# National Non-Fatal Injury Surveillance System

# PILOT STUDY REPORT

Report prepared

by

Members of the Violence and Injury Surveillance Consortium

November 2000

A DACST Innovation Fund Project

**Acknowledgments**

The design, implementation and evaluation of this Injury Surveillance System is funded under the Department of Arts, Culture, Science and Technology Innovation Fund for Crime Prevention.

Special thanks are due to the following people:

*GF Jooste Hospital*

- Dr Maharaj (Medical Superintendent)
- Dr Naidoo (Head of Trauma)
- All the doctors and nursing staff who participated in this study.

*King Edward VIII Hospital*

- Dr Mhlambi (Medical Supintendent)
- Dr Wilson (Head of Trauma)
- All the doctors and nursing staff who participated in this study.

We are grateful for their candid comments and for providing us with their valuable trauma statistics. We hope that the envisaged surveillance system will eventually play a part in reducing their substantial workload.

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## 1. INTRODUCTION

The lack of reliable national level data on the extent of injury mortality and morbidity makes it difficult to establish its contribution to South Africa's burden of disease.

The effect of this injury information vacuum is an impoverished primary prevention and injury control response. Without appropriate data, resource allocation within the health services will remain inappropriate and ineffective, and it will be difficult to design, establish and evaluate systematic injury prevention and control programmes. Good quality injury data are also fundamental to making health resource allocation decisions, especially in the South African situation where there are substantial disparities between various socio-economic groupings.

Recognising the need for a concerted response to injuries in South Africa, the 1996 Essential National Health Research Congress identified research for injury and violence prevention as the top priority. In February 1997, South African Minister of Health and the US Secretary of Health and Human Services signed a joint statement on collaboration around violence as a public health problem. This formed part of the US-South Africa Bi-National Commission. In July 1997 a consultative conference on health and violence prevention identified the "*absence of valid, ongoing and timeous information about the basic determinants of violence and injury*' as a barrier to effective prevention and control, and thus prioritised the development of fatal and non-fatal injury surveillance to overcome it. Financially supported by the Department of Arts, Culture, Science and Technology's (DACST) innovation fund for crime prevention, the first steps towards overcoming the South African injury surveillance crisis are in the process of being addressed.

A consortium of research partners (Medical Research Council, University of South Africa, Centre for Scientific and Industrial Research) have been charged with the responsibility of setting up a national injury surveillance system incorporating both morbidity and mortality data.

## 2. THE NATIONAL NON-FATAL INJURY SURVEILLANCE SYSTEM

The National Non-fatal Injury Surveillance System will involve violence and injury surveillance through a sentinel system of health facility in the country. It is estimated that every non-natural death in South Africa is accompanied by around 80 non-fatal injuries, meaning that the approximately 60 000 injury deaths each year are matched by some five million non-fatal

cases, of which between 50 and 60 percent present to health facilities. While perhaps desirable, it is therefore unfeasible to monitor all of the 2.5 million injuries seen in the health sector, requiring instead that a sampling-based surveillance system be developed. This is known as sentinel surveillance, and the success of such systems depends on the degree to which the facilities used as sentinel sites are representative of the injury profile across all demographic and social sectors. The system will record data for first-time attendees at participating health facilities, and no referrals will be included. It is the objective of this component to establish such a system for South Africa.

## 2.1 Aims

The National Non-fatal Injury Surveillance System's **ultimate aim** is to establish a permanent system in sentinel hospitals throughout the country in order to register and describe injuries which occur annually in South Africa.

## 2.2 Goals

The National Non-fatal Injury Surveillance System's goals are:

- To provide ongoing and systematic information about the incidence, causes and consequences of all non-fatal injuries at local, regional and national levels
- To enable the early identification of new injury trends and emerging problems so that adequate interventions can be timeously established
- To determine priorities for injury and violence prevention action, both for high-risk groups and socio-economic risk factors
- To help evaluate direct and indirect violence and injury prevention measures
- To monitor seasonal and longitudinal changes in injury profile
- Policy and decision-making capacity

While the National Department of Health is the primary client for the proposed surveillance system, programme beneficiaries include all state, private and non governmental agencies formally engaged in violence prevention and injury control who will apply the information in their day-to-day planning and service delivery.

## 2.3 Surveillance Methods

There are at least 361 public and 383 private health facilities (clinics, hospitals, etc.) treating the approximately 2.5 million new victims of violence and injury that present to these facilities each year.

While desirable, it is logistically impossible to establish a comprehensive morbidity surveillance system that covers all injuries at all sites. Internationally, there has been a move away from attempts to achieve this, to strategic sentinel surveillance, a more labour and cost-effective option that is also more sustainable and achieves similar results.

The effectiveness of such a system depends on the degree to which the sentinel sites chosen represent the entire spectrum of violence and injury experiences. Both the amount and the characteristics of violence and injury events and causes differ widely, not only within cities, but also between cities, towns and rural areas. The proposed sampling frame is therefore aimed at identifying sentinel sites to cover all of these contexts.

To select these sentinel sites, all health facilities treating injury victims will be evaluated for inclusion in the study, using the following criteria:

- Geographical location (province, urban, rural, metropolitan).
- Level of care (primary, secondary, tertiary)
- Patient population (head count of trauma units).
- Catchment population (community demographics)
- Public / private status (cost of core)

**The target victims are all first time attendees at a health facility.**

**No referrals will be included.**

## 2.4 The Data Collection Form

The National Non-fatal Injury Surveillance data collection form was developed with the guidance of both local and international experts (Annexure A). It incorporates elements of the International Classification of External Causes of Injury (although these have been modified somewhat for the South African situation) in order to obtain data which may be compared with many other countries who use this system.

In order to meet the needs of both researcher and clinician the data collection form has been developed to include doctors notes, forensic drawings, and management. The completed form therefore provides a comprehensive summary of the patient's injuries, management and outcome.
The form consists of four pages. The first page is in duplicate and is the actual injury surveillance data capture form. It collects the following information:

- hospital, province
- patient demographics
- city, suburb and scene of injury as well as activity at the time of the injury
- alcohol and drug-relatedness of the injury
- cause of injury and specific mechanism as well as perpetrator victim relationship and type of violence
- severity of injury
- placement after initial treatment

## 2.5 Piloting of Data Capture Form

Two sites were chosen for the piloting of the National Non-fatal Injury Surveillance System data capture form, viz. King Edward VIII hospital (KEH) in Durban and GF Jooste hospital in Cape Town.

This report presents some of the general information, the findings from the study as well as the problems experienced by doctors completing the forms at the two facilities. It also includes the updated data capture form and the sentinel hospitals chosen for roll out of the surveillance system.

# 3 GENERAL INFORMATION

## 3.1 Instruction Manual

An instruction manual, explaining how to complete the proforma, was produced and a number were left in the Trauma Units for access by doctors completing the data capture forms.

This manual included:

- An overview of surveillance.
- An explanation of all variables included on the data capture form
- Some examples.

## 3.2 Form completion

Forms were completed as a matter of routine by each doctor assessing a patient who had presented to the Trauma Units with an injury. The duplicate questionnaire and other pages were retained in the patients file as 'patient notes'. The top copy of the questionnaire was used for surveillance purposes.

Doctors at both hospitals were given training on the completion of the surveillance form by MRC staff during the first week of the pilot project. Regular feedback and encouragement was given throughout the piloting phase.

## 3.3 Acceptability of Data Capture Form

At KEH the doctors accepted the form since they found it relatively easy to complete and also it obviated the need for them to write additional notes. They were happy to continue using the form after the one month piloting period was over. Their only complaints were that the carbon paper was making their hands dirty and they had to staple the proforma to the patients out patient record.

At GFJ, initially the doctors did not complete the forms complaining that it was 'too much paperwork' and that the carbon paper used was 'making everything dirty'. Consequently, during the first week of data capture not all trauma patients were included and the forms were

completed very haphazardly. In order to remedy this situation the Head of Trauma unit was revisited in the second week and asked for his support and assistance. A retraining session was conducted with the doctors where it was pointed out that the system would replace their previous documentation and consequently a fairly good response was noted.

Unlike KEH where the doctors asked to continue completing the forms after the one month pilot was complete - the doctors at GFJ did not want to continue. Furthermore, about 500 uncompleted forms went missing or were discarded from GFJ.

### 3.4 Computerisation of Data Capture Form

A database was designed in Epi Info 6.04 for the piloting phase and data was punched in and analysed using this programme. This system was satisfactory for the pilot study, but when roll out of this system commences a more sophisticated system such as MS Access will be used to capture data because of the volume of records involved.

The data punching was out sourced and these personnel were paid to punch in the data. In general, few punch errors were found. The data was checked, cleaned and analysed by MRC researchers.

Each form completed by the doctor was also assessed for accuracy (or face validity). Each variable on the proforma was assessed for:

- blanks
- completed but incorrect, e.g. pedestrian collision indicated as 'other' under 'accident'
- wrong category completed, e.g. attempted suicide with a gun indicated under violence.

## 4. PROBLEMS ENCOUNTERED

The piloting of the data capture form commenced a week late because the printers encountered problems with the replication of the forms. Also, a self carbonating paper could not be used because of the proforma design and consequently carbon paper had to be used as an interim measure.

Despite reprinting the forms the following problems remained:

- The carbon paper used was very expensive and messy

- The glue used by the printers was useless and so MRC researchers needed to staple the forms together by hand - this was very time consuming
- The writing still came through from the back pages onto the questionnaire copy
- The forms were expensive to produce in three colours although very user-friendly
- at KEH the doctors needed to staple the patient management section of the proforma to each patient's out patient card which was very time consuming
- duplication of records was a problem because patients are admitted from three different sources
- continuous training on form completion was required since the doctors change often.

## 5. RESULTS FROM PILOT STUDY

### 5.1 Accuracy of Forms

At both KEH and GFJ the accuracy or face validity of the forms was assessed after they had been used for one week. At KEH, 21 of the 29 variables assessed were found to have a 90% or greater accuracy while at GFJ only 62% of the variables had 90% or more accuracy. At both facilities the variables with the poorest accuracy were found to be 'time treated', 'time injured', and 'placement'. This information was fed back to the doctors completing the forms. Accuracy was reassessed again at 4 weeks and this had improved to 72.4% and 68.5% at the two facilities, respectively. The same three variables remained problematic as well as 'gender of the main perpetrator' and 'safety belt usage'.

### 5.2 Ability to capture all injured patients

At KEH a total of 606 forms were completed for the four-week period. However, 832 cases were registered in the casualty logbooks for this time period, i.e. 72.8% of patients passing through the department had injury surveillance forms completed. At GFJ, the completing rate was less satisfactory. 516 forms were completed for the four-week period while 860 patients were identified in the casualty register - a case completion rate of only 60%.

Possible reasons for this low registration were:

- patients are registered at a number of different points in the emergency rooms
- some patients with very minor injuries are seen and treated rapidly before injury surveillance forms could be completed

- there was a steep learning curve for many doctors, some of whom remained resistant to completing yet another form.

### 5.3 Cause of Injury

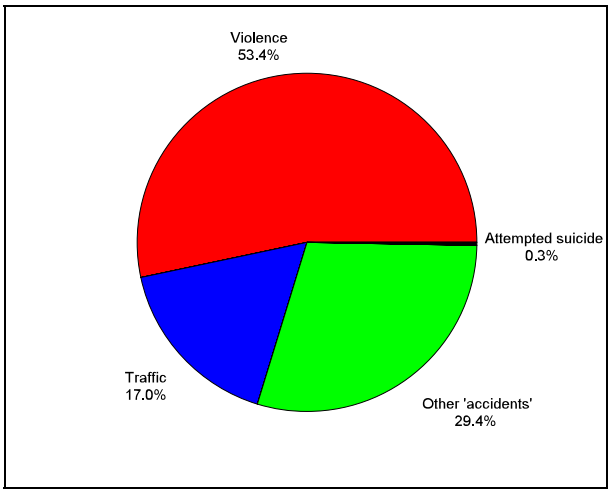


**Figure 1 : Cause of Injury**

Just over half of all patients had been injured as a result of violence (Figure 1). A further 29% had been injured in accidents or mishaps such as falls, burns and drowning. Traffic-related collisions accounted for 17% of the injuries seen at the two facilities. Only three patients who had attempted suicide were seen at the two facilities over the one-month pilot period.

**Table I : Cause of Injury by Facility**

| | KEH n (%) | GFJ n (%) |
|---|---|---|
| Violence | 269 (44.4) | 323 (64.2) |
| Accidents | 215 (35.5) | 111 (22.1) |
| Traffic | 121 (20.0) | 67 (13.3) |
| Suicide | 1 (0.2) | 2 (0.4) |

There were interesting differences in the injury profiles at the two facilities (Table I). Unexpectedly, GF Jooste registered a significantly higher incidence of violence than KEH (ChiSq=37.1, p<0.0001), while KEH had significantly higher levels of both traffic injuries (ChiSq=9.7, p=0.002) and other non-traffic accidents (ChiSq=26.4, p<0.0001).

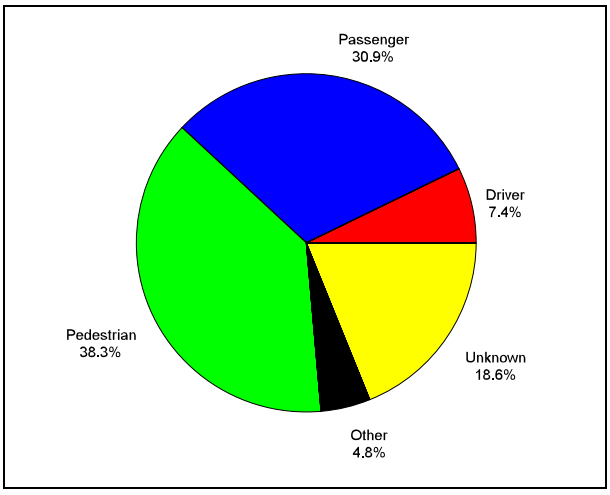


**Figure 2 : Traffic Injuries**

#### 5.3.1 Traffic

Overall, pedestrians accounted for more than one-third of traffic injuries, while passengers made up another approximately 30% (Figure 2). However, in nearly one-fifth

of cases the traffic user category was not known.

**Table II : Traffic user by Facility**

| | KEH n (%) | GFJ n (%) |
|---|---|---|
| Driver | 7 (5.8) | 7 (10.4) |
| Passenger | 51 (42.1) | 7 (10.4) |
| Pedestrian | 44 (36.4) | 28 (41.9) |
| Other | 3 (2.5) | 6 (9.0) |
| Unknown | 16 (13.2) | 19 (28.4) |

Significantly more passengers (ChiSq=28.3, p<0.0001) who had been involved in motor vehicle collisions were admitted to KEH (Table II). This is probably because the incidence of taxi-related collisions was higher in the Durban area than in Cape Town (33.1% versus 10.4; ChiSq=19.1, p<0.0001).

### 5.3.2 Violence

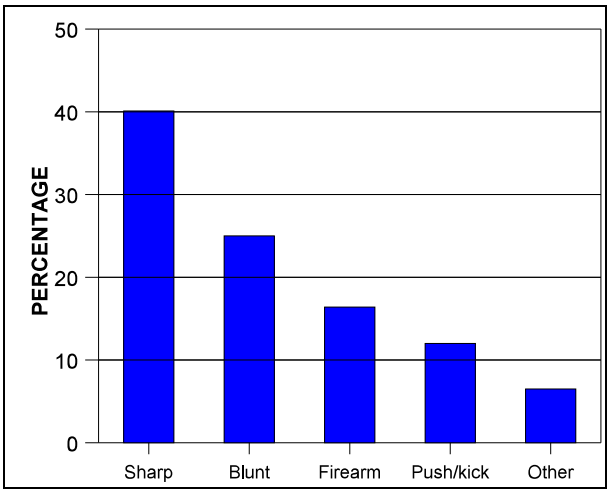


**Figure 3 : Mechanism of Violence**

Forty percent of patients injured as a result of violence had been stabbed or injured with a sharp object (Figure 3). A further one-quarter had blunt object injuries. Just over 16% of patients at the two facilities had been shot.

**Table III : Mechanism of Violence by Facility**

| | KEH n (%) | GFJ n (%) |
|---|---|---|
| Sharp | 86 (32.0) | 151 (46.9) |
| Blunt | 78 (29.0) | 70 (21.7) |
| Firearm | 47 (17.5) | 50 (15.5) |
| Pushed/kicked | 42 (15.6) | 29 (9.0) |
| Other | 5 (1.9) | 16 (5.0) |
| Unknown | 11 (4.1) | 6 (1.9) |

Significantly more violence was perpetrated with a sharp object in the Cape than in Durban (ChiSq=38.0, p<0.0001). Similar proportions of firearm violence were recorded in the two cities (Table III).

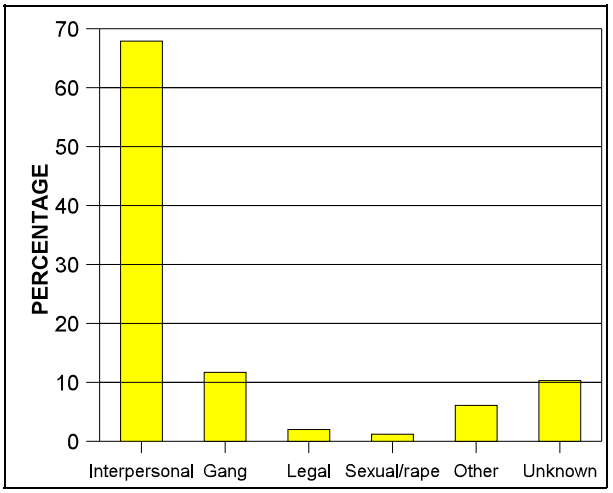


**Figure 4 : Type of violence**

Two-thirds of the violence seen at both facilities was categorised as interpersonal (Figure 4). A further 11% was gang-related. In just over 10% of cases, the type of violence was unknown.

There were significantly more gang-related violence injuries seen at GFJ hospital in the Cape than at KEH (14.3% versus 8.6%, ChiSq=12.7, p=0.0004).

**Table IV : Perpetrator of violence**

| | Female | Male | All |
|---|---|---|---|
| Friend | 32 (21.8) | 72 (16.6) | 106 (17.9) |
| Stranger | 28 (19.0) | 192 (44.2) | 255 (38.0) |
| Spouse/partner | 39 (26.5) | 10 (2.3) | 51 (8.6) |
| Other relative | 16 (10.9) | 20 (4.6) | 36 (6.1) |
| Acquaintance | 11 (7.5) | 56 (12.9) | 68 (11.5) |
| Parent/step parent | 3 (2.1) | 2 (0.4) | 5 (0.8) |
| Police | 1 (0.7) | 13 (3.0) | 14 (2.4) |
| Unknown | 17 (11.6) | 69 (15.9) | 87 (14.5) |

In nearly 50% of cases the patient knew their perpetrator (Table IV). This phenomenon was even more exaggerated when the victim was a female. Females were significantly more likely to know their perpetrator than injured men (ChiSq = 45, p<0.0001).

Furthermore, women victims were more likely to have been injured by their spouse or partner than were male victims (ChiSq=83.4, p<0.0001).

The gender of the perpetrator was only documented in 54% of cases and so therefore meaningful deductions could not be made, except to say that the majority of perpetrators were male. The doctors recommended that an 'unknown' category be included for this variable.

The number of perpetrators involved in the violent attack was also poorly completed by doctors. However, it was disturbing to note that in 30% of attacks where this variable was known there were two or more perpetrators. Interestingly, where there were multiple perpetrators involved in the attack the victim was significantly more likely to be male than female (ChiSq=24.8, p<0.0001).

### 5.3.3 Accidents

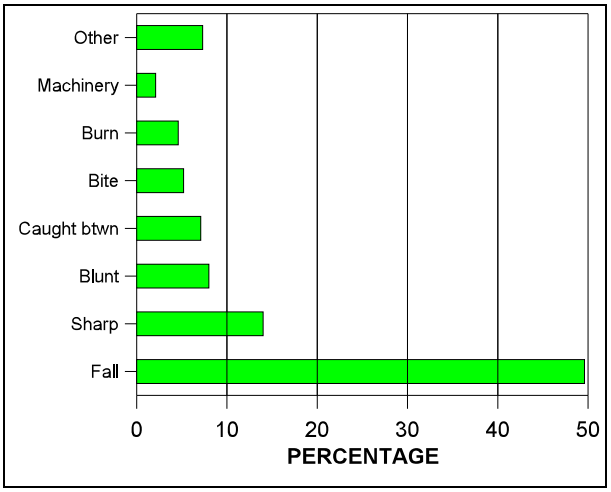


**Figure 5 : Mechanism of Accident**

The majority of non-traffic accidents were the result of a fall accounting for almost half of such mishaps (Figure 5). Accidental injuries with a sharp object accounted for a further 15% of cases. Few cases of burns were recorded during the sampling period but this could be related to the fact that the pilot project took place during summer. Interestingly, no cases of near-drowning were recorded despite the timing of the pilot study. There were also no cases of accidental poisoning. The types of accidental injuries were remarkably similar at the two facilities.

### 5.3.4 Attempted suicide

Only three cases of attempted suicide were recorded in the database and therefore meaningful deductions could not be made. The doctors did, however, recommend that place should be left on the proforma for them to stipulate exactly what type of poison/drug had been used in the suicide attempt.

## 5.4 Gender

70.3% of all patients registered at the facilities were male (Table V). This male preponderance was further seen among the different injury categories - patients injured violently were significantly more likely to be male than female (ChiSq=11.2, p=0.0008) as were those injured in traffic collisions (ChiSq=4.1, p=0.04). There were no significant differences in gender between the two facilities.

**Table V : Cause of Injury by Gender**

| | Violence | | Traffic | | Non-traffic 'accidents' | | Total | |
|---|---|---|---|---|---|---|---|---|
| | KEH | GFJ | KEH | GFJ | KEH | GFJ | KEH | GFJ |
| Female | 54 (21.4) | 90 (28.6) | 42 (35.3) | 24 (36.9) | 66 (31.3) | 44 (40.4) | 165 | 161 |
| Male | 204 (78.6) | 225 (71.4) | 77 (64.7) | 41 (63.1) | 145 (68.7) | 65 (59.6) | 432 | 341 |

## 5.5 Race

The race variable was optional. Consequently, many doctors did not complete this question (particularly at GFJ) and therefore meaningful deductions could not be made.

## 5.6 Home Language

Of greater importance for the purposes of injury prevention was the variable on home language. However, it was disappointing to note that this variable was only completed in 70% of cases. This is possibly because 'home language' is not a variable frequently included in medical documentation and therefore the doctors completing the forms would require further education so that they can understand its relevance to injury prevention.

Where home language was documented, 70% spoke Zulu, 12.7% Afrikaans, 10.2% Xhosa and only 6.4% English. This outcome highlights the inadequacies of most injury prevention and education efforts conducted in SA to date. They have been largely conducted in English

and Afrikaans.

## 5.7 Age

**Table VI : Ages of patients by Facility**

| | KEH | GFJ |
|---|---|---|
| 0 - 14 | 87 (15.7) | 59 (12.1) |
| 15 - 24 | 162 (29.2) | 161 (33.1) |
| 25 - 34 | 163 (29.4) | 123 (25.3) |
| 35 - 44 | 78 (14.1) | 83 (17.1) |
| 45 - 54 | 41 (7.4) | 39 (8.0) |
| 55+ | 23 (4.1) | 21 (4.3) |

On average patients admitted to the two facilities with non-fatal injuries were 27.7±14.2 years old. The proportions of patients in the different age categories was strikingly similar (Table VI) with approximately one-third of all patients being in the 15 - 24 years age range and a further quarter in the 25 - 34 range.

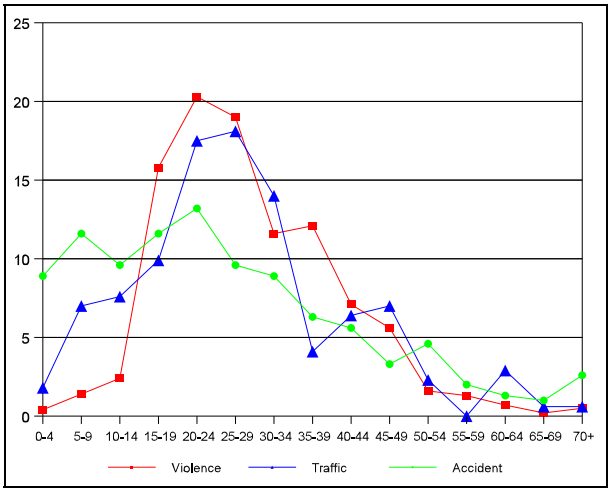


**Figure 6 : Cause of injury by Age**

Figure 6 depicts the classic age distribution for the three major causes of non-fatal injuries.

Violence-related injuries show low proportions in the young age ranges, but peak during the teen years to a level similar to that of adults. Violence-related injuries drop down at approximately 45 years of age.

On the other hand, both traffic and other non-traffic injuries show much higher rates in the younger age groups. Traffic collisions peak at about 20 years and have high levels until 34 years. Non-traffic accidents have high levels until approximately 24 years of age and then tail off. There is a slight increase in the proportion of these accidents among geriatrics.

**Table VII : Mechanism of injury by age**

| <5 | 10 - 14 | 15 - 24 | 25 - 34 | 35 - 44 | 45 - 54 | 55+ |
|---|---|---|---|---|---|---|
| Fall (46.7) | Fall (43.5) | Viol sharp (26.5) | Viol sharp (29.5) | Viol sharp (30.3) | Viol sharp (27.8) | Fall (40.5) |
| Burn (16.7) | Pedestrian (15.2) | Viol gun (17.3) | Viol blunt (17.3) | Viol blunt (22.1) | Acc struck (13.8) | Viol blunt (21.4) |
| Pedestrian (6.7) | Viol sharp (13.0) | Viol blunt (15.3) | Fall (10.2) | Fall (12.3) | Fall (11.3) | Pedestrian (9.5) |
| Acc sharp (6.7) | Push/kick (8.7) | Fall (11.6) | Passenger (9.1) | Viol gun (11.5) | Acc sharp (8.8) | Viol sharp (7.1) |
| Acc blunt (6.7) | Acc sharp (6.5) | Pedestrian (5.8) | Viol gun (8.7) | Acc sharp (5.7) | Pedestrian (7.5) | Driver (5.0) |

Table VII above depicts the five major causes of injury in different age groups. Violence perpetrated with a sharp object dominated from young adulthood through to 54 years of age. Falls were the most common cause of injuries in the very young and the very old.

## 5.8 Scene of Injury

The most common scenes of injury for all patients were: private house (30.7%), road (34.5%), informal settlement (7.1%), public transport area (3.8%), industrial or construction site (3.0%) and bar, shebeen, nightclub (2.8%). Scenes were similar for the two facilities.

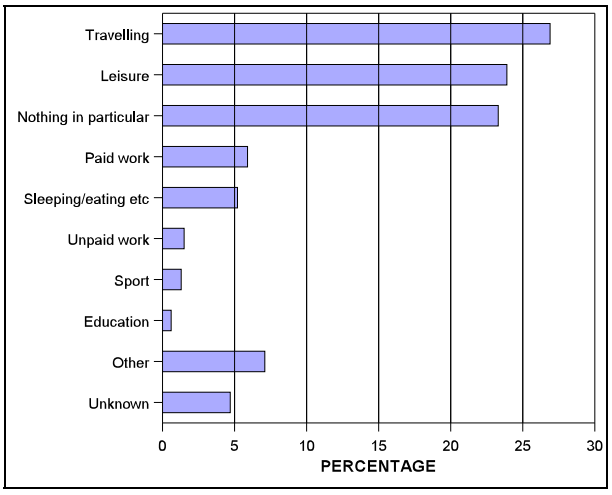


**Figure 7 : Activity at the time of injury**

## 5.9 Activity at the time of Injury

Just over one-quarter of patients were travelling, either in a vehicle or on foot, when they were injured (Figure 7). A further one half of patients stated that they were at leisure/playing or doing nothing in particular.

## 5.10 Substances abused

### 5.10.1 Alcohol

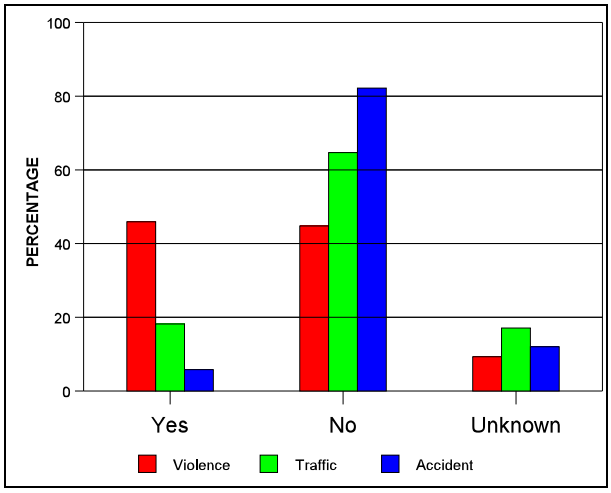


**Figure 8 : Alcohol usage by Cause of Injury**

Alcohol usage was unknown in 12% of patients, negative in 58.8% and positive in 29.2%. As can be seen in Figure 8, significantly more patients injured in violence were alcohol positive than where those injured in traffic collisions or accidents (ChiSq=176, p<0.0001). Alcohol assessment was based on self-report or clinical judgement and as such is probably an undercount of the true incidence of alcohol-related trauma at both facilities.

Significantly more patients were assessed to be intoxicated at GFJ (39.4%) than at KEH (20.6%) (ChiSq=40.6, p<0.0001).

### 5.10.2 Drugs

Only 4.4% of patients were judged to have used drugs prior to their injury. This is possibly because patients deny drug usage because of its illicit nature and also because doctors are not yet aware of the usefulness of this information.

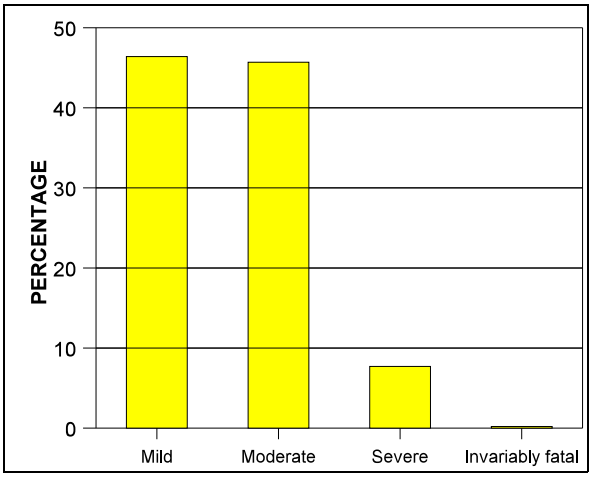


**Figure 9 : Severity of Injuries**

## 5.11 Severity of Injuries

Approximately 45% of patients were judged to have minor injuries, while a further 45% had moderate injuries. Less than 8% had severe injuries and only 0.2% had injuries judged to be invariably fatal.

Injuries were similar at the two facilities.

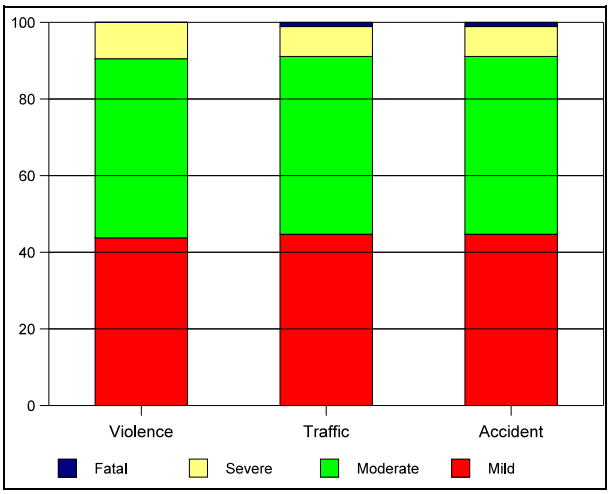


**Figure 10 : Severity by cause of injury**

Furthermore, the severity of injuries in the three major cause categories was strikingly similar (Figure 10).

### 5.12 Placement after initial assessment

Nearly two-thirds of the patients who were seen in the trauma units, were treated and then discharged. Approximately 18% required admission to a hospital ward or intensive care unit. A further 18% were referred on for further management and were thus lost to follow up. This was particularly the case at KEH where patients leave the unit in order to have x-rays or other diagnostic procedures and do not return. It is possible that some of these patients could have been admitted to a hospital ward after seeing another doctor in an out patient's department.

**Table VIII : Placement by Cause of Injury**

| | Violence (%) | Traffic n (%) | Accident n (%) |
|---|---|---|---|
| Discharged | 299 (64.9) | 82 (53.9) | 188 (67.4) |
| Admitted | 102 (22.1) | 34 (22.4) | 24 (8.6) |
| Referred | 60 (13.0) | 36 (23.7) | 67 (24.0) |

As can be seen by Table VIII significantly less patients who had sustained accidental injuries required admission to a hospital ward (ChiSq=47.8, $p<0.0001$).