was conducted in order to determine the epidemiological profile of firearm injuries and deaths among children and adolescents. The study population was all persons under 19 years of age in the Cape Town metropole who had sustained a firearm injury during the period 1 January 1992 to 31 December 1996.

Information about the total number of children living in the Cape Town metropole was based on 1991 census data and 1995 estimates of the population. (Age and regional breakdowns from the 1996 census were not available at the time that this study was conducted.)

Thirteen public hospitals (3 tertiary, 4 secondary, 2 district and 4 community health centres) and 8 private hospitals were operating 24-hour trauma or casualty services during the study period. Data on firearm-related injuries to persons under 19 years of age seen during the study period were abstracted from all available registers at these hospitals. Details of victims' age, sex, race, anatomy injured and outcome were obtained, and when possible additional data on victims' residence and circumstances surrounding the incident were recorded. The names and dates of birth of the children and adolescents were recorded; this was done solely for the purpose of comparing hospital data with mortuary data and avoiding duplication of cases recorded.

When databases were available (as they were for three tertiary hospitals — Red Cross War Memorial, Groote Schuur and Tygerberg), these were utilised instead of reviewing registers. Individual hospital folders were retrieved when information was missing or unclear in the register or database. All data were captured on a standard intake form, the same form used by Red Cross Hospital's trauma unit.

As all non-natural deaths require an autopsy, registers at the two State mortuaries serving the Cape Town metropole, Salt River Mortuary and Tygerberg Mortuary, were reviewed.

In addition a database maintained by the University of Cape Town's Department of Forensic Medicine and Toxicology, with information on all deaths seen at both mortuaries since 1994, was utilised to abstract information for the period 1 January 1994 to 31 December 1996.

Details were obtained from mortuary data, regarding each victim's name, sex, race, date of birth, date of death, place of death and cause of death (e.g. suicide or homicide). For victims above the age of 13 years blood alcohol content details were also obtained; when these were missing from the death register, they were obtained from the City of Cape Town's Forensic Chemical Laboratory.



Finally, police records of firearm incidents involving children and adolescents were obtained from the South African Police Service (SAPS) Crime Information Management Centre (CIMC) in Cape Town. The CIMC only has data available by age from July 1995. Records from July 1995 to December 1996 were reviewed in an attempt to determine to what extent they corresponded with hospital and mortuary records.

A search for duplications in the data was done by: (i) cross-checking names, dates of birth and dates of injury within hospital data; (ii) cross-checking names, dates of birth and dates of injury/death between hospital and mortuary data; and (iii) searching the hospital database for names when mortuary notes indicated that a patient had come from a particular hospital.

Data were analysed using Epi-Info 6.

## RESULTS

### Socio-demographic

The total number of Cape Town children and adolescents who were victims of firearm-related incidents from 1992 to 1996 was at least 1 736; of this number 322 (19%) died (Table I).

Table I. Total number of firearm-related injuries and deaths in the under-19 age group in Cape Town, 1992 - 1996

	No. presenting at hospital	No. seen at mortuary	Firearm injury mortality rate (/100 000)	Firearm injury incidence rate (/100 000)	Total
1992	142	32	3.8	20.2	174
1993	204	43	5.1	28.9	247
1994	257	71	8.4	37.7	328
1995	443	89	10.6	60.8	532
1996	421	87	10.3	58.1	508
Total number seen	1 467	322			1 789
Total without duplication*	1 414	322			1 736

\* In this total figure children and adolescents who were recorded in both hospital and mortuary registers have been counted once only.

Over this period the incidence of firearm injuries among under-19-year-olds almost tripled from 20.2/100 000 in 1992 to 58.1/100 000 in 1996. The average incidence of firearm injuries among under-19-year-olds for the period 1992 - 1996 was 41.2/100 000 person-years.

The firearm mortality rate for persons under 19 years of age also almost tripled during the period under review, from 3.8/100 000 in 1992 to 10.3/100 000 in 1996.

During the years for which a computer database of all causes of death was available (1994 - 1996), it was possible to identify the most frequent causes of death among children and adolescents (under 19 years of age) at the mortuaries.

Homicides (from all causes) in the under-19 age group constituted 18% of deaths ( $N = 200$ ) in 1994 - 1995, and 20% in 1996 ( $N = 221$ ), representing the most important cause of non-natural death among persons aged 0 - 18 years in Cape Town during the period.

Data obtained from hospitals and mortuaries corresponded with regard to the characteristics of victims. There were more coloured male victims than any other race and sex group (62% of those presenting at hospital ( $N = 906$ ), and approximately 59% ( $N = 189$ ) of those seen at mortuaries). (For the years 1994 - 1995 mortuary data were not stratified by sex. Therefore, the estimate of the total number of coloured males seen at mortuaries is based on 1994 - 1995 race data, and 1992, 1993 and 1996 race and sex data.) Black males were the next most affected group, representing 23% of those injured or killed during the period under review ( $N = 398$ ).

Adolescents between 13 and 18 years of age represented 86% of hospital cases in the under-19 age group ( $N = 1 260$ ), and 87% of mortuary cases ( $N = 280$ ). However, the proportion of victims under 13 years of age has increased in recent years (Fig. 1).

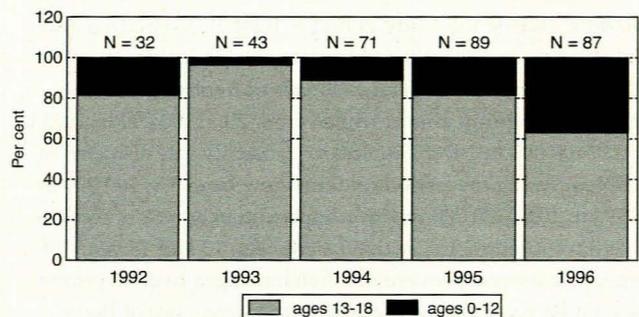


Fig. 1. Firearm deaths by age group, under-19 population, 1992 - 1996 ( $N = 322$ ).

### Factors associated with injuries and deaths

Twenty-one per cent ( $N = 60$ ) of all adolescent victims (aged 13 - 18 years) who died from firearm wounds had a blood alcohol content of higher than 0.08 g/100 ml blood, indicating that they were intoxicated. Information about the blood alcohol content of younger victims who died, as well as those seen at hospital, was not obtained.

The anatomical site of injury was described in only 497 (34%) hospital cases and 76 (24%) mortuary cases. Of these, the majority of injuries seen at hospital occurred on the limbs (61%,  $N = 303$ ) and the head and neck (20%,  $N = 98$ ). Among those seen at the mortuary, the most common site of injury was the head/neck area (38%,  $N = 29$ ) and the chest (28%,  $N = 21$ ).

For the vast majority of victims seen at hospital (87%,  $N = 1 279$ ) it was not possible to determine whether or not the shooting was self-inflicted. One hundred and eighty-three cases



(12%) seen at hospital were identified in the folders as definitely not being self-inflicted, and only 5 cases (0.3%) were identified as being self-inflicted (i.e. suicide or unintentional self-injury). In addition, efforts to determine whether the injury was intentional or unintentional were unsuccessful for 99% ( $N = 1\ 458$ ) of the hospital cases in this study.

The majority of firearm-related deaths in the under-19 age group were classified at the time of postmortem as murders (93%,  $N = 298$ ). Males accounted for 79% ( $N = 15$ ) of the 19 suicide firearm victims, with coloured males accounting for 58% ( $N = 11$ ), coloured females 10% ( $N = 2$ ), and white females 10% ( $N = 2$ ) of the total. During this study period there were no black suicide firearm victims under 19 years of age.

Information as to where the child or adolescent was injured was not known in 52% ( $N = 765$ ) of all cases seen at hospital. However, for those cases where the site of injury was known, the most common places were on roads or pavements (76%,  $N = 536$ ) and inside children's own homes (15%,  $N = 102$ ). Details as to the circumstances surrounding injuries that occurred inside homes were not reported in the majority of cases; however examples of details provided in folders include: 'child shot self', 'child was shot by a family member', 'stray bullet from outside hit child' and 'child's house was robbed'.

Several children and adolescents presented at hospital with firearm injuries on more than one occasion. After a check for duplicates it was found that 16 were shot on two different occasions and 3 were shot on three different occasions. Review of the folders revealed that some victims were seen on different occasions for other traumas as well, e.g. stabbing.

### Health services

This study found that approximately 76% ( $N = 1\ 113$ ) of the firearm victims were seen at public sector tertiary hospitals, although firearm-related injuries were seen at all levels of public hospitals. Only one firearm-related case in the under-19 age group was seen at a private sector hospital.

### Results based on police data

Information on police records was obtained from the SAPS, CIMC in Cape Town. Firearm data were only available for the Western Cape as a whole, and were recorded in terms of the following parameters: murder < 12 years, murder 12 - 17 years, attempted murder < 12 years and attempted murder 12 - 17 years.

In total, the police reported that during the period July 1995 - December 1996 there were 89 firearm murders and 340 attempted murders of children and adolescents aged 0 - 18 years.

The total number of murder cases ( $N = 89$ ) recorded by the SAPS for the Western Cape as a whole was compared with numbers of cases recorded in Cape Town metropole mortuary records for victims under 18 years of age ( $N = 111$ ). (Police data were available for 12 - 17-year-olds and under 12-year-olds.) In

13 of the 18 months reviewed the mortuary cases recorded for Cape Town alone were higher than the SAPS reported cases for the entire Western Cape.

### DISCUSSION

This is the first study to obtain an estimate of the numbers and characteristics of firearm-related injuries among children and adolescents in Cape Town.

Injuries that were not included in this study were those seen by private practitioners (including specialists and general practitioners) and district surgeons working in the Cape Town metropole, those seen at health facilities that were not operating a 24-hour service during the study period, and those that did not present to hospitals or the police. It is also possible that cases were missed due to the fact that registers were scanned manually.

This study demonstrated the poor quality of records kept at health facilities, for instance missing registers, illegible, incomplete or destroyed records and lack of detail pertaining to incidents in registers and folders.

Problems were found with mortuary data as well. Of the 22 instances where hospital records indicated that a victim had died and had been sent to a mortuary, only 11 cases were found among the mortuary records. Eight cases were definitely not in the mortuary records, and it was unclear whether 3 of the cases were recorded in the mortuary registers because information was missing with regard to either the name or date of birth.

Police records were found to be inaccurate — this study showed that at least 20% of firearm-related deaths involving persons under 18 years of age were missing from police records. In addition, the police data obtained provided minimal detail about victims and the circumstances surrounding incidents.

In spite of these limitations, firearm-related injuries among children and adolescents in Cape Town were found to have increased substantially in recent years.

As was expected, the review of registers revealed that private sector hospitals see very few firearm-related injuries. Only one firearm injury in the under-19 age group was found for the period 1992 - 1996. The burden of violence-related injuries appears largely to be borne by the public sector.

It was found that children and adolescents presented with firearm injuries at all levels of health facilities in Cape Town, i.e. tertiary, secondary and district. This suggests that health professionals at all levels must be trained in both clinical management and safety education of patients and their parents.

The fact that many injuries occurred inside children's own homes has important implications for policies such as trigger safety locks, enforced safekeeping in the home and other measures to reduce children's access to guns.

The difficulty experienced during this study in obtaining



quality data on trauma-related injuries illustrates a need for the development of adequate information systems. At present adequate injury surveillance does not exist in Cape Town. Only two hospitals reviewed during this study used data collection forms that facilitate a description of specific details regarding the nature of the injury and how it occurred. Most hospital records give minimal information about the nature of the injury.

Furthermore, a uniform data intake form for trauma or casualty units would facilitate links among hospital information systems.

At present there is no system operating in Cape Town to link injuries seen by health professionals with those seen by the police (aside from that for injuries to patients who are implicated in a crime). Improved links would assist in understanding the nature of the problem in the city, and would keep police better informed about where incidents occur, and to whom.

An integrated injury-reporting system for health services in collaboration with pathologists and police (including information on the patient, perpetrator, firearm and environment) would greatly facilitate a better understanding of the nature of the problem, and would be useful in generating information to direct preventive strategies and to target resources to areas of greatest need. Information from this surveillance system would allow for both a more informed public debate and better public policy.

Many research questions about firearm-related injuries among children and youth in South Africa remain unanswered. Gaps in our understanding include the circumstances surrounding injuries and deaths, intent, sources of firearms (e.g. legal or illegal means), types of firearms being used, the economic cost to the public health system, and successful prevention efforts.

Preventing firearm death and injury among children and youth will require a multifaceted approach that incorporates reduced accessibility, improved education among both policymakers and the general public, community-based prevention programmes, improved surveillance and enforcement of appropriate legislation. Implementation of all of these strategies together will undoubtedly make a substantial contribution to preventing firearm injuries among children and youth in the future.

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