Firearm-related injuries in Cape Town children and youth 1992 - 1996

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by

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DECLARATION

I, Alyssa B Wigton, hereby declare that the work on which this thesis is based is my original work (except where acknowledgements indicate otherwise), and that neither the whole work nor any part of it has been, is being, or is to be submitted for another degree in this or any other university.

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Table of Contents — Page Number

Tables

Figures

Appendices

1: Coding sheet for hospital data
2: Data intake form
3: Hospitals included in the study: An overview of registers reviewed and registers missing
4: Missing public sector hospital registers
5: Coding sheet for mortuary data
6: Tables from analyses
Table 10: Children seen at Cape Town public and private sector hospitals, by hospital and year, 1992-1996
Table 11: Children seen at Cape Town public sector hospitals by race and sex, 1992-1996
Table 12: Children seen at hospitals by age, 1992-1996
Table 13: Times children and youth with firearm injuries were admitted to hospital, 1992-1996
Table 14: Time of year injuries occurred hospital data, 1992-1996
Table 15: Places of residence of firearm injury victims hospital data, 1992-1996
Table 16: Classification of injuries as self-inflicted, not self-inflicted, or unknown hospital data, 1992-1996
Table 17: Anatomy code assigned to injuries hospital data, 1992-1996
Table 18: Pathology code assigned to injuries hospital data, 1992-1996
Table 19: AIS code assigned to injuries hospital data, 1992-1996
Table 20: Treatments given for injuries hospital data, 1992-1996
Table 21: Places where injuries occurred hospital data, 1992-1996
Table 22: Total numbers of firearm deaths to persons under 19 years of age as recorded at mortuaries, 1992-1996
Table 23: Victims of firearm injuries, race and sex mortuary data
Table 24: Percent of cases at different ages mortuary data, 1992-1996
Table 25: Percent of total victims that were 13-18 years old by year, 1992-1996 mortuary data
Table 26: Months in which deaths occurred mortuary data, 1992-1996
Table 27: Blood alcohol content of teenage victims (ages 15-18 years) mortuary data, 1992-1996
Table 28: Classification of deaths, mortuary data, 1992-1996
Table 29: Suicide victims, by race and sex, mortuary data, 1992-1996
Table 30: Part of anatomy causing death, mortuary data, 1992-1996
Table 31: Comparison of SAPS data and Mortuary data for murder victims under 18 years of age, July 1995- December 1996

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Summary

This study was commissioned by the South African Medical Research Council as part of funding made available through the National Crime Prevention Strategy (NCPS) which has designated research on the impact of violence against women and children a priority. This is the first study which attempts to obtain an estimate of the numbers and characteristics of firearm-related injuries for the entire population of Cape Town children and youth.

Aim and purpose

The aim of this study was to determine the epidemiological profile of firearm-related injuries among children and youth under 19 years of age in Cape Town during the period 1 January 1992 - 31 December 1996. The purpose of the study was to make recommendations for future research, policies, prevention programmes and surveillance.

Objectives

Specific objectives of the study were to:

1. review what is known about the problem of paediatric firearm-related injuries in South Africa
2. describe current South African and selected international policies relating to firearms
3. determine the epidemiological profile of firearm-related injuries among children in Cape Town during the period 1 January 1992 - 31 December 1996
4. make recommendations for future research on paediatric firearm injuries, policies relating to firearms, prevention programmes and surveillance systems.

Review of the literature

International and local literature were reviewed to understand:

- the epidemiology of violence and firearm injuries
- the severity of firearm injuries

- circumstances surrounding firearm-related incidents in children and youth
- the link between violence and accessibility of weapons
- the link between violence and poverty
- the economic impact of firearm violence
- key factors in the prevention of firearm injuries
- the role of health professionals in preventing firearm injuries
- South African policies.

Summary of results

The total number of Cape Town children and youth who were victims of firearm-related incidents during 1992-1996 was at least 1736, and of these, 322 died (18.5%). Due to problems with data availability and collection, it is probable that some firearm incidents involving children and youth were missed.

Over this period, the incidence of firearm injuries among under 19 year olds almost tripled from 20.6 per 100 000 in 1992 to 59.1 per 100 000 in 1996. The average incidence of firearm injuries among under 19 year olds for the period 1992-1996 was 41.9 per 100 000 person years.

The firearm mortality rate for persons under 19 years of age more than doubled during the period under review from 3.8 per 100 000 in 1992 to 10.1 per 100 000 in 1996.

Preliminary data indicate that the number of young victims continued to increase in 1997.

Results based on mortuary data indicate that homicides from all causes are the most important cause of non-natural death among persons aged 0-18 years in Cape Town, and firearm homicides particularly have been within the top four leading causes of death in this age group for the period 1994-1996.

Data obtained on characteristics of the victims were similar from both hospitals and mortuaries. There were more "Coloured" (mixed-race) male victims than any other race and sex group, and more adolescents were victims than younger children. However, the recent trend appears to be that younger children are increasingly more likely to be shot.

Data also indicate that more incidents happen at night, as the majority of children and youth present at hospital between the hours of 22h00 and 05h00. There was no apparent seasonal pattern; however, this is not surprising in a city with a mild year-round climate such as Cape Town.

Details about area of residence of the victims were only complete for children and youth who died. Key areas over the five year period in which firearm victims lived were Mitchells Plain, Khayelitsha, Guguletu, Bellville South and Elsies River, among others. It is important to note that area of residence does not necessarily indicate the area in which the victim was shot.

Approximately 23% of all teenage victims (aged 15-18 years) who died from firearm wounds had a blood alcohol content of higher than 0,08 grams per 100 millilitres of blood, indicating that they were intoxicated. Information about the blood alcohol content of younger victims who died, as well as persons seen at hospital, was not obtained.

Information on the body part injured was incomplete for most cases seen at hospital; however, the majority of injuries seen appear to have occurred on the limbs (61%), and the head and neck (20%). Those seen at the mortuary were most commonly on the head/neck area (38%), and the chest (28%).

Surprisingly, approximately 79.4% of those injuries seen at hospital (and for which information was available) were classified as moderate or minor. This is particularly unexpected considering that information on the degree of injury severity was obtained mostly from tertiary hospitals.

For the majority of victims seen at hospital it was not possible to determine whether or not the injury was self-inflicted, although it appears that the majority of injuries were not self-inflicted.

However, whether or not the injury was self-inflicted does not necessarily indicate intent. Efforts to determine whether or not the injury was intentional or unintentional were unsuccessful for 99% of the hospital cases in this study.

During the five year period, the majority of deaths were classified as homicides (93%). Classifications of suicides (6%) and "accidental death by firearm" (1%) were few.

Information about where the child or youth was injured was not known in 52% of all cases seen at hospital. However, of those cases for which place of injury was known, the most common places injuries occurred were on the road or pavement (76% of cases) and inside children's own homes (15%).

Other important findings from this study include:

- Nineteen youth presented at hospital on more than one occasion for gunshot wounds.
- *At least* 20% (1 out of 5) of children and youth who were shot during the period were killed or permanently disabled. It is possible that a higher percentage were permanently disabled but this was not possible to determine from the hospital records.
- Police data on murders and attempted murders of children and youth for the time period were poor.
- There are few linkages among hospital, mortuary, and police data systems.

Conclusion

Firearm-related injuries among children and youth in Cape Town have increased substantially in recent years.

The prevention of firearm injuries will require a multi-faceted 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.

Introduction

Background

Recent studies in South Africa have shown that unintentional and intentional injuries are major causes of morbidity and mortality in children (Lerer, Matzopoulos & Bradshaw, 1995; Kibel, Bradshaw & Joubert, 1990; Lerer, Matzopoulos & Phillips, 1997). Within the broad spectrum of injury, firearm injuries are thought to be an emerging problem. However, little is known about the extent of and the factors associated with firearm-related injuries in this country, particularly among children and youth.

This study was commissioned by the Medical Research Council as part of funding made available through the South African National Crime Prevention Strategy (NCPS) which has designated research on the impact of violence against women and children a priority.

Aim and purpose

The aim of this study was to determine the epidemiological profile of firearm-related injuries among children and youth under 19 years of age in Cape Town during the period 1 January 1992 - 31 December 1996. The purpose of the study was to make recommendations for future research, policies, prevention programmes and surveillance systems.

Objectives

Specific objectives of the study were to:

1. review what is known about the problem of paediatric firearm-related injuries in South Africa
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Methods

Approval for this study was obtained from the University of Cape Town's Research and Ethics Committee (reference number 172-98).

Objectives 1 and 2

A review of both South African and international literature from January 1990 to May 1999 was undertaken to describe what is known about the epidemiology of paediatric firearm-related injuries, and to describe local policies and plans relating to firearms. International policies and legislation (and their impacts) were also reviewed, in order to identify potential models for South Africa.

Searches were conducted on published literature through Medline, Popline and Health STAR databases, as well as on paediatric firearm-related articles published in South African newspapers and magazines through the University of the Orange Free State's Institute for Current History. Other "fugitive" or "grey" materials were obtained through independent organisations working on injury, violence, small arms, and firearm issues.

Objective 3

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

Information about the total number of children in the Cape Town metropole was obtained from Metropolitan Information Services, Cape Metropolitan Council and was based on 1991 and 1996 Census data.

Numerator data was obtained through hospital, mortuary and police records as outlined in the following sections.

Collection of hospital data

A list of public and private hospitals serving the Cape Town metropole was obtained from the Department of Health in the Provincial Administration of the Western Cape. From this list, both public and private hospitals in the Cape Town metropole with a 24-hour trauma or casualty unit operating during the study period were identified.

Data on firearm-related cases seen were abstracted from all available hospital registers for the period 1 January 1992- 31 December 1996. Details on the victims' age, sex, race, anatomy injured, and outcome were obtained, and, when possible, additional data on the victims' residence and circumstances surrounding the incident were recorded (See Appendix 1). The names and dates of birth of the children and youth shot were recorded only for the purpose of facilitating comparison of hospital data with mortuary data and to avoid duplication of cases recorded in the study. ICD E-codes were not used because they were too unreliable.

When databases were available (as they were for the three tertiary hospitals -- Red Cross through the Child Accident Prevention Foundation of South Africa, Groote Schuur and Tygerberg), these were utilised instead of reviewing registers. In addition, databases were used at Conradie and Somerset Hospitals in order to obtain information missing from registers, such as date of birth and residence. At some hospitals, individual hospital folders were retrieved when information was missing or unclear in the registers. In many instances, the information not available in the register was also missing in the folder.

All data were captured on a standard intake form, which is the form used by the Red Cross Children's Hospital Trauma Unit (see Appendix 2).

Collection of Mortuary data

As all firearm-related deaths in South Africa require an autopsy, records were abstracted from the two state mortuaries serving the Cape Town metropole -- Salt River Mortuary and Tygerberg Mortuary. For the years 1994-1996, databases have been established for the mortuaries which include information about all cases seen. These databases were

used, but for the period 1992-1993, death registers were reviewed for firearm-related deaths to persons under 19 years of age.

Information was collected on name, sex, race, date of birth, date of death, place of death, cause of death (e.g., suicide or homicide), and blood alcohol content (which, when missing from the death register, was obtained from the Department of Health's Forensic Chemical Laboratory) (see Appendix 5).

As some of the children and youth who were seen in hospitals subsequently died, these cases were linked with mortuary data to avoid duplication.

Police data

Police records of firearm incidents involving children and youth during the time period were obtained from the South African Police Services (SAPS) Crime Information Management Centre in Cape Town. These records were reviewed in an attempt to determine to what extent they corresponded with hospital and mortuary records.

Limitations

Due to personnel and time constraints, it was not possible to review data from private practitioners (including specialists and general practitioners) and district surgeons working in the Cape Town metropole. In addition, Community Health Centres that did not have a 24-hour casualty service were not included. If they became 24-hour during the period of the study, data were collected from the time that they became 24-hour. Therefore any firearm incidents that presented during the day in health facilities that were not operating a 24-hour service have not been included in this study.

Any children with firearm injuries who never presented at hospitals or to the police would also be missed (including minor injuries and non-penetrating firearm incidents such as being threatened with a gun).

Problems with data collection included the following:

- many registers were missing from both the public and private hospitals (see Appendices 3 and 4)
- in most cases, minimal detail about the incident was included in the hospital registries and folders (for example, there was no information regarding the type of weapon used).
- many records were illegible or incomplete
- some records have been destroyed (for example, Red Cross destroys "specialist" cases (such as Trauma) after 3 years if the patient has not returned to the hospital)
- as hospital registers were manually scanned, cases may have been inadvertently missed.

In addition, due to the lack of detail in records and the fact that this study was retrospective, it was not possible to identify which cases were "intentional" as opposed to "unintentional" for the majority of injuries and deaths. When possible, details from records about intentionality have been included.

Finally, it is important to note that the census data used to determine the denominator for all children in Cape Town may be inaccurate.

Analysis

Data was analysed using EPI INFO 6.

A search for duplications in the data was done by:

1. cross-checking names, dates of birth and dates of injury/death within hospital data
2. cross-checking names, dates of birth and dates of injury/death between hospital and mortuary data
3. searching the mortuary database for names when hospital folders indicated that a patient had died
4. searching the hospital database for names when mortuary notes indicated that a patient had come from a particular hospital.

Review of the Literature

The epidemiology of violence and firearm injuries -- South African studies

Several studies conducted in South Africa have examined the extent of intentional and unintentional injuries.

National estimates

Butchart and Peden (1997) report that:

- Non-natural causes of death accounted for 32% of all potential years of life lost in South Africa in 1994 -- the single largest category.
- Violence is the leading cause of fatal injuries in the country -- the 1996 homicide rate of 61 per 100 000 places South Africa among the most violent countries in the world.
- Childhood injury mortality rates in South Africa are some three times higher in South Africa than in the USA.

A national study of childhood deaths in South Africa during the period 1981-1985 found that injury was the leading cause (43%) of death for children between the ages of 5-14 years of age (Kibel, Bradshaw and Joubert, 1990).

Gun Free South Africa (unpublished data) reports that in 1994, 7000 people in South Africa were murdered with guns and 17 700 attempted murders involved guns. In addition, they estimate the number of firearms in the country to be as high as 7 million -- one per every six people in the country. They state that handguns and assault weapons have become the fastest growing cause of violent death in South Africa.

A study by the Institute for Security Studies (1997) found that of the 18 312 murders reported during 1994, 39% were committed using firearms. Then in 1995, guns were used in 40% of all murders, and again in 1996.

According to the South African Police Service, gun use in murders increased to 43% in 1996-97, and 75% of robberies were committed with guns (personal communication with Superintendent Eric Dewey, Pretoria, 20 November 1997).

Cape Town estimates

In 1984, a study by Knobel, deVilliers, Parry & Botha focused on non-natural deaths in children (under the age of 15 years) over a 15 year period in greater Cape Town. This study found that the majority of deaths during 1966-1981 were due to road traffic injuries (n=1767, 54.4%). Other important causes of death during this period were burns (n=417, 12.8%) and drowning (n=356, 11.0%). Assault and abuse were combined, and together accounted for 5.4% (n=175) of non-natural deaths. Homicides by firearm were classified in this category, and occurred only 30 times during the 15 year period. There were also 5 "accidental" deaths by firearm, and 1 suicide by firearm during the period.

A 1994 study by the Medical Research Council (MRC) found that violence and injury accounted for approximately 30% of mortality for all age groups in Cape Town (Lerer, Matzopoulos & Bradshaw, 1995). This same study found that stabbings (52.4%) and firearm homicides (25.8%) were the most frequent causes of death. Within the 15-34 year old age group, firearm homicides were responsible for 29% of homicides. The authors found Cape Town's overall homicide rate to be 68 per 100 000; more than six times higher than the rate in the United States.

A 1994 study by McDonald & Lerer found that both firearm homicides and suicides had been increasing in Cape Town since 1984.

Estimates of other parts of the country

Two major studies of non-fatal injuries in South Africa found Johannesburg to be an even more violent city than Cape Town (Butchart, Nell, Yach et al, 1991; Van der Spuy, Steenkamp, Peden et al, no date). These studies found that 50% of all new cases seen in Johannesburg hospitals were due to intentional injuries while 34% of those seen in Cape Town hospitals were due to intentional injuries.

Butchart & Peden (1997) report that in the Johannesburg study, firearms were used in 13% of injuries, and in Cape Town, only 1.4% of injuries. They also report that a separate study conducted in Durban found that guns were used in the majority of violence-related fatalities (Meumann, Peden, Gouws & van der Spuy, no date).

There is a dearth of scientific research focusing on the problem of gun violence in rural areas of the country. The *Mail & Guardian* newspaper has reported that in rural KwaZulu-Natal, technical expertise in constructing homemade shotguns and pistols is widespread (AJ Venter, 5-11 December 1997: The kraal shotgun: A nifty killer). A police officer interviewed for the story said that "10 or 15 years ago the weapon most likely to be used to settle differences in the rural areas was the knife. Now everyone who hasn't got a gun can get one" (p. 6).

A recent study of gunshot injuries in infants and children under 13 years of age in Durban found that there was a rapid escalation of patients presenting at King Edward VIII Hospital over the period 1983-1995 (Hadley & Mars, 1998). The mean age of injury in patients admitted was 6.4 years and the abdomen was the most frequently injured area. Of the children who survived to reach hospital, 10% died and 11% had lifelong major morbidity.

As these studies show, injuries and violence are an important cause of death in South Africa. Firearms appear to be prominent, but there is no scientific record of the extent to which children and youth in South Africa are affected.

The epidemiology of firearm injuries -- International studies

The international literature on firearm-related violence is vast, and is dominated by studies conducted in the United States, reflecting the epidemic of firearm violence that that country currently faces.

A recent study by the US Centers for Disease Control published in *Morbidity and Mortality Weekly Report* (1997) compared rates of firearm-related death among children under 15 years of age in 26 industrialised countries. The United States was found to have the highest rates of childhood homicide, suicide, and firearm-related death among all the countries. In addition, while the overall annual death rate for US children aged less than 15 years of age declined substantially during 1950-1993 (primarily reflecting decreases in deaths associated with diseases, unintentional injuries and congenital anomalies), childhood homicide rates tripled, and suicide rates quadrupled.

During the period 1986 to 1992 alone, Teret & Baker (1995) report that the homicide rate among youth aged 15-19 years in the United States more than doubled.

Information from other studies that illustrate the American epidemic particularly among youth include:

- Currently, firearms are the second leading cause of death (after motor vehicle injuries) among teenagers aged 15-19 years in the US (American Academy of Pediatrics, 1992).
- Youth aged 16-19 years now have the highest rate of handgun victimisation among all age groups (O'Donnell, 1995).
- Across all race groups, firearms are involved in 70% of teen homicides and 63% of teen suicides (AAP, 1992).
- Young African American males are particularly vulnerable. In 1990, firearms were involved in 91% of homicides and suicides among 15-19 year old black males, and 85.2% among 10-14 year old black males (Fingerhut, 1993).
- An American child dies of gunshot wounds every 1 1/2 hours, and every two days 30 children--the equivalent of a school classroom--lose their lives to guns (Powell, Sheehan & Christoffel, 1996).

Clearly, firearm violence is a public health emergency in the United States.

In striking contrast to the situation in the US, nations such as Japan, Great Britain, Sweden, Australia, Israel and Switzerland report low rates of deaths by handguns. One commonality of these countries is strict handgun laws (Schetky, 1985). Findings from a study on international firearm ownership rates illustrate the relationship between an abundancy of guns and high homicide rates (see Table 1).

Table 1: International firearm ownership and homicide rates
(Source: Canadian Department of Justice, 1995)

Country	Firearm ownership rate per 100 000 population	Homicide rate per 100 000 population
Japan	414	1.2
Britain	3 307	1.3
Switzerland	42 857	1.5
Australia	19 444	1.8
Canada	24 139	2.2
New Zealand	29 412	2.6
France	22.6% of households	4.9
United States	85 395	9.3

In 1997, the United Nations convened a *Panel of Government Experts on Small Arms.* This Panel concluded that some of the commonalities among regions affected by violence include:

- There is a link between the availability of weapons, trafficking in drugs and arms, and the level of violence.
- The crime and violence arising from the availability of small arms and light weapons have made it more difficult to conduct development projects and programmes that address the root causes of conflict.
- Where a culture of weapons exists, it may be more easily transformed into a culture of violence, particularly when tension escalates due to the root causes of conflict.
- In some regions, young people are often the victims and perpetrators of violence, particularly where high unemployment and political hostilities exist. They are easily recruited and indoctrinated into violent groups and are more likely to follow a path of violence, even when political hostilities cease.
- National efforts to address excessive and destabilising accumulations of small arms are often insufficient owing to the magnitude of the problem and scarce resources. In many instances, multilateral and regional efforts have been undertaken, which have been shown to be successful.
- In some regions, drug control efforts have increased the demand for small arms and light weapons by both the law enforcement authorities and drug traffickers, thereby raising the level of violence.

Severity of firearm injuries

The American Academy of Pediatrics (1992) has estimated that for each firearm fatality in the United States there are at least 5 non-fatal injuries.

A study of patterns of penetrating trauma by Crandall, Olson, Fullerton et al (1997) found that rates of non-fatal injuries for firearms and stabbing were similar (firearm, 34.3 per 100,000 person-years; stabbing, 35.1). However, rates of fatal injury were significantly different (firearm, 21.9; stabbing, 2.7; relative risk: 8.2; 95% confidence interval: 5.4, 12.5).

Nance, Templeton & O'Neill (1994) conducted a study at Children's Hospital of Philadelphia during which they reviewed 139 cases of gunshot wounds in patients under 17 years of age seen at the hospital between 1986 and 1992. This study found that the average hospital stay was 5.6 $\pm$ 8.5 days. There were 11 deaths (7.9%) with head injuries the most common cause (20.6%). The extremities were the most commonly injured area (41%), but gunshot wounds to the abdomen were the most likely to require operative intervention (85.7%).

Circumstances surrounding firearm-related incidents in children and youth

Children

Children are a unique group at risk of injury because of their immaturity, curiosity and imitative behaviour (Keck, Istre, Coury et al, 1988). As Schetky (1985) has reported, injuries among children are usually unintentional and related to the fact that they did not realise the gun was real or lethal. A later study by Nance, Templeton & O'Neill (1994) confirmed this with their study of paediatric gunshot wounds in Philadelphia, in which 73.4% of the children were injured unintentionally. About 20% of these were children who either shot themselves or were shot by friends; usually the gun was found and the child did not realise the weapon was loaded or real.

In South Africa, a 1995 study of firearm injuries seen at Red Cross Children's Hospital found that almost one-third of injuries occurred inside the children's own home (Child Accident Prevention Foundation of South Africa, 1996).

Although a thorough literature search was not conducted on the relationship between violence and the media, the American Academy of Pediatrics (1995) reports that several studies have found links between violence in the media and violence in society. In addition, the AAP states that "media violence may: 1) facilitate aggressive and antisocial behavior; 2) desensitize viewers to future violence; and 3) increase viewers' perceptions that they are living in a mean and dangerous world".

Hardy, Armstrong, Martin et al (1996) conducted a study to compare pre-school children's play and aggressive behaviour with firearms before and after an information-based

intervention. Subjects were videotaped for 10 minutes in a structured play setting, in which they had access to a variety of toys and to real and toy guns. One child from each dyad was then exposed to an information-based intervention and told not to play with guns. The children were again videotaped in the same setting approximately 1 week later. Results indicated that the intervention was ineffective in modifying the behaviour of the children. Analyses revealed that access to a parent's firearm was correlated with gun play and that gun play and handling of firearms in the home were correlated with aggressive behaviour. The findings in this study suggest that information provision alone is an insufficient intervention.

In a US study, Naureckas, Galanter, Naureckas et al (1995) found that many young children are strong enough to fire many of the handguns that are now in circulation. They report that 25% of 3- to 4-year-olds, 70% of 5- to 6-year-olds, and 90% of 7- to 8-year-olds have a two-finger trigger-pull strength of at least 10 pounds (22 kilograms). Of the 64 different types of handguns reviewed for this study, the vast majority (92.5%) require a trigger-pull strength of less than 10 pounds; 62.5% only require a trigger-pull strength of less than 5 lb.

Although the technology to child-proof guns has been in existence for more than 100 years, Teret & Baker (1995) report that it has rarely been used.

These studies show that firearm incidents involving children often are unintentional and occur in children's own homes. This is in part due to the fact that even young children have the strength to operate a gun and many guns do not have child-proof mechanisms.

Youth

It is commonly believed that most teenage homicides are related to crime, gang activity or premeditated assault. However, the Centers for Disease Control (1986) has reported that the majority of youth shootings in the US are committed by friends or relatives, typically precipitated by an argument. The CDC reports that such shootings are usually "impulsive, unplanned and instantly regretted."

Another study of gun injuries conducted in the US state of Washington found that when a youth fatally fired a gun at home, the victim was most often the youth (35%), a friend (34%), a sibling (25%) or a parent or other relative (6%) (Tanz, 1989).

Risk factors for firearm death are indeed related to age, as rates of firearm violence peak between the ages of 15 to 24 years, and decrease in young adulthood (25-34 years) (American Academy of Pediatrics, 1992). Therefore, special characteristics of adolescent development must be considered in designing effective counter-measures to prevent injury and death. This idea has been explored in the context of gangs by Pinnock (1996), a researcher at the UCT Institute of Criminology. He suggests that youth gangs serve an important function in providing a "rite of passage" from childhood to adulthood, and that we should try to understand how this occurs in order to develop a better social support and justice system for teenagers.

An article on gangs in the Cape Flats that appeared in *The Sunday Independent* (H Friedman: 22 Feb 1998, "How gangs tore out a community's heart") concluded that "Gangs provide glamour, status and a road to respect seemingly beyond reach through conventional behaviour" for many teenagers.

On the other hand, one study conducted on middle school students in the US found that fear was a major reason that many of these students decided to carry a lethal weapon to school (Arria, Borges & Anthony, 1997).

Gaining an understanding of the behavioural patterns of children and adolescents will provide an indication of which types of intervention strategies are most likely to succeed (Steenkamp & van der Spuy, 1996).

The link between violence and accessibility of weapons

> *"The proliferation of small arms and light weapons affects the intensity and duration of violence and encourages militancy rather than a peaceful resolution of unsettled differences. Perhaps most grievously, we see a vicious circle in which insecurity leads to a higher demand for weapons, which itself breeds still greater insecurity...."*
>
> - *United Nations Report of the Panel of Governmental Experts on Small Arms* (1997)

Numerous studies have documented the fact that an increased accessibility to firearms puts a person at greater risk of firearm injury, whether it be homicide, suicide, or unintentional injury. Almost 15 years ago, Christoffel and Christoffel (1986) reported firearm violence to be a major cause of morbidity and mortality in American society, particularly among young people, and concluded that the best way to reduce these types of injuries is to make handguns less available. After finding a "striking rise" in gun-related homicides between the 1960s and the 1980s (p. 75), the authors state that although "handgun control cannot reduce rates of crime or interpersonal assault, ...it can be expected to reduce the frequency and severity of injury which grows out of these situations, to levels closer to the much lower ones found in other countries" (p. 80).

Another 1986 study that appeared in the *New England Journal of Medicine* found that a gun in the home is 43 times more likely to kill a family member or friend than to be used in self defence (Kellermann & Reay). Another study found that the accessibility to firearms is associated with a 4.8-fold risk of suicide (Kellermann, Rivara, Somes, et al, 1994).

Nance, Templeton & O'Neill (1994) attribute the increase in paediatric gunshot wounds they found in a Philadelphia population to ease of access to firearms and the constant exposure of youths to violent behaviour. They state that efforts are needed to prevent injuries through behavioural/educational modification and national efforts at firearm restriction.

Florida, USA was the first state to pass a law requiring that guns present in the home be safely secured through either safe storage facilities or trigger locks. The National Center for Health Statistics reported that the results of this law were dramatic -- unintentional

shooting deaths dropped by more than 50% in the first year (Physicians for Social Responsibility, 1997).

Another technology that is available allows one to personalise handguns so that no one else can use them, much like cellular phones are personalised. This includes high technology electric or magnetic sensory mechanisms, or the perhaps more practical low technology combination locks (Teret & Baker, 1995). It should be noted that although this technology is promising, it has not yet been shown to be practical in application to guns.

The link between violence and poverty

Violence is linked closely to poverty. Lerer (1997) has reported that "there is ample evidence from both developed and developing countries that levels of non-natural death are a good indicator of socio-economic disparity between urban dwellers" (p. 283). A 1997 study conducted by the MRC found that the poorer suburbs of Cape Town accounted for over 3/4 of all deaths due to homicide and transportation accidents (Lerer, Matzopoulous & Phillips).

In the US, Nance, Templeton & O'Neill (1994) have reported that there is a fivefold increase in homicides and a 2.6 fold increase in accidental death in children from low-income families in the US.

In 1993, a report by the South African Goldstone Commission of Inquiry observed that there is a strong connection between crime and conditions of poverty and deprivation. Another study by the Institute for Security Studies found that than the poor bear the brunt of violent crime more than anyone else (Louw & Shaw, 1997).

The economic impact of firearm violence

Estimates of the costs of firearm violence show that it poses a serious economic problem and is a substantial drain on health care providers and their resources (Nance, Templeton & O'Neill, 1994; Buechter, Wright & Maher 1997).

In a US study, researchers calculated the costs of firearm-related injuries at a university trauma centre (Kizer, Vassar, Harry & Layton, 1995). The authors estimate that if the costs produced at this institution were extrapolated to the entire nation, the actual cost of providing medical care for firearm-related injuries in the United States would have been $4.0 billion in 1995.

Zavoski, Lapidus, Lerer et al (1995) estimated that the total cost of firearm-related hospitalisations averaged $864,000 per year for the state of Connecticut during the period 1986 through 1990.

In another US study which included data from 44 acute care children's hospitals, the average hospital charges alone for treating a child wounded by gunfire were more than $14 000 (Allen, 1993). This figure did not include other fees such as the cost of rehabilitation services.

Finally, Miller and Cohen (1996) estimate that in the US:

- costs for child gunshot victim average $3 million per fatality and nearly $390 000 per hospitalised survivor and
- lifetime medical costs for the average child hospitalised with a nonfatal gunshot wound exceed $27 000. Medical costs for some paralysed or brain-damaged victims exceed $1 million.

Clearly, the treatment of firearm injuries consumes a substantial amount of health resources.

Key factors in the prevention of firearm injuries

Hypotheses on the most appropriate ways to respond to the epidemic of firearm injuries are diverse.

The South African Gunowners Association promotes gun safety training (personal communication: Advocate John Welch, 21 November 1997). Although this should indeed form part of a national response to the epidemic, Christoffel (1991) states that there is

little evidence currently to support the effectiveness of this approach on its own, particularly among teenagers.

Others have stressed the importance of improving policing. However, as Batchelor illustrates (1996), better policing will mean more than simply increasing the numbers of police on the streets. He states that between 1984 and 1995, the South African police budget grew more than twice as fast as the rest of the national budget, and the police force increased from 47 000 to approximately 115 000. Despite these increases, crime levels continued to rise, demonstrating that an increased budget does not necessarily represent a solution to the crime problem. He states that some of the problems are that 87% of all police stations are located in traditionally white areas, and that current systems for the collection and management of crime information are "still totally inadequate, and severely limit the ability of the police to deliver an effective service" (p. 2).

Batchelor recommends strategies such as community policing, strengthening the relationship between the police and the communities they serve, and a re-distribution of police resources from traditionally white areas to townships, former homelands, and under-resourced provinces. Indeed, although Elsies River was recently described as "virtually unpoliceable" by Western Cape Police Commissioner Leon Wessels, the Cape Argus subsequently reported a weekend free of gang crime due to a new police action plan and the co-operation of residents (N Joseph: March 10, 1998, "Elsies River joins hands to beat the gangs." *Cape Argus*).

Batchelor (1996, p. 2) states that crime is "primarily a socio-economic problem...therefore the alleviation of poverty, job creation, and improved social and economic justice are important prerequisites for combating crime".

Lerer (1997, p. 284) concurs when he states that "[w]hile law enforcement is an important component of crime and violence control, it has to be sustainable and subsidiary to programmes designed to uplift communities and address the determinants of violent behaviour". This philosophy is also followed by Butchart and Peden (1997, p. 214) who state that "[c]ontemporary approaches to crime and violence prevention emphasise the need for multi-disciplinary interventions that focus upon prevention in addition to the criminal justice responses."

Widome (1991) stresses that the "three Es" -- education, engineering (of products) and enforcement (of legislation) -- should be employed as a framework for prevention of childhood injury. This approach has been followed in Sweden, where Bergman & Rivara (1991) reported that key reasons that the country has the lowest childhood injury rates in the world were the implementation of trauma surveillance systems and injury prevention research, ensuring safer environments and products through legislation and regulation, and a broad-based safety education campaign using coalitions of existing groups.

Following their study of gang-related homicides in Los Angeles County, Hutson, Anglin, Kyriacou et al (1995) concluded that to prevent gang violence, the root causes of violent street gang formation must be alleviated, the cycle of violent street gang involvement must be broken, and access to firearms must be limited.

As these studies illustrate, preventing firearm death and injury among children and youth will require a multifaceted approach, which should include, among other efforts, strategies to:

- eliminate guns from the environment of children and youth
- educate families on how to create a gun-safe home environment
- inform about the dangers of guns in school curricula
- limit involvement of youth in criminal and gang activities.

The role of health professionals in preventing firearm injuries

Health professionals have a special role to play in advocating for enforcement of appropriate gun legislation, as well as in educating families with children and adolescents (Mitka, 1998; Webster, Wilson, Duggan & Pakula, 1992; Senturia, Christoffel & Donovan, 1996; Johnson, 1997).

A national survey conducted by the American Academy of Pedatrics questioned 982 paediatricians on 4 areas: (1) recent experience treating gun injuries, (2) attitudes toward legislation to reduce the availability of guns, (3) attitudes toward gun safety counselling by paediatricians, and (4) current gun safety counselling practices (Olson, Christoffel & O'Connor, 1997).

This study found that 92.5% of paediatricians supported restricting the sale and possession of handguns. Seventy-six percent supported banning the sale or possession of handguns. In addition, the majority of respondents (82%) believed that patient education on firearm safety could reduce injury and death, 95% supported asking parents to unload and lock firearms in their homes, and 66% supported encouraging parents to remove handguns from the home.

The authors conclude practicing paediatricians overwhelmingly agree that handguns in the home are hazardous and that steps should be taken to reduce this hazard through legislation and patient counselling. However, a substantial lag between attitudes that favour counselling about firearms and reported practices indicates the need for further training in and evaluation of firearm counselling in office settings.

Webster, Wilson, Duggan & Pakula (1992) make several suggestions about how healthworkers can counsel parents about firearms, including the following:

1. Approach firearm injury prevention from the perspective of an expert on child development and behaviour and discuss the elevated risks to curious children.
2. Explain risks associated with keeping guns in the home, but avoid being too directive in advice on removing guns from the home.
3. Incorporate firearm injury prevention counselling into broader discussions of home safety.

The South African response

South Africa's primary legislation relating to firearms is the *Arms and Ammunition Act (75-1969)*. There are also several *Regulations on the Act (No. 15652, 26 April 1994)*. Among other provisions, this law states that:

- The minimum age required in order to apply for a gun license is 16 years.
- When a firearm is in the home, it must be kept in a prescribed safe or on the person "under their direct control".

- Permits for guns have a limited life and are not transferable (e.g., through inheritance or purchase). However, there is a provision that states you are permitted to "loan" your gun to someone for 14 days or less.
- Firearms need not be concealed on your person.
- There is no limit on the number of firearms one person can own.

The National Crime Prevention Strategy (NCPS) is a recent project of the national government. The NCPS has four main focus areas:

1. reforming the criminal justice system
2. changing public values and attitudes
3. changing the environmental design of communities, to strengthen social networks and cohesiveness
4. decreasing transnational crime.

One priority aim of the NCPS is to reduce crimes against women and children. Also at the national level, the Ministry of Safety and Security has developed proposals for control of both legal and illegal firearms. Four initiatives were recently undertaken:

1. Civilian Commission of Inquiry into alleged corruption in the Central Firearms Registry (the report from this commission is based on a study of illegal licensing and is not available to the public)
2. National Firearm Policy Committee (this report was released to the public in August 1997 and focused on developing recommendations for tighter legislation for licensing, such as increasing the minimum legal age for purchasing a gun, improving injury surveillance, and improving the Central Firearms Registry)
3. Joint Investigation Team (including representatives from both the South African Policy Service and the South African National Defence Force to recover illegal weapons in the country)
4. National Firearm Plan (a comprehensive plan on firearms that was released to the public in November 1997 and incorporates the findings and recommendations of the three other committees. Key issues covered in this plan include stopping the inflow of illegal arms to South Africa, preventing legal arms from becoming illegal (i.e., through theft), improving statistics and reporting, conducting special surveys, and mobilising public support such as through programmes for youth, firearm safety and education).

Results

Results based on hospital data

In total, there were 13 public hospitals (3 tertiary, 4 secondary, 2 district and 4 Community Health Centres) and 8 private hospitals that were operating a 24-hour trauma or casualty service during the period:

- Groote Schuur, Red Cross War Memorial Children's and Tygerberg Hospitals (tertiary level)
- Conradie, Hottentots Holland, Somerset and Victoria (secondary level)
- False Bay and Wesfleur (district level)
- Elsies River, Hanover Park, Khayelitsha, Mitchells Plain (community health centres)
- Citipark, Constantiaberg, Durbanville, Gatesville, Milnerton MediClinic, N1 City, Wynberg (private hospitals).

Access to 2 Military Hospital's records was not granted so it was not possible to collect data from that hospital for this study.[1]

Numerous registers were missing from these hospitals (see Appendices 3 and 4), and therefore it is assumed that some firearm-related injuries have been missed.

Table 2: Children presenting with firearm-related injuries at Cape Town hospitals, 1992-1996

	1992	1993	1994	1995	1996	Total
Total presenting	142	204	257	443	421	1467

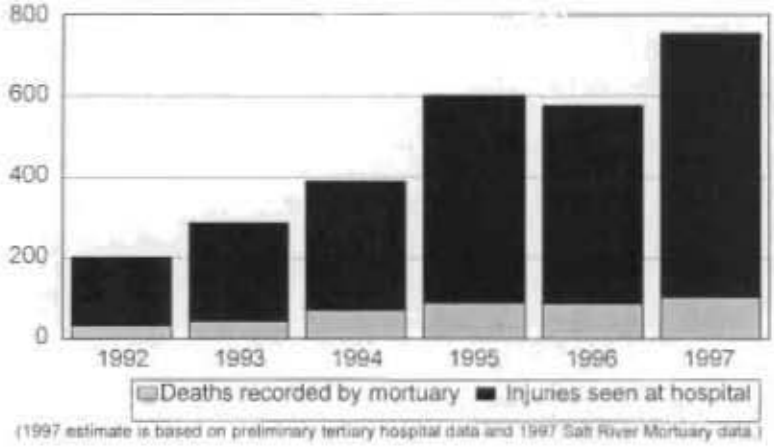
As shown in Table 2, over the period, there is a clear increase in children presenting at hospital for firearm-related injuries, totalling 1436 cases from 1992-1996.[2] However, between 1995 and 1996 there appears to be a levelling off of injuries. Preliminary data obtained from the three tertiary hospitals (which, on average, accounted for 90% of firearm cases seen per year over the 1992-1996 period) indicate that a major increase occurs again in 1997. This is illustrated along with an increase in mortuary cases in 1997 in Figure 1.

[1] This hospital primarily serves military personnel and their families.

Table 10 in Appendix 6 shows which hospitals saw the firearm cases by year. As was expected, the review of registers revealed that private sector hospitals see very few firearm-related injuries. Although a few adult firearm cases were obtained from the registers of the private hospitals (notably Citipark and N1 City), only one firearm injury in the under 19 year old age group was found for the period 1992-1996 (at N1 City Hospital in 1994). Overall, it is clear that private hospitals generally see far fewer cases of all violence-related injuries than public hospitals.

Figure 1: Total number shot, 1992-1997

Cape Town children and youth < 19 years (n=1736)



Data from hospital records were analysed by the following characteristics:

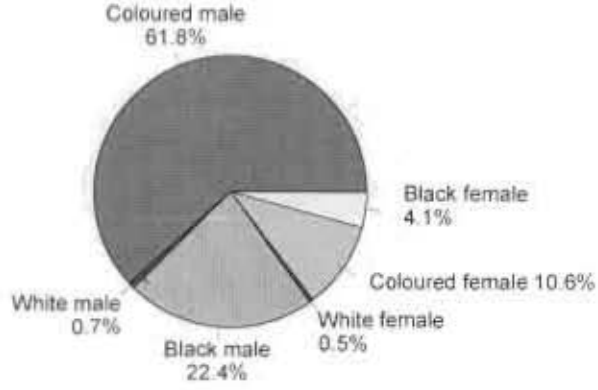
- race and sex of victim
- age of victim
- time of day victim presented at hospital
- time of year injury occurred
- area of residence of victim
- whether or not the injury was self-inflicted
- the anatomy injured, pathology of the injury, and treatment given
- places where the injury occurred
- other information obtained from the folder.

[7]Children and youth recorded in both hospital and mortuary registers have been counted once as deaths.

Race/sex

Figure 2 illustrates that the majority of children and youth victimised by firearm violence are coloured males (n=906, 61.8%). Black males are the next highest affected group, representing 22.4% of those injured or killed during the period (n=328).

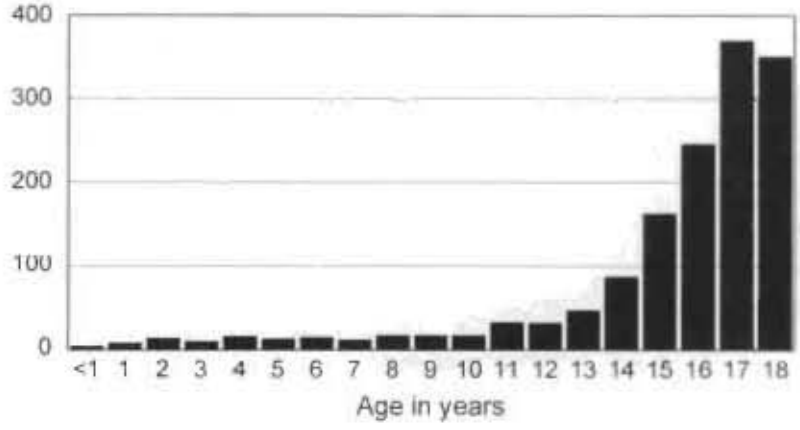
Figure 2: Children and youth presenting at hospital with firearm-related injuries, 1992-1996 by race/sex (n=1467)



Age

Figure 3 illustrates that older children are more likely to present at hospital than younger children.

Figure 3: Profile of children seen at hospital for firearm injuries by age (n=1467), 1992-1996

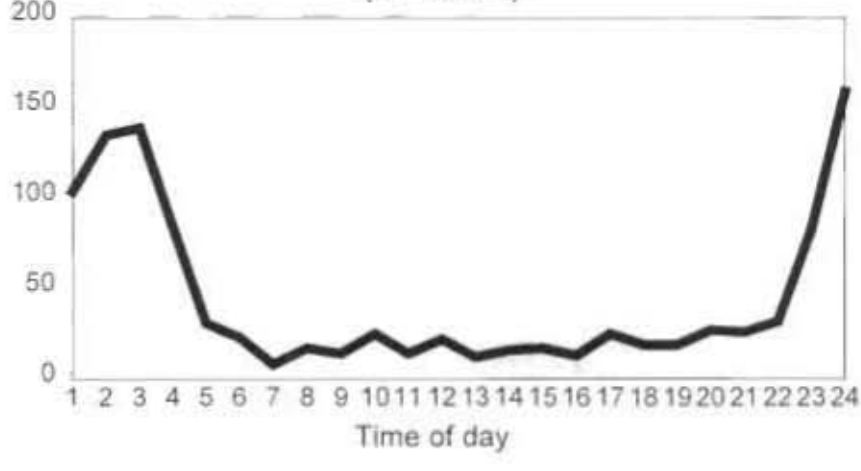


Time presenting at hospital

Hospital data were also analysed for the time of day that children with firearm-related injuries presented. As Figure 4 shows, firearm victims are much more likely to present between 22h00 in the evening and 05h00 in the morning. Cases presenting during these times represented 52% of total cases seen (n=767). (It was not possible to tell what time children and youth presented for about 27% of the total hospital cases.) A possible explanation for the patterns seen in this figure is that injury risk or exposure is mostly governed by the child's prevailing routine, with peak risk being outside of school hours and on weekends.

Unfortunately, only Red Cross Children's Hospital (n=146, 10% of total cases) collected information about time of injury as opposed to time presenting. This data set was considered to be too small to analyse.

Figure 4: Children presenting at hospital by time of day, 1992-1996 (n=1064)

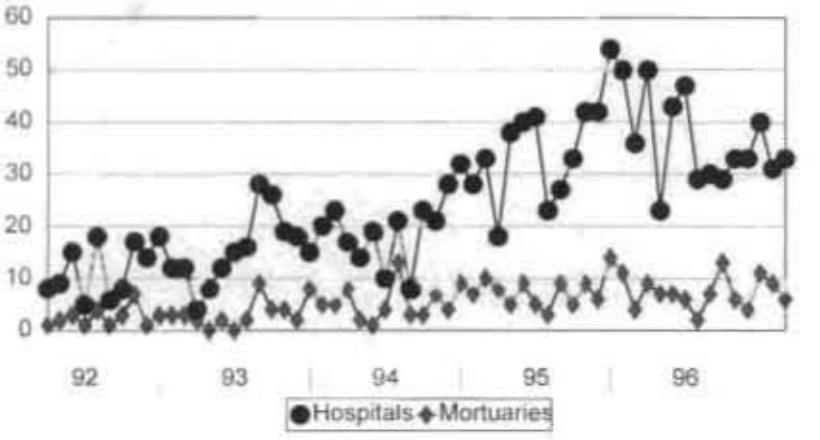


Time of year

Figure 5 shows that, over the five year period, neither firearm-related injuries seen at hospital nor deaths recorded in mortuary records had consistent seasonal patterns. During the winter months of May and June over the period 1992-1994, there were surprisingly sharp increases in both injuries and deaths. However, this pattern was not as clear in subsequent years. A particularly high number of firearm-related injuries occurred

during the summer of 1995-1996, and the highest number of deaths appear to have happened around the time of the first democratic elections (April 1994).

Figure 5: Firearm injuries and deaths, by month
1992-1996 (n=1436)



Area of residence

For 59% (n= 864) of the total cases presenting with firearm related wounds at hospital, it was not possible to determine the area of residence. This is largely due to the fact that information about area of residence was not provided from Groote Schuur Hospital (which saw approximately 50% of total cases). Information about area of residence was complete for the mortuary data, and is presented in that section.

Self-inflicted

Although attempts were made to determine whether or not the shooting was self-inflicted, for the vast majority of cases, it was not possible to determine this from hospital folders (n=1279, 87%). There were 183 cases (12%) seen at hospital that were identified in the folders as definitely not self-inflicted and only 5 cases (0.3%) that were identified as self-inflicted (i.e., suicide or unintentional self-injury). However, if the situation in Cape Town reflects the situation internationally, it can be assumed that many young children unintentionally injure themselves when "playing" with guns.

Information about the injury

Data on the part of anatomy injured, the pathology of the injury, the Abbreviated Injury Score and treatment of the injury were obtained for some of the cases.

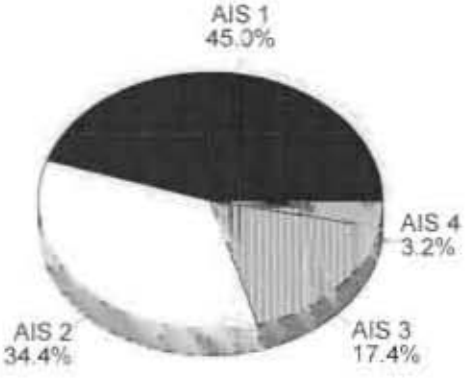
Anatomy injured was described in 497 (34%) of hospital cases. For these cases, the most commonly injured body parts were the limbs (n=303, 60%), and head and neck (n=98, 20%). Injuries to the thigh, abdomen and spine occurred in 16%, 13%, and 3% of cases respectively.

At least 14% (n=71) of the children seen at hospital were injured on more than one part of the body.

Pathology was described in only 268 (18%) of all hospital cases. Although "other" pathology was indicated in 16% of these cases, the most frequent pathologies indicated were simple and complicated lacerations (n=75, 28%), avulsion/amputation (n=55, 21%), and fractures (n=53, 20%).

The Abbreviated Injury Score (AIS) was available for only 282 (19%) of cases seen at hospital, and these figures came primarily from Red Cross Children's and Groote Schuur Hospitals (both tertiary level facilities) (see Figure 6). Abbreviated Injury Scores range from 1 (minor), 2 (moderate), 3 (severe/extensive), and 4 (mortal). Again, as these figures are based only on cases presenting at tertiary facilities, they must be interpreted with caution.

Figure 6: AIS Scores for firearm victims seen at hospital, 1992-1996
(Groote Schuur and Red Cross data)



Information about treatments given were available on 300 (20%) of hospital cases. Of these, dressing was provided to 30% of patients (n=91), open operation was performed on 22% (n=66), suture on 10% (n=29), and advice and medicine only was provided to 9% (n=26). Twenty-four percent of patients (n=72) received "other" treatment, although this was not defined.

Intent

Attempts were made to determine whether or not the firearm incident was intentional or unintentional; however, for almost all cases (n=1458, 99%), it was not possible to do so based on hospital records alone.

Places injured

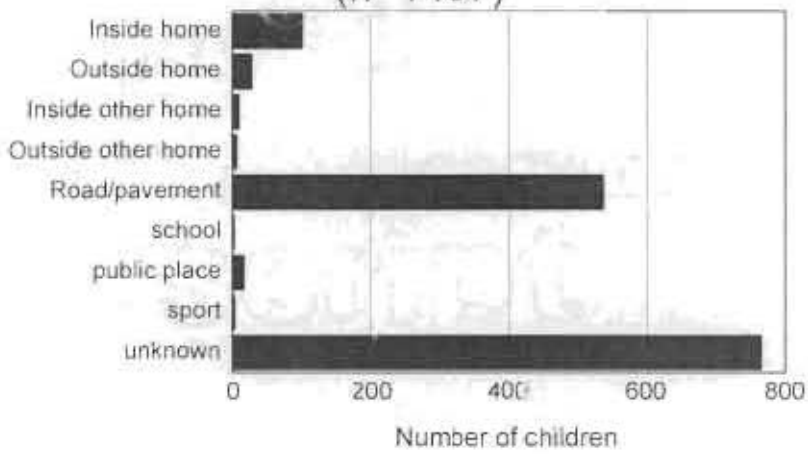
Figure 7 shows the places where children and youth were injured. Although the place of injury was unknown in 52% of cases (n=765), of those cases for which place of injury was known, by far the most common places injuries occurred were on the road/pavement (n=536, 76%) and inside children's own homes (n=102, 15%). Details on the circumstances surrounding injuries that occurred inside homes were not reported for the majority of cases; however, some examples of what happened include:

- child shot self
- child was shot by a family member
- stray bullet from outside hit child
- child's house was robbed.

Twenty percent of the 102 children who were shot inside their homes were less than 10 years of age; 26% were less than 13 years of age. Due to the large percentage of "unknown" places of injury in the study, it is possible that this figure is higher.

Of the children shot on the road/pavement, 10% were less than 13 years of age.

Figure 7: Places injuries occurred, 1992-1996 for children seen at hospital (n=1467)



There were at least three children in the study who were shot at school. Again, it is possible that there were more cases than were apparent from hospital records.

During 1992-1996, hospital records indicated that at least 15 children and youth were shot by the police.[3] As Table 3 shows, the majority of these cases involved teenagers who the police reported to be involved in illegal activities. However, the fact that several very young children were shot is surprising; as is the part of anatomy that was injured during these incidents (i.e., injuries on the neck, face, and spine would be expected to be more severe than injuries on the extremities).

Table 3: Examples of shooting incidents of children and youth by the police, 1992-1996

Victim's age and sex	Year during which injury occurred	Area of residence	Anatomy injured	Other information provided
2 year old female	1993	Mitchells Plain	thigh	police shot at crowd
7 year old male	1992	Manenberg	arm	shot while running in the road
9 year old male	1995	Nyanga	neck	Shot while housebreaking
14 year old male	1995	Retreat	face	shot while breaking into clinic
14 year old male	1996	Ottery	neck	Shot while housebreaking
15 year old male	1994	Ottery	calf	(no information provided)
15 year old female	1994	Retreat	buttock	police shot at crowd
16 year old male	1996	Muizenberg	foot	in police custody
17 year old male	1996	Guguletu	shoulder	shot during robbery

[3] As the circumstances surrounding the incidents are unknown for the majority of cases in the study, it is possible that this number may be higher as well.

Victim's age and sex	Year during which injury occurred	Area of residence	Anatomy injured	Other information provided
17 year old male	1993	Khayelitsha	back	died
17 year old male	1994	Retreat	calf	Attempted to escape from police
18 year old male	1992	unknown	spine	shot during robbery
18 year old male	1994	Guguletu	unknown	in police custody
18 year old male	1992	Guguletu	foot	in police custody

Repeat trauma visits

Several children and youth presented at hospital with firearm injuries on different occasions. After hospital folders were checked to make sure that there was not a duplicate case recorded, it was found that 19 youth were shot on two different occasions, three of these were shot on three different occasions. Some of these children were seen at Trauma Units on different occasions for other trauma as well (e.g., stabbing).

Victims seen at Conradie Hospital's Spinal Clinic

Conradie Hospital provides the only Spinal Clinic at a Cape Town public sector hospital. During the study period, this Spinal Clinic saw 26 children and youth under 19 years of age who were injured in firearm incidents. Although the residences of all of these children (except for one) indicated that they were living in the Cape Town metropole, most of these children were not included in the study because it was not possible to determine when (and where) they had been shot.

Results based on mortuary data

Information about firearm-related deaths to children and youth under 19 years of age was obtained from the two medico-legal laboratories (state mortuaries) located in Cape Town: Salt River Mortuary and Tygerberg Mortuary.

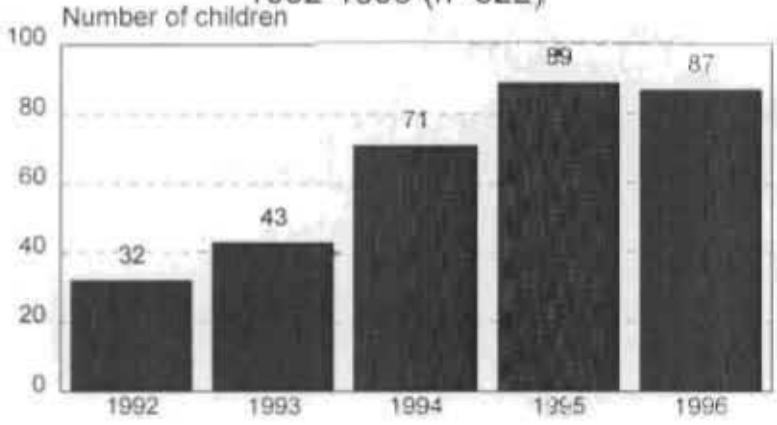
Mortuary data were analysed by the following characteristics:

- all causes of death for persons under 19 years of age
- race and sex
- age
- time of year
- area of residence

- blood alcohol content (only analysed for victims ages 15-18 years)
- classification of death
- anatomy injured

The total number of children and youth under 19 years of age classified as having died due to firearm-related wounds during the period 1992 - 1996 in Cape Town was 322. Figure 8 shows the trend over the five year period.

Figure 8: Total number of firearm deaths to persons under 19 years of age
1992-1996 (n=322)



As was true with hospital data, mortuary data appear to show that the numbers of firearm-related incidents stabilised between 1995-1996. However, data from Salt River Mortuary for 1997 indicate that the number of children and youth under 19 years of age increased by 18% from the previous year. (A projected estimate for 1997 is included in Figure 1 on page 25.)

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 deaths at the mortuaries among children and youth under 19 years of age (see Tables 4, 5 and 6 below).

These tables show that in 1994, firearm injuries *by homicide* were the fourth most common cause of death (n=64, 6%); in 1995, they were the second most common cause of death (n=82, 5%); and in 1996, they were the third most common cause of death (n=84, 7.5%).

During these years, homicides from all causes rose from 18% of deaths to persons under 19 years of age in 1994 (n=200), to 20% in 1996 (n=221).

For persons 19 years of age or older during this same period, firearms were responsible for 23% (n=371), 29% (n=544), and 30% (n=582) of all homicides in 1994, 1995 and 1996 respectively.

Table 4: Causes of non-natural death for under 19 year olds, Cape Town, 1994

Cause of Death as Indicated by Pathologist	Number of Cases	Percent of Total Cases
MVA (pedestrian)	146	13.3%
Homicide by sharp instrument	79	7.2%
Unintentional by fire	78	7.1%
Homicide by firearm	64	5.8%
Unintentional by drowning	38	3.5%
MVA (passenger)	27	2.5%
Homicide by blunt instrument	16	1.5%
Suicide by all methods	15	1.4%
Homicide by strangulation	14	1.3%
Homicide by child battery	12	1.1%
Railway	12	1.1%
Homicide by undetermined causes	10	.9%
Homicide by legal intervention	5	.8%
MVA (driver)	2	2%
Other causes	642	58.5%
TOTAL	1096	100.0%[4]

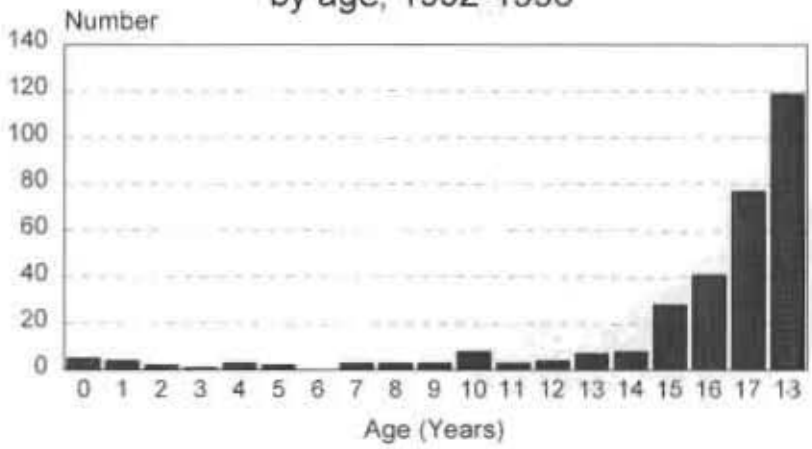
Table 5: Causes of non-natural death for < 19 year olds in Cape Town, 1995

Cause of Death as Indicated by Pathologist	Number of Cases	Percent of Total Cases
MVA (pedestrian)	132	7.7%
Homicide by firearm	82	4.8%
Homicide by sharp instrument	77	4.5%
Unintentional by fire	48	2.8%
Unintentional by drowning	29	1.7%
MVA (passenger)	26	1.5%
Suicide by all methods	25	1.5%
Homicide by blunt instrument	18	1.0%
Railway	15	0.9%
Homicide by child battery	8	0.5%
MVA (driver)	6	0.3%
Homicide by strangulation	6	0.3%
Homicide by legal intervention	2	0.1%
Other causes	1248	72.5%
TOTAL	1722	100.0%

[4]Percentages do not always add up to 100% due to rounding.

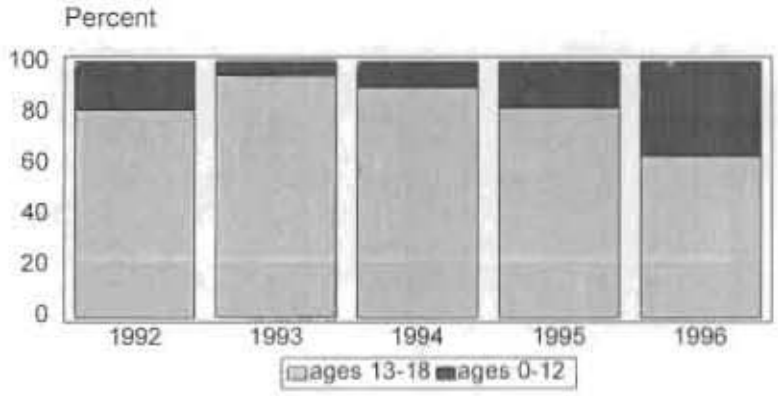
handles firearms, and perhaps are also more likely to be directly involved in gang warfare than younger children.[7]

Figure 9: Profile of firearm deaths to persons under 19 years of age (n=322) by age, 1992-1996



Interestingly, when separated into age groups of children less than 13 years and teenagers 13-18 years, it is clear that the proportion of child victims between 0-12 years has increased in recent years (see Figure 10).

Figure 10: Firearm deaths to persons under 19 years of age, 1992-1996 (n=322) by age group



Time of year

As was the case with data obtained through hospital records, there did not appear to be a definite seasonal pattern of firearm-related deaths in the under 19 year old age group. This is shown along with the firearm injuries seen at hospital by month in Figure 5 on page 27.

[6] "Coloured" refers to "mixed race".

Area of residence

Over the five year period, information was collected from the mortuaries on area of residence of the victims. The major "hot spot" areas where firearm victims lived are shown below in Table 8. It is important to note that area of residence does not necessarily indicate the area in which the victim was shot.

Table 8: Top areas of residence of firearm victims, 1992-1996 (mortuary data)

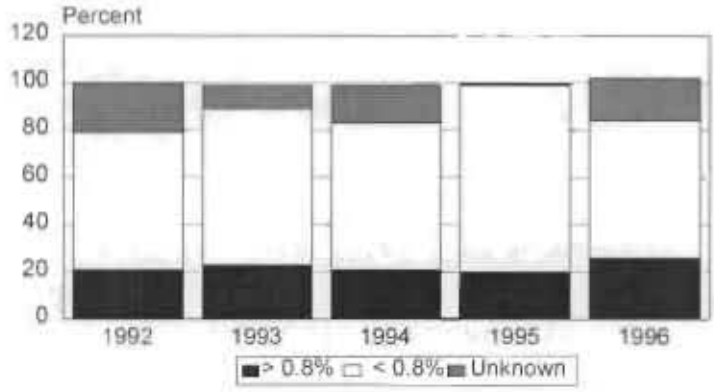
1992	% (n=32)	1993	% (n=43)	1994	% (n=71)	1995	% (n=89)	1996	% (n=87)
Khayelitsha	19%	Mitchells Plain	21%	Mitchells Plain	14%	Bishop Lavis	15%	Khayelitsha	11%
Guguletu	13%	Khayelitsha	19%	Bellville South	13%	Mitchells Plain	13%	Bishop Lavis	11%
Grassy Park	13%	Nyanga	12%	Manenberg	11%	Bellville South	10%	Mitchells Plain	11%
Woodstock	9%	Hanover Park	9%	Elsies River	7%	Elsies River	10%	Elsies River	9%
Manenberg	6%	Guguletu	7%	Nyanga	7%	Phillipi	9%	Bellville South	8%
All other areas	40%	All other areas	32%	All other areas	48%	All other areas	43%	All other areas	50%
TOTAL	100%	TOTAL	100%	TOTAL	100%	TOTAL	100%	TOTAL	100%

Blood Alcohol Content (BAC)

When possible, information was obtained regarding the blood alcohol content of the teenagers who died. This information generally was not obtained from the younger victims. According to the Road Traffic Act (29 of 1989), as amended by the Road Traffic Amendment Act (39 of 1993), intoxication is defined as not less than 0,08 grams per 100 millilitres of blood (Knobel, 1997). Figure 11 illustrates the percent of 15-18 year olds that were intoxicated at the time of their death, by year. This figure does not show an increase in the percent of victims that were intoxicated over the time period; rather, the percentage of teens intoxicated remained steady at approximately 20% of firearm victims (mean = 23%).

[7] See Table 12 in the Appendix for actual numbers for each age group.

Figure 11: Blood Alcohol of 15-18 year olds 1992-1996 (n=265)



Classification of deaths

As shown in Table 9, the majority of firearm-related deaths to persons under 19 years of age were classified at the time of post-mortem as murders. Only five of the victims over the study period were not classified as either murder or suicide (method was undetermined). Of all the deaths due to suicides, males accounted for 79% (n=15), whilst Coloured males accounted 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 African suicide victims under 19 years of age.

Table 9: Mortuary classification of deaths to firearm victims under 19 years of age 1992-1996 (n=322)

Classification	1992/93	%	1994	%	1995	%	1996	%
Murder	68	91	64	90	82	92	84	97
Suicide	3	4	7	10	6	7	3	3
Unknown	4	5	0	0	1	1	0	0
TOTAL	75	100	71	100	89	100	87	100

These findings corroborate with findings from the Centers for Disease Control in the United States (1996), which found that for children and young adults, the highest percentage of firearm deaths are homicides and unintentional shootings. After the age of 45 years, the CDC found that there are more firearm-related suicides than homicides. Among persons aged 45-64, suicides account for almost 70% of firearm-related deaths; among persons aged 65+, suicides account for almost 90%.

Anatomy

Finally, information was obtained from the mortuaries on the part of anatomy wounded, leading to the victim's death. This information was only collected for the years 1992-1993.

The most common area shot was the head/face/neck (n=29, 38% of cases), followed by the chest (n=21, 28%). It was not possible to determine the part of anatomy injured in 17% of cases (n=13). Other key areas were the abdomen (n=5, 7%), heart (n=3, 4%) and multiple injuries (n=2, 3%).

Results based on police data

As stated previously, information on police records was obtained from the South African Police Services (SAPS) Crime Information Management Centre (CIMC) in Cape Town. The CIMC reports that SAPS data prior to July 1995 was not kept by age. Data after July 1995 was not kept by race. Originally, it was hoped that if available, these data might reveal cases of minor firearm incidents which did not require hospitalisation.

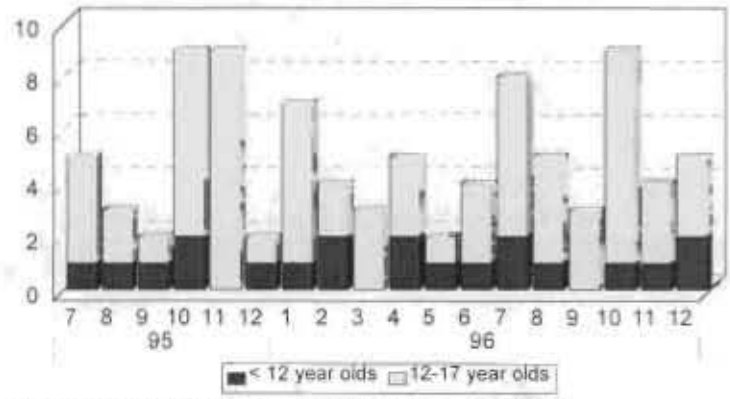
However, data was only available from the CIMC for the Western Cape as a whole and by the following parameters:

- murder victim under 12 years of age,
- murder victim between 12-17 years of age,
- attempted murder victim under 12 years of age and
- attempted murder victim between 12-17 years of age.

It was therefore not possible to check for matches of individual cases, as the SAPS would not provide names or details of individual victims.

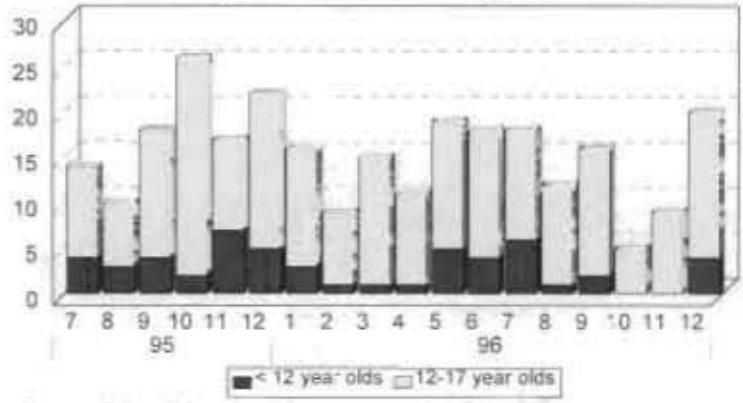
SAPS statistics on murders (Figure 12) and attempted murders (Figure 13) for persons less than 18 years of age by age group (under 12 years, and 12-17 years) are shown below.

Figure 12: SAPS records of murders, Western Cape: July 1995 - Dec 1996
< 12 year olds and 12-17 year olds



Source: Crime Information Management Centre (SAPS)

Figure 13: SAPS records of attempted murders, Western Cape: July 1995 - Dec 1996
< 12 year olds and 12-17 year olds

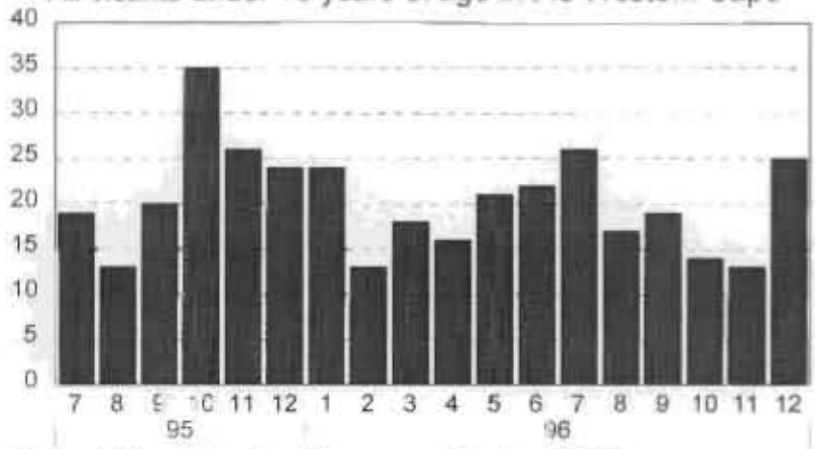


Source: Crime Information Management Centre (SAPS)

Figure 14 shows the SAPS records of the total numbers of both murders and attempted murders of all persons under 18 years of age for the period July 1995 to December 1996.

Figure 14: SAPS records of murders and attempted murders: July 1995 - Dec 1996

All victims under 18 years of age in the Western Cape



Source: Crime Information Management Centre (SAPS)

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

Comparison of data

Among hospitals

General problems with records kept at health facilities were reflected in the poor quality of data obtained during this study. Problems that were found included the following:

- transfers of children to other hospitals (typically a higher level facility) were not always recorded in registers and folders
- some children who were recorded as having been transferred to other hospitals did not appear in the registers of the second facility visited (evidence of the transfer was found in only 42% of the cases)
- as stated under the limitations for this study, there were numerous problems with hospital registers being incomplete, illegible, or missing (see Appendices 3 and 4).

Hospitals and mortuaries

There were 22 cases listed in hospital records that specifically indicated the victims had died, and were sent to mortuary. However, of these only 11 cases were found amongst the mortuary records, 8 cases were definitely not in the mortuary records, and it was

unclear for 3 of the cases whether or not they were recorded in the mortuary registers (due to pertinent information about name or date of birth not being recorded).

Mortuary registers indicated from where the victims had come. These registers were reviewed for the period 1992-1993, as those were the years for which a database was not available.[8]

Although the majority of victims had come via a hospital, it was generally not possible to find a matching name within the hospital dataset due to the fact that so many of the hospital registers from the years 1992 and 1993 were missing. Also, some of the hospitals at which the victim presented were not operating a 24-hour service at the time, and thus were not in the study database.

However, information was available during 1992-1993 for several of the hospitals (namely Tygerberg, Victoria, Groote Schuur, Red Cross and Mitchells Plain Day Hospitals). Of the 33 people who came to the mortuary via these hospitals, a match was found in the hospital records for only 8 of the victims.

Hospitals and police

Due to the fact that information was not provided by the SAPS on individuals who were victims of attempted firearm murders or murders, it was not possible to determine to what extent police records corresponded with hospitals. However, a common impression of the police is that there is little communication between the health sector and the police (personal communication: Superintendent EB Dewey, 20 November 1997).

Police and mortuaries

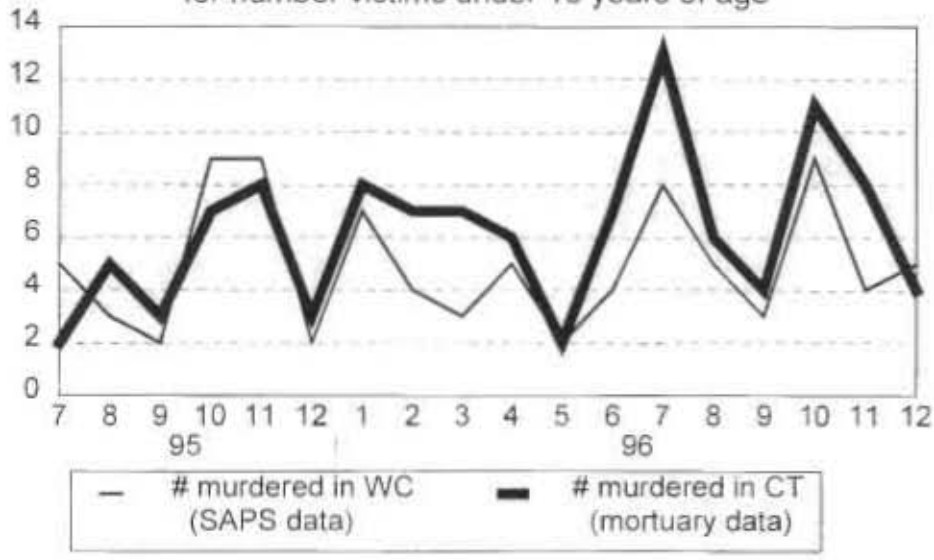
Total numbers of murder cases recorded by the SAPS for the Western Cape as a whole (n=89) were compared to numbers of cases obtained from mortuary records (for Cape Town metropole) for victims under 18 years of age (n=111).[9] In 13 of the 18 months reviewed, the mortuary cases recorded for Cape Town alone were *higher* than the SAPS reported cases for the entire Western Cape. Thus, at least 20% of firearm-related deaths

[8]The mortuary database did not indicate from where the victim came.
[9]Police data was available for 12-17 year olds, and under 12 year olds.

to persons under 18 years of age were missing from the police records. These differences are shown in Figure 15.

Figure 15: Comparison of SAPS data and mortuary data

for number victims under 18 years of age



Sources of data: Crime Information Management Centre, Cape Town (SAPS) and Salt River and Tygerberg Forensic Mortuaries.

Summary of results

In summary, the total number of Cape Town children and youth who were victims of firearm-related incidents during 1992-1996 was at least 1736, and of these, 322 died (18.5%). However, it is possible that some firearm incidents involving children and youth were missed due to problems with data availability and collection.

Preliminary data indicate that the number of young victims continued to increase in 1997.

Results based on mortuary data indicate that homicides from all causes are the most important cause of non-natural death among persons aged 0-18 years in Cape Town, and firearm homicides particularly have been within the top four leading causes of death in this age group for the period 1994-1996.

Data obtained on characteristics of the victims were similar from both hospitals and mortuaries. There were more Coloured male victims than any other race and sex group, and more adolescents were victims than younger children. However, the recent trend appears to be that younger children are increasingly more likely to be shot.

Data also indicate that more incidents happen at night, as the majority of children and youth present at hospital between the hours of 22h00 and 05h00. There was no apparent seasonal pattern, however, this is not surprising in a city with a mild year-round climate such as Cape Town.

Details about area of residence of the victims were only complete for children and youth who died. Key areas over the five year period in which firearm victims lived were Mitchells Plain, Khayelitsha, Guguletu, Bellville South and Elsies River, among others. It is important to note that area of residence does not necessarily indicate the area in which the victim was shot.

Approximately 23% of all teenage victims (aged 15-18 years) who died from firearm wounds had a blood alcohol content of higher than 0,08 grams per 100 millilitres of blood, indicating that they were intoxicated. Information about the blood alcohol content of younger victims who died, as well as persons seen at hospital, was not obtained.

Information on the body part injured was incomplete for most cases seen at hospital; however, the majority of injuries seen appear to have occurred on the limbs (60%), and the head and neck (20%). Those seen at the mortuary were most commonly on the head/neck area (38%), and the chest (28%). These findings confirm findings by Nance, Templeton & O'Neill (1994), who found that gunshot wounds to the head were the most common body part injury to result in death, but that many deaths were also due to wounds to the back, flank, chest, and abdomen.

Surprisingly, approximately 79.4% of those injuries seen at hospital (and for which information was available) were classified as moderate or minor. This is particularly unexpected considering that information on the degree of injury severity was obtained mostly from tertiary hospitals.

For the majority of victims seen at hospital it was not possible to determine whether or not the injury was self-inflicted, although, it appears that the majority of injuries were not self-inflicted.

However, whether or not the injury was self-inflicted does not necessarily indicate intent. Efforts to determine whether or not the injury was intentional or unintentional were unsuccessful for 99% of the hospital cases in this study.

During the five year period, the majority of deaths were classified as homicides (n=300, 93%). Classifications of suicides (n=19, 6%) and "accidental death by firearm" (n=3, 1%) were few.

Information about where the child or youth was injured was not known in 52% of all cases seen at hospital. However, of those cases for which place of injury was known, the most common places injuries occurred were on the road or pavement (n=536, 76% of cases) and inside children's own homes (n=102, 15%).

Other important findings from this study include:

- Nineteen youth presented at hospital on more than one occasion for gunshot wounds.
- *At least* 20% (1 out of 5) of children and youth who were shot during the period were killed or permanently disabled. It is possible that a higher percentage were permanently disabled but this was not possible to determine from the hospital records.
- Police data on murders and attempted murders of children and youth for the time period were poor.
- There are few linkages among hospital, mortuary, and police data systems.

Incidence rates

1991 and 1996 Census estimates on the total population of Cape Town children and youth under the age of 19 years for the study period were obtained from Metropolitan Information Services, Cape Metropolitan Council. According to these figures, the population of persons under 19 years of age in Cape Town was 843 287 in 1991 and 860 099 in 1996.

Estimates of the same population for the years 1992-1995 were extrapolated based on the 1991 and 1996 figures. Incidence rates were then calculated for under 19 firearm mortality, incidence of firearm injuries among under 19 year olds, and the average incidence of firearm injuries to under 19 year olds for the five year period. These are shown in Figures 16 and 17 below.

The average incidence of firearm injuries to all persons under 19 years of age living in Cape Town for the period 1992-1996 was 41.9 per 100 000 person years.

Figure 16: Firearm mortality rate for persons under 19 years of age living in Cape Town, 1992-1996

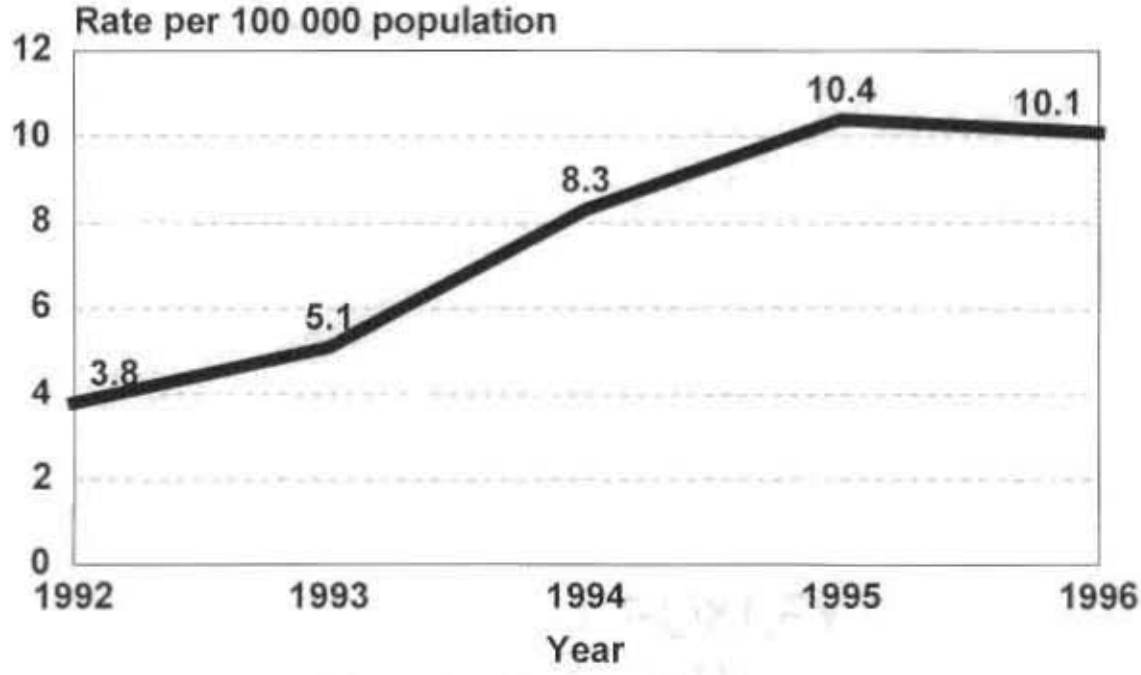
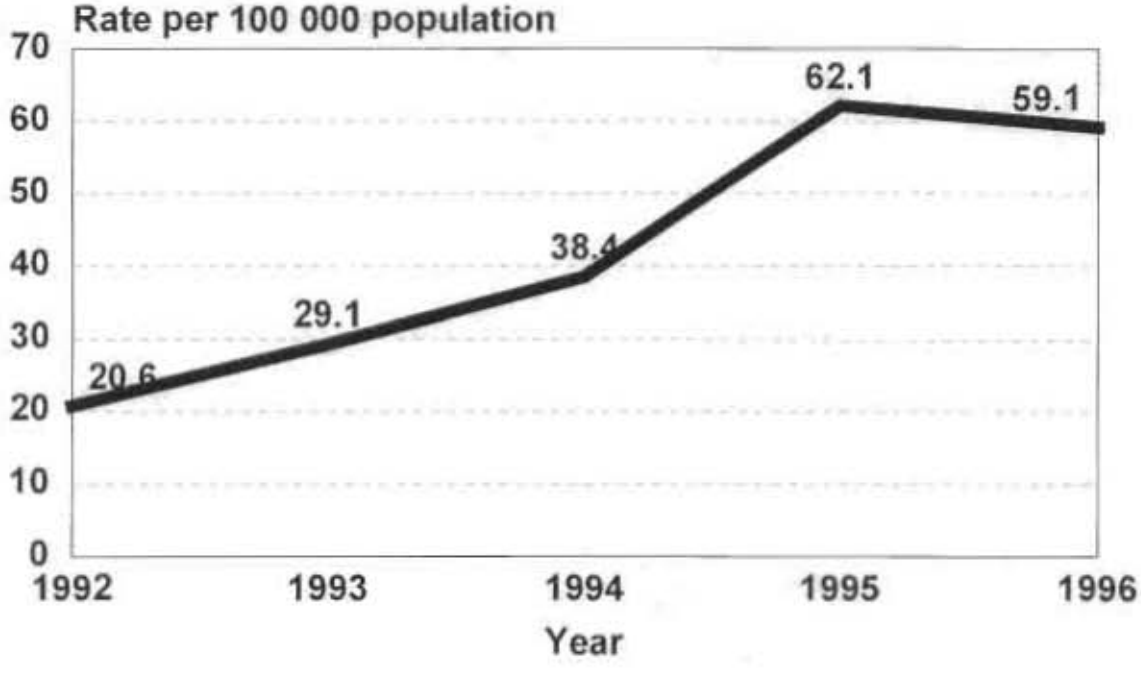


Figure 17: Incidence of firearm injuries to persons under 19 years of age living in Cape Town, 1992-1996



Discussion

This is the first study which attempts to obtain an estimate of the numbers and characteristics of firearm-related injuries for the entire population of Cape Town children and youth. The finding that there has been an increase in firearm-related injuries over the past few years confirms the impressions of those working in the health, mortuary and police services in Cape Town, as well as impressions of many in the general public based on daily news headlines.

Studies from the US have found that gunshot deaths represent between 3.1% and 13% of gunshot victims (Nance, Templeton & O'Neill, 1994; Heins, Kahn & Bjordnal, 1974; Barlow, Niemirsha & Gandhi, 1982; Ordog, Prakash, Wasserberger et al, 1987). This study found that gunshot deaths represented 18.5% of victims under 19 years. As stated previously, it is possible that some firearm incidents involving children and youth were missed due to problems with data availability and collection.

In addition, this study found that the incidence of firearm injuries among under 19 year olds almost tripled from 20.6 per 100 000 in 1992 to 59.1 per 100 000 in 1996. The firearm mortality rate for persons under 19 years of age more than doubled from 3.8 per 100 000 in 1992 to 10.1 per 100 000 in 1996.

Implications for prevention programmes

As Lerer (1997, p. 283) has stated, "The catastrophic loss of young life due to interpersonal violence makes a clear case for prevention priorities in health planning at a district level."

Indeed, schools, health care programmes, religious institutions, parents' organisations, social service programmes, law enforcement, juvenile justice, policymakers and the media *all* have important roles to play in preventing the tragedy of child and youth firearm deaths and injuries.

Key components of successful programmes include conflict management, coping skills and risk awareness. Groups such as Gun Free South Africa (Braamfontein, South Africa),

The Centre for Peace Action (UNISA), the Centre to Prevent Handgun Violence (Washington, DC, USA) and the Medical College of Wisconsin, Department of Emergency Medicine (USA) all have developed models of community-based programmes.

Implications for health providers

As this study shows, children and youth present with firearm injuries at all levels of health facilities in Cape Town. This suggests important implications for training health professionals to deal with firearm injuries (both medical and nursing) in both clinical management and in providing health education to patients.

Indeed, health providers have an important role to play in preventing firearm injuries in children and youth through counselling parents about keeping guns out of the home or gun safety in the home. The American Academy of Pediatrics (AAP) has produced information packets for physicians to assist in the AAP campaign to prevent firearm injury. These materials advise doctors on how to approach parents in a non-judgemental way about the danger of guns, dispel common misconceptions about guns, advise them in discussing guns with their children, and display informative materials in waiting rooms (AAP, 1996).

Implications for policy

Although current South African legislation relating to firearms is considered to be strict by international standards, tighter regulations are needed for licensing, and loopholes exist relating to the lending of a firearm, the justification for owning a firearm, the minimum age required to apply for an application for a firearm, and the lack of any competency testing of candidates.

In addition, enforcement of the legislation has been described as inadequate by the SAPS, by Gun Free South Africa, and even by the South African Gunowners Association. This legislation is currently under review by a national committee charged with investigating the control of legal firearms in South Africa.

Some of the recommendations of this Committee include:

- appropriate education programmes be used to inform the public of alternative methods of self-defence that are available
- the concealment of a firearm, when being carried in public, be encouraged
- a firearms injury database be instituted and information relating to all injuries sustained by means of a firearm be collected for the purpose of informing prevention programmes
- the various firearms databases be linked; that the databases of the Central Firearms Register and the Criminal Record Centre be linked; and that the possibility of linking the planned NATIS database to that of the Central Firearms Register be investigated
- an amnesty period for the voluntary surrender of firearms.

Another project underway at the national level is the National Firearm Plan from the SAPS. Primary aims of this plan are to:

- address the huge pool of weapons obtained through illegal means (e.g., through smuggling or theft)
- improve statistics and reporting (currently very poor and does not provide adequate details about crimes)
- mobilise public support through programmes for youth, and on firearm safety and education.

In Cape Town, the lack of confidence in the law has made some people believe that they need to take the law into their own hands. This is clearly evident by the popularity of the community-organised group People Against Gangsterism and Drugs (PAGAD). Efforts must be made to develop a police force and judicial system that inspires the confidence of the people.

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

Implications for the development of information systems

The difficulty experienced during this study in obtaining quality data on trauma-related injuries illustrates a need for the development of adequate information systems.

As Lerer, Matzopoulos & Bradshaw (1995) state, poor statistics hamper the identification of problem areas and the equitable allocation of health resources. Further, accurate and comprehensive data are necessary to highlight areas amenable to a range of interventions.

Currently, proper injury surveillance does not exist in Cape Town. Only two hospitals reviewed during this study use a data collection sheet which facilitates a description of specific details about the nature of the injury and how it occurred. Most hospital records give minimal information about the nature of the injury.

Links among hospital data systems need to be improved, which would be facilitated by the use of a uniform data intake form for trauma or casualty units. However, it is recognised that problems in collection, aggregation and interpretation of proper statistics exist among health facilities in Cape Town for many other types of data as well.

In addition, links between the health sector and police and pathologist systems need to be improved. As all non-natural deaths require a post-mortem examination, firearm-related deaths are reported to the police. However, there is not a system operating in Cape Town to link injuries seen by health professionals with the police (aside from those patients who are implicated in a crime). This 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.

Findings from this study also have illustrated the poor quality of police data. Police records should provide more detail about the characteristics of children being affected, the perpetrators, types of gun used and other pertinent information.

In conclusion, a surveillance system should be established that will provide uniform data on firearm-related mortality and morbidity to aid in risk factor research and development and evaluation of intervention programs. Information from this surveillance system will allow for both a more informed public debate and better public policy.

Implications for research

Through this study, several gaps in our understanding of firearm-related injuries in children and youth have been identified. Questions remaining include:

- What are the circumstances surrounding injuries and deaths? Which of these are intentional? What are the contributing factors (for example, substance abuse, gang activities, etc.)?
- What are the sources of firearms (for example, are they obtained by illegal means, or through peers or a family member)?
- To what extent are firearm injuries among children and youth a problem in other parts of the country, including rural areas?
- What types of firearms are being used?
- To what extent are other types of weapons (such as pangas, knives, etc) used in injuries and deaths among children and youth?
- Why do children and youth want to carry guns? (e.g., Do they feel they need to protect themselves? Do they see a gun as a status symbol?)
- Which firearm injury prevention programmes are in existence? What are the key aspects for success?
- What is the economic cost of firearm-related injuries among children and youth to the public health system?

Conclusion

> *"Blame it on apartheid for creating the conditions in the first place. Blame it on the government for failing to deliver to an already depressed community. Blame it on a corrupt police force, poverty, unemployment, bad parenting, drugs, American movies, rap music and of course, the media. It is a familiar refrain. But in the festering wounds of the Cape Flats, symptom, cause and consequence tend to converge, with no immediate cure in sight."*
>
> - Hazel Friedman, *The Sunday Independent*, 2 February 1998.
> "How gangs tore out a community's heart."

It is clear from both the limited statistics that are available and daily reports in the press that the availability of guns in South Africa contributes significantly to the incidence of violent crime. The trend in Cape Town seems to be that higher numbers of children and youth are being affected each year. Recent newspaper reports indicate that applications for gun licenses have doubled in recent months in certain communities on the Cape Flats, notably the "hot spots" outlined in this report .

What is happening in Cape Town is, unfortunately, only the tip of the iceberg: the SAPS have reported that during the first 6 months of 1995, 80% of all murders committed with firearms were recorded in the provinces of Natal and Gauteng.

As has been observed in this report, the prevention of firearm injuries will require a multi-faceted 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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Appendices

Appendix 1: Coding Sheet For Hospital Data

Hospital

Groote Schuur	GSH	Khayelitsha	KHA
Tygerberg	TYG	Mitchells Plain	MPL
Red Cross	RXH	Citipark	CIT
Somerset	SOM	Constantiaberg	CBG
Victoria	VIC	Durbanville	DUR
False Bay	FAL	Gatesville	GAT
Conradie	CON	Milnerton Mediclinic	MIL
Wesfleur	WES	2 Military	2M
Hanover Park	HAN	N1 City	N1
Hottentots Holland	HHH	Wynberg	WYN
Elsies River	ELS		

Hospital Number

Indicate the number assigned to the child by the hospital (folder number)

Surname

Indicate the child's surname

First Name

Indicate the child's firstname

Race/Sex

Integers 1-8 are allowed

Indicate the child's race and sex as follows:

1- white male	5- asian male
2- white female	6- asian female
3- coloured male	7- black male
4- coloured female	8- black female

Date of Birth

Indicate the child's birth date as follows: dd/mm/yy. If the exact date is not known, type in 01/01/ and then the year.

Date of Injury

Indicate the date the firearm injury occurred as follows: dd/mm/yy.

AgeKidY

EPI INFO will automatically calculate the child's age.

Time Admitted

Indicate the time the child was admitted to trauma/casualty as 00-23 (round off to the nearest hour).

Time injured

Indicate the time the child was injured as 00-23 (to do this you will need to subtract the number listed on the trauma record in "hours since accident" from "time". (round off to the nearest hour).

Place

Indicate where the firearm injury occurred using the following categories:

1. own home inside
2. own home outside
3. other home inside
4. other home outside
5. road/pavement
6. school/creche
7. public place
8. sport
9. other
10. unknown

Major area name

Indicate the area in which the injury occurred as follows:

ATH	ATHLONE
ATL	ATLANTIS
BEL	BELLVILLE
BEL-S	BELLVILLE-SOUTH
BIS	BISHOP LAVIS
BLA	BLANKENBERG
BLH	BELHAR
BLKH	BLACKHEATH
BLU	BLUE DOWNS
BON	BONTEHEUWEL
CLA	CLANWILLIAM
DED	DE DOORNS
DEL	DELFT
DUR	DURBANVILLE
EER	EERSTE RIVER
ELS	ELSIES RIVER
FAC	FACTRETON
FIS	FISH HOEK
GOO	GOODWOOD
GRA	GRASSY PARK
GUG	GUGULETHU
HAN	HANOVER PARK
HEI	HEIDEVELD
HOU	HOUT BAY
KAL	KALKSTEINFONTEIN
KEN	KENSINGTON
KHA	KHAYELITSHA
KRA	KRAAIFONTEIN
KTC	CROSSROADS
KUI	KUILSRIVER
LAN	LANGA
LAV	LAVENDER HILL
LOT	LOTUS RIVER
MAC	MACASSER
MAI	MAITLAND
MAN	MANENBERG
MIL	MILNERTON
MPL	MITCHELLS PLAIN
MUI	MUIZENBERG
NOO	NOOITGEDACHT
NYA	NYANGA
OCE	OCEAN VIEW
ONB	ONBEKEND
OTT	OTTERY
PAA	PAARL
PHI	PHILIPPI
PHILADELPHIA	PHILADELPHIA
PIN	PINELANDS
RAV	RAVENSMEAN
RET	RETREAT
ROB	ROBERTSON
RON	RONDEBOSCH
SAL	SALDANLHA
SAR	SAREPTA
SCO	SCOTTSDENE
SIM	SIMONSTOWN
SLP	SIR LOWRY'S PASS
SOM	SOMERSET WEST
SPR	SPRINGBOK
STR	STRAND
SUT	SUTHERLAND
TAB	TABLEVIEW
UIT	UITSIG
VAL	VALHALLA PARK
VRD	VRDENDAL NORTH
VRE	VREDENBURG
WET	WETTON
WOR	WORCESTER
WOO	WOODSTOCK

Admission

Integers 1-3 are allowed

Indicate whether the child was:

1. not admitted
2. admitted to Trauma Unit
3. admitted directly to other ward or ICU

Disposal

Integers 01-10 are allowed

Indicate where the child was sent after the Trauma Unit:

01. absconded
02. home/GP
03. day hospital
04. other hospital
05. outpatients
06. ward
07. burns unit
08. ICU
09. childcare agency
10. died

Unconscious

Indicate whether the child was unconscious when he/she arrived in trauma with Y/N or 99 if unknown

Shock

Indicate whether the child was in shock when he/she arrived in trauma with Y/N or 99 if unknown

Resuscitation

Indicate whether the child required resuscitation when he/she arrived in trauma with Y/N or 99 if unknown

Anaesthetic

Indicate whether the child required anaesthesia when he/she arrived in trauma with Y/N or 99 if unknown

Self inflicted?

Indicate whether or not the injury was self inflicted with Y/N or 99 if unknown

More data 1 ?

Y, N or blank entry allowed. If you type "N", the curser will jump to "Intentionality" (see below). Type Y if you have information to record about the child's anatomy, pathology, AIS, or treatment (see below). **Note:** The same applies for **More data 2 ?**, **More data 3 ?**, and **More data 4 ?**.

Anatomy

Indicate which part of the child's anatomy was injured by the firearm as follows:

01. no injury	11. ear	21. wrist	31. pelvis
02. scalp	12. face - other	22. hand	32. perineum/buttock
03. skull	13. neck	23. nerve plexus	33. vertebral column
04. brain - closed	14. oesophagus	24. thorax cage	34. spinal cord
05. brain - open	15. shoulder girdle	25. thorax resp.	35. hip/femoral neck
06. eye(s)	16. shoulder joint	26. thorax CVS	36. femor - shaft/thigh
07. nose	17. upper arm	27. abdominal wall	37. knee region
08. facial bones	18. elbow (s condylar)	28. abdominal viscus	38. tib./fib. shaft/calf
09. mouth/orophar.	19. elbow - other	29. kidney/ureter	39. ankle region
10. mandible	20. forearm	30. bladder/urethra	40. foot

Anatomy other

Indicate which part of the anatomy has been injured if it is not possible to put a code to it. (The same applies to the data items labeled: **Pathology other**, **AIS other**, and **Treatment other**.)

Pathology

Indicate the pathology of the injury as follows:

01. none	10. nerve injury	19. foreign body
02. concussion	11. muscle/tendon injur	20. pneumothorax
03. abrasions	12. dislocation	21. haemothorax
04. closed tissue	13. joint injury - closed	22.haemopneumothora
05. laceration - superfic	14. joint injury - open	23. CSA no injury
06. laceration - complic	15. fracture - pathol	24. CSA injury present
07.avulsion/amputation	16. fracture - closed	25. other
08. burns	17. fracture - open	
09. vascular injury	18. fracture dislocation	

AIS

Indicate the child's Abbreviated Injury Score (AIS) as follows:

1. minor
2. moderate
3. severe
4. mortal

Treatment

Indicate the treatment given to the child as follows:

1. advice/medication/HIF
2. dressings/simple POP
3. clean and suture
4. observation/traction
5. EUA/MUA
6. open operation
7. amputation
8. skin graft
9. other

Intentionality

If possible, indicate whether or not it is known if the injury was intentional or unintentional as follows:

1. intentional
2. unintentional
3. cannot be determined

NB: In almost all cases, it will not be possible to determine whether the injury was intentional or not. If you are not sure, rather code the answer 3.

Notes

Write down any notes recorded that may provide additional information about the injury or child (e.g., child was shot by police during a buglary attempt).

Appendix 2: Data Intake Form

CROSS WAR MEMORIAL CHILDREN'S HOSPITAL — TRAUMA UNIT RECORD — RX 15

y label

NME (1–24) — RACE/SEX (25)

NAME (26–37) — FOLDER NO (38–45) — DATE OF BIRTH (46–53)

SS

(54–59) — TIME (nearest hr 24 hr clock) (60) — HOURS SINCE INJURY (62–63) — RACE/SEX {1 = WM, 2 = WF, 3 = CM, 4 = CF, 5 = AM, 6 = AF, 7 = BM, 8 = BF}

(Mark one code with circle)

TRANSPORT

01	MVA Pedestrian
02	MVA Passenger - restrained
03	MVA Passenger - unrestrained
04	MVA Driver
05	Cycle
06	Motorcycle
07	Other, eg boat, train, plane, horse

ASSAULT

10	Blunt
11	Sharp
12	Rape/sexual assault
13	Human bite
14	Other

BURN

20	Flame
21	Fluid
22	Heat contact
23	Electrical
24	Chemical
25	Explosion
26	Other

FALL

30	Off bed
31	Stairs/steps
32	Attendants arms
33	Playground equip.
34	Mobiles
35	Other heights
36	On level

MISCELLANEOUS

40	Struck by/against
41	Caught between
42	Sharp instrument
43	Firearm
44	Machinery
45	Dog bite
46	Other bite
47	Immersion/drowning
48	Suffocation
49	Food FB
50	Other FB
51	Other cause
99	Unknown

OF OCCURRENCE

1	Own home inside
2	Own home outside
3	Other home inside
4	Other home outside
5	Road/pavement
6	School/creche
7	Public place
8	Sport
9	Other
0	Unknown

ADDRESS WHERE ACCIDENT OCCURRED

ADMISSION (67)

1	Not admitted
2	Admitted to Trauma Unit
3	Admitted directly to other ward

DISPOSAL FROM TRAUMA UNIT (68–69)

01	Absconded
02	Home/GP
03	Day hospital
04	Other hospital
05	Out-patients
06	Ward
07	Burns Unit
08	ICU
09	Police
10	Died

UNCONSCIOUS (71): 1 No; 2 Yes

SHOCK (72): 1 No; 2 Yes

RESUSCITATION (73): 1 None; 2 Single; 3 Complex

ANAESTHETIC (74): 1 None; 2 Local/regional; 3 General

SELF INFLICTION (75): 1 No; 2 Yes

ABUSE: 1 No; 2 Possibly; 3 Yes

FOR ANATOMY, PATHOLOGY, INJURY SCORE AND TREATMENT (ONE SET OF CODES/INJURY MAX.6)

	ANAT	PATH	AIS	TRT
				81
2.	82			87
3.	88			93
4.	94			99

ANATOMY

injury	15 Shoulder girdle	29 Kidney/ureter
nip	16 Shoulder joint	30 Bladder/urethra
all	17 Upper arm	31 Pelvis
hin - closed	18 Elbow (s'condylar)	32 Perineum/buttock
in - open	19 Elbow - other	33 Vertebral column
e(s)	20 Forearm	34 Spinal cord
ne	21 Wrist	35 Hip/femoral neck
rilla	22 Hand	36 Femur - shaft/thigh
sth/oropharr.	23 Nerve plexus	37 Knee region
ndible	24 Thorax cage	38 Tib./Fib.shaft/calf
r	25 Thorax resp.	39 Ankle region
ce - other	26 Thorax CVS	40 Foot
ck	27 Abdominal wall	
sophagus	28 Abdominal viscus	

PATHOLOGY

01 None	14 Joint injury - open
02 Abrasions	15 Other joint injury
03 Closed tissue	16 Fracture - pathol.
04 Laceration - superfic.	17 Fracture - closed
05 Laceration - complic.	18 Fracture - open
06 Avulsion/amputation	19 Fracture dislocation
07 Burns	20 Foreign body
08 Vascular injury	21 Pneumothorax
09 Nerve injury	22 Haemothorax
10 Muscle/tendon injury	23 Haemopneumothorax
11 Sprain/lig. rupture	24 Fat embolism
12 Dislocation	25 Other
13 Joint injury - closed	

ABBR. INJURY SCORE (AIS)

1 Minor
2 Moderate
3 Severe/extensive
4 Mortal

TREATMENT

1 Advice/medic. only
2 Dressing/simple
3 Suture
4 Manipulation
5 Amputation
6 Open operation
7 Drainage
8 Skin graft
9 Other

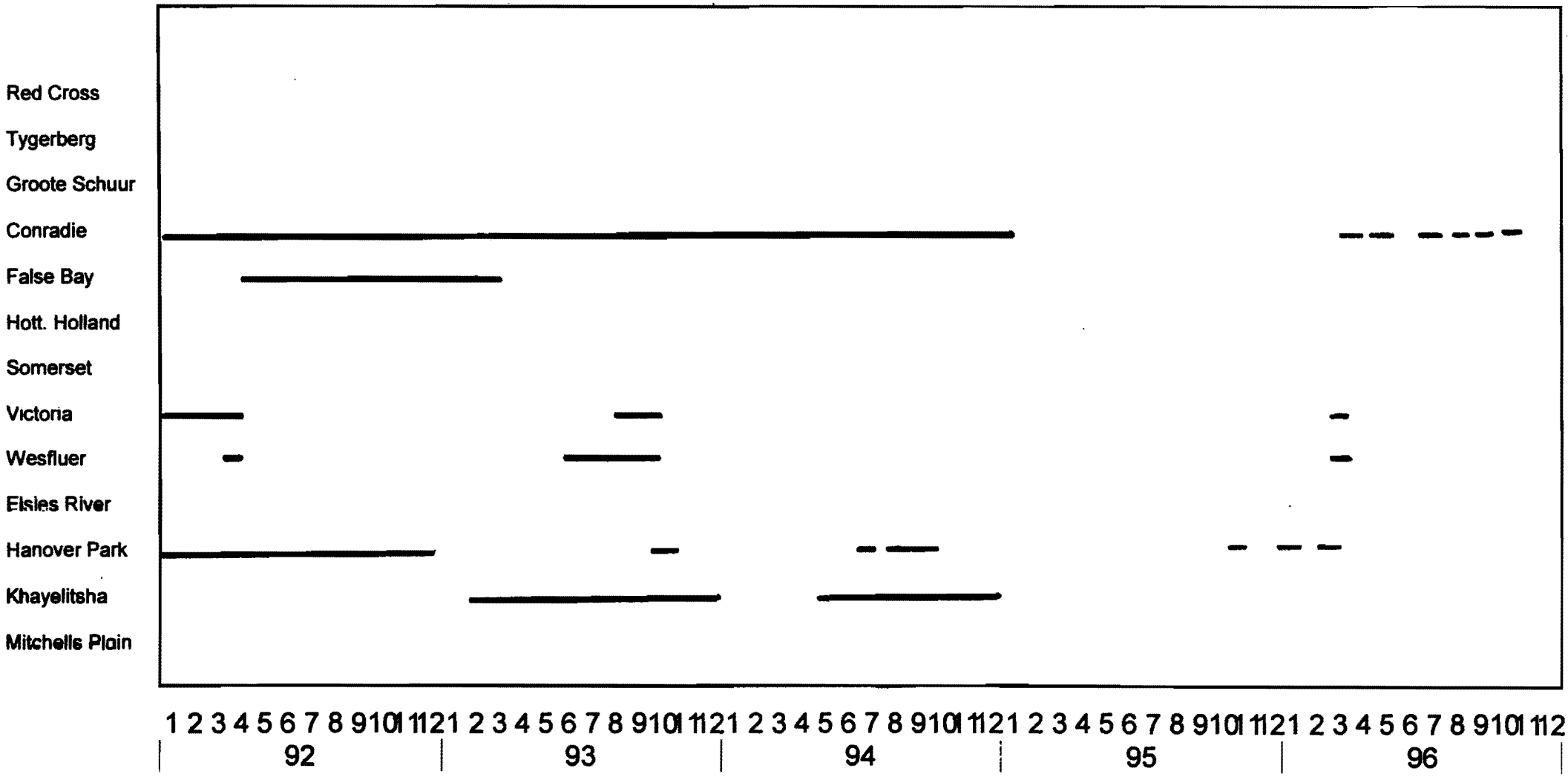
ox.

Appendix 3: Hospitals included in the study: An overview of registers reviewed and registers missing

HOSPITAL	REGISTERS REVIEWED	REGISTERS MISSING
TERTIARY		
Red Cross	database used	
Tygerberg	database used	
Groote Schuur	database used	
SECONDARY		
Conradie		1992: all dates 1993: all dates 1994: all dates 1995: 1 Jan - 5 February 1996: 7-21 July, 8-29 April, 6 May - 2 June, 1-21 July, 12-25 Aug, 9-22 Sept, 1-20 Oct
False Bay		6 April 1992-15 March 1993
Hottentots Holland	ALL	
Somerset	ALL	
Victoria	25/12/95-1/1/96 1/12/95-9/12/95	1992:15 Jan - 24 April 1993:12 Aug - 6 Oct 1996: 1-16 March
Wesfleur		1992: April 1993: June - Oct 1994:1-10 Nov
Community Health Centres		
Elsies River (24 hour since Jan 1994)	ALL	
Hanover Park (24 hour since Feb 1993)		1992: all dates 1993: 4-27 Nov 1994: 24 July -7 Aug and 29 Aug -10 Oct 1995: 12-25 Nov 1996: 1-12 Jan and 19 Feb - 8 March
Khayelitsha (24 hour since Feb 1993)		1993: Feb -Dec 1994: 1 May -31 Dec
Mitchells Plain (24 hour before Jan 1992)	ALL	
PRIVATE HOSPITALS		
CitiPark (24 hour before Jan 1992)	9 Aug 1995 - 31 Dec 1996	1992: all dates 1993: all dates 1994: all dates 1995: 1 Jan - 8 Aug
Constantiaberg (24 hour since Jan 1996)	no cases reported	
Durbanville (24 hour since Aug 1995)	Aug 1995-Dec 1996	1996: 29 April - 22 June
Gatesville (24 hour before Jan 1992)	no cases reported	
Milnerton MediClinic (24 hour since May 1994)	no cases reported	
2 Military (24 hour before Jan 1992)	Permission to review records was not granted	
N1 City (24 hour before Jan 1992)	ALL	
Wynberg (24 hour since Jan 1996)	no cases reported	

Appendix 4: Missing public sector hospital registers

1992-1996



Appendix 5: Coding Sheet for Mortuary Data

MORTUARY
- 1 = Salt River
- 2 = Tygerberg

DR
- Death record number

SEX
- 1 = male
- 2 = female
- 3 = undetermined

RACE
- 1 = Black
- 2 = Coloured
- 3 = White
- 4 = Unknown

AGE
- Age of deceased

DOB
- Date of birth

DOD
- Date of death

PLACE
- Community or part of town where death occurred

COD
- Cause of death
- 922 = accidental firearm
- 955 = suicide by firearm
- 965 = homicide by firearm

MOD
- Method of death
- 1 = homicide
- 2 = suicide
- 3 = accident
- 4 = other
- 5 = natural

OCC
- Occupation of deceased
- 1 = child
- 2 = scholar
- 3 = student
- 4 = unemployed
- 5 = labour
- 6 = blue collar
- 7 = professional
- 8 = pensioner
- 9 = unknown

BAC
- Blood alcohol content

CO
- Carbon monoxide level

TOX1
- Toxocology measurement 1

TOX2
- Toxocology measurement 2

TOX3
- Toxocology measurement 3

ADDRESS
- Address of deceased

NOTES

Appendix 6: Tables from Analyses[1]

Tables from hospital data

Table 10: Children seen at Cape Town public and private sector hospitals, by hospital and year, 1992-1996

Hospital	1992	1993	1994	1995	1996	TOTAL
Groote Schuur	87	135	159	222	143	746
Red Cross	17	20	20	36	37	130
Tygerberg	24	29	35	75	74	237
Conradie	?	?	?	26	46	72
Elsies River			1	11	8	20
False Bay	?	3	0	4	0	7
Hanover Park		?	3	3	5	11
Hottentots Holland	1	7	6	10	11	35
Khayelitsha		?	1	5	14	20
Mitchells Plain	0	0	8	35	40	83
Somerset	3	3	4	5	7	22
Victoria	7	6	16	3	27	59
Wesfluer	3	1	3	8	9	24
Citipark	?	?	?	?	0	0
Constantiaberg					0	0
Durbanville				0	0	0
Gatesville	0	0	0	0	0	0
Milnerton Mediclinic			0	0	0	0
N1 City	0	0	1	0	0	1
Wynberg					0	0
2 Military	?	?	?	?	?	?
TOTAL	142	204	257	443	421	1467

Notes: ? indicates that it was not possible to review any registers for that year.
A blank cell indicates that the facility was not operating during that year.

Table 11: Children seen at Cape Town public and private sector hospitals by race and sex, 1992-1996

Race/Sex	Number Seen	Percentage of Total
white male	11	0.7
white female	7	0.4
coloured male	906	61.8
coloured female	155	11.0
black male	328	22.0
black female	60	4.0
TOTAL	1467	100.0

[1]Percentages shown do not always add up to 100% due to rounding.

Table 12: Children seen at hospitals by age, 1992-1996

Age of patient (in years)	Number seen	Age of patient (in years)	Number seen
< 1	4	10	17
1	8	11	33
2	14	12	32
3	10	13	47
4	16	14	87
5	13	15	162
6	15	16	245
7	12	17	369
8	17	18	350
9	17	TOTAL	1467

Table 13: Times children and youth with firearm injuries were admitted to hospital, 1992-1996

Hour of day	Number seen	Hour of day	Number seen
Unknown	403	13h00	12
01h00	104	14h00	16
02h00	135	15h00	17
03h00	139	16h00	13
04h00	84	17h00	25
05h00	31	18h00	19
06h00	23	19h00	19
07h00	8	20h00	27
08h00	17	21h00	26
09h00	14	22h00	32
10h00	25	23h00	83
11h00	14	24h00	159
12h00	22	TOTAL	1467

Table 14: Time of year injuries occurred hospital data, 1992-1996 (n=1467)

Month/ Year	No.	Month/ Year	No.	Month/ Year	No.	Month/ Year	No.	Month/ Year	No.
01/92	8	01/93	4	01/94	17	01/95	13	01/96	50
02/92	9	02/93	8	02/94	14	02/95	27	02/96	23
03/92	15	03/93	12	03/94	19	03/95	34	03/96	43
04/92	5	04/93	15	04/94	10	04/95	31	04/96	47
05/92	18	05/93	16	05/94	21	05/95	16	05/96	29
06/92	6	06/93	28	06/94	8	06/95	27	06/96	30
07/92	8	07/93	26	07/94	23	07/95	33	07/96	29
08/92	17	08/93	19	08/94	21	08/95	42	08/96	33
09/92	14	09/93	18	09/94	28	09/95	42	09/96	33
10/92	18	10/93	15	10/94	32	10/95	54	10/96	40
11/92	12	11/93	20	11/94	28	11/95	50	11/96	31
12/92	12	12/93	23	12/94	33	12/95	36	12/96	33

Table 15: Places of residence of firearm injury victims hospital data, 1992-1996 (n=1467)

Area	Number	Area	Number
Unknown	864	Macasser	9
Athlone	14	Maitland	1
Atlantis	28	Manenberg	16
Bellville	3	Milnerton	2
Bellville-South	14	Mitchells Plain	33
Bishop Lavis	7	Muizenberg	3
Blankenberg	2	Nooitgedacht	1
Belhar	28	Nyanga	17
Blackheath	4	Ocean View	1
Blue Downs	1	Onbekend	1
Bonteheuwel	25	Ottery	8
Clanwilliam	1	Paarl	3
De Doorns	2	Philippi	10
Delft	9	Philadelphia	1
Durbanville	1	Pinelands	1
Eerste River	11	Ravensmean	10
Elsies River	87	Retreat	22
Factreton	7	Robertson	1
Fish Hoek	9	Rondebosch	1
Goodwood	1	Saldanlha	1
Grassy Park	11	Sarepta	1
Gugulethu	19	Scottsdene	1
Hanover Park	15	Simonstown	1
Heideveld	3	Sir Lowry's Pass	6
Hout Bay	3	Somerset West	2
Kalksteinfontein	8	Strand	17
Kensington	3	Sutherland	1
Khayelitsha	49	Tableview	1
Kraaifontein	17	Uitsig	10
Crossroads	2	Valhalla Park	9
Kuilsriver	4	Vrdendal North	1
Langa	17	Vredenburg	1
Lavender Hill	1	Worcester	1
Lotus River	1	Woodstock	1

Table 16: Classification of injuries as self-inflicted, not self-inflicted, or unknown hospital data, 1992-1996

Classification	Number recorded
Self-inflicted	5
Not self-inflicted	183
Unknown	1279
TOTAL	1467

Table 17: Anatomy code assigned to injuries hospital data, 1992-1996 (n= 497)

Anatomy	#	Anatomy	#	Anatomy	#	Anatomy	#
scalp	7	ear	5	hand	30	perineum/ buttock	15
skull	16	face	17	nerve plexus	0	vertebral column	11
brain/ closed	3	neck	15	thorax cage	26	spinal cord	6
brain/open	12	oesopha-gus	1	thorax resp.	13	hip/ femoral neck	6
eye(s)	12	shoulder	22	thorax CVS	3	femur – shaft thigh	78
nose	1	upper arm	17	abdomen	43	knee region	76
maxilla	1	elbow	7	kidney/ ureter	0	tib/fib shaft/calf	32
mouth	4	forearm	15	bladder/ urethra	2	ankle	8
mandible	4	wrist	4	pelvis	7	foot	30

Table 18: Pathology code assigned to injuries hospital data, 1992-1996 (n=268)

Pathology	#	Pathology	#
none	2	sprain/lig - rupture	8
abrasions	5	joint injury - open	1
closed tissue	6	fracture - pathol.	4
laceration - superficial	25	fracture - closed	27
laceration - complic.	50	fracture - open	4
avulsion/amputation	55	fracture - dislocation	18
vascular injury	1	foreign body	1
nerve injury	6	pneumothorax	2
muscle/tendon injury	4	other	7

Table 19: AIS code assigned to injuries hospital data, 1992-1996 (n=282)

AIS Code	Number
1	127
2	97
3	49
4	9

Table 20: Treatments given for injuries hospital data, 1992-1996 (n=300)

Treatment	Number	Treatment	Number
Advice/medicine only	26	Open operation	66
Dressing/simple	91	drainage	1
Suture	29	skin graft	0
Manipulation	11	other	72
Amputation	4		

Table 21: Places where injuries occurred hospital data, 1992-1996

Places	Number of times occurring
Unknown/Other	765
Own home inside	102
Own home outside	28
Other home inside	9
Other home outside	6
Road/pavement	536
School/creche	2
Public place	16
Sport	3
TOTAL	1467

Tables from mortuary data

Table 22: Total numbers of firearm deaths to persons under 19 years of age as recorded at mortuaries, 1992-1996

Year	Salt River Mortuary	Tygerberg Mortuary	Total
1992	32	0	32
1993	39	4	43
1994	47	24	71
1995	48	41	89
1996	50	37	87

Table 23: Victims of firearm injuries, race and sex mortuary data

Race/sex (%)	Coloured Male	Coloured Female	African Male	African Female	White Male	White Female
1992	53%	12%	28%	0%	3%	3%
1993	51%	5%	37%	0%	7%	0%
1994	73%		24%		3%	
1995	81%		15%		3%	
1996	61%	16%	17%	3%	1%	1%

Table 24: Percent of cases at different ages mortuary data, 1992-1996

Age	1992	1993	1994	1995	1996
< 1	0	0	0	4	1
1	1	0	0	1	2
2	0	0	1	0	1
3	0	0	0	0	1
4	0	0	2	1	0
5	1	0	0	0	1
6	0	0	0	0	0
7	1	0	0	1	1
8	1	0	0	1	1
9	0	1	1	1	0
10	1	1	3	3	0
11	0	0	0	2	1
12	1	0	0	1	2
13	1	0	2	1	3
14	1	2	1	1	3
15	2	6	6	7	7
16	2	1	13	8	17
17	2	10	19	23	23
18	18	22	23	33	23
TOTAL	32	43	71	89	87

Table 25: Percent of total victims that were 13-18 years old by year, 1992-1996 mortuary data

Year	Number of 13-18 year olds	Total cases	% of total
1992	26	32	81
1993	41	43	95
1994	64	71	90
1995	73	89	82
1996	55	87	63

Table 26: Months in which deaths occurred mortuary data, 1992-1996

Month	1992	1993	1994	1995	1996
January	1	2	8	8	9
February	2	0	2	5	7
March	3	2	1	9	7
April	1	0	4	5	6
May	4	2	13	3	2
June	1	9	3	9	7
July	3	4	3	5	13
August	7	4	7	9	6
September	1	2	4	6	4
October	3	8	9	14	11
November	3	5	7	11	9
December	3	5	10	4	6
TOTAL	32	43	71	89	87

Table 27: Blood alcohol content of teenage victims (ages 15-18 years) mortuary data, 1992-1996

Blood Alcohol Content	1992	1993	1994	1995	1996
0	13	21	35	42	26
99	5	4	10	1	11
.01	0	0	0	2	5
.02	0	2	0	1	2
.03	0	1	1	1	3
.04	0	0	0	4	3
.05	0	1	0	2	0
.06	1	1	1	3	1
.07	0	0	1	1	1
.08	0	0	0	0	0
.09	0	4	0	2	2
.10	1	0	1	2	0
.11	0	1	1	0	1
.12	0	1	2	1	2
.13	1	1	1	0	1
.14	0	1	0	4	1
.15	0	0	1	0	0
.16	1	0	1	2	1
.17	0	0	0	0	2
.18	0	0	0	0	2
.19	0	0	0	0	2
.20	0	1	1	0	0

Blood Alcohol Content	1992	1993	1994	1995	1996
.21	2	0	2	2	2
.22	0	0	1	0	1
.23	0	0	1	0	1
.27	0	0	0	1	0
.32	0	0	1	0	0
TOTAL	32	43	71	89	87

Table 28: Classification of deaths mortuary data, 1992-1996

Classification	1992/93	1994	1995	1996
Murder	68	64	82	84
Suicide	3	7	6	3
Unknown	4	0	1	0
TOTAL	75	71	89	87

Table 29: Suicide victims, by race and sex mortuary data, 1992-1996 (n=19)

Coloured Male	58%
White Male	21%
African Male	0%
Coloured Female	10%
White Female	10%
African Female	0%

Table 30: Part of anatomy causing death mortuary data, 1992-1996 (n=76)

Anatomy	Number	Anatomy	Number
Unknown	13	heart	3
head/skull/brain/face	25	abdomen	3
neck	4	back	1
chest	18	abdomen/thigh	1
chest/abdomen	2	thigh	1
chest/back	2	multiple injuries	2
chest/neck	1		

Table 31: Comparison of SAPS data and Mortuary data for murder victims under 18 years of age July 1995-December 1996

Month/Year	Number of murders for the entire Western Cape (according to SAPS data)	Number of murders for the Cape Town metropole only (obtained from mortuary records)
July 1995	5	2
August 1995	3	5
September 1995	2	3
October 1995	9	7
November 1995	9	8
December 1995	2	3
January 1996	7	8
February 1996	4	7
March 1996	3	7
April 1996	5	6
May 1996	2	2
June 1996	4	7
July 1996	8	13
Aug 1996	5	6
Sept 1996	3	4
Oct 1996	9	11
Nov 1996	4	8
Dec 1996	5	4
TOTAL	89	111

Sources of data: Crime Information Management Centre, Cape Town (SAPS) and Salt River and Tygerberg Forensic Mortuaries.