Epidemiology of non-fatal injuries due to external causes in Johannesburg-Soweto

Part I. Methodology and materials

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Summary

In this, the first of two articles examining the epidemiology of non-fatal trauma in Johannesburg-Soweto, we define case inclusion criteria, and discuss the methodology and materials used in this low-cost, hospital-based survey. The survey was conducted between 8 June 1989 and 24 August 1990. Sampling of both inpatient trauma cases and those seen in casualty departments took place in 6 state and 5 private hospitals located within or nearby the Johannesburg magisterial district. Demographic details about each patient, as well as information concerning spatial and temporal details of the incident, involvement of alcohol or drugs, diagnosis, severity of injury, and placement after casualty treatment, were collected by interviewing each patient. Data concerning the age, sex and racial composition of the background population were assembled from a number of sources. After discussing the internal limitations of this methodology, it is concluded that its findings may be of limited use for improving secondary interventions, but are of definite value for trauma prevention programmes.

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Trauma has been described as 'the scourge of modern society'.[1] In America it is the fourth largest overall cause of death, and the main cause of death for people under 45 years of age, with rates for vehicular trauma and homicide approximately equal.[2,3] In South Africa, accidents, poisoning and violence rank fourth as a cause of death among people classified as white, and second as a cause of death among people classified as black.[4] In 1984, trauma was the leading cause of potential years of life lost, accounting for 32,8% and 49,8% potential years of life lost among people classified as black and white respectively.[4] Van der Spuy[5] notes that each death in the Groote Schuur Hospital Trauma Unit is paralleled by 80 admissions and 351 patients treated on an ambulatory basis. Extrapolating from these findings, he estimates that some 2,35 million trauma patients annually require treatment. In South Africa, approximatey 5 times as many people as in the USA sustain trauma in motor vehicle accidents (MVAs), while trauma due to assault appears to be at least 3 times as common as that due to MVAs.[5] Why do an inordinately high number of people sustain trauma in South Africa?

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Van der Spuy,[5] focusing on vehicular trauma, singles out deficient law enforcement measures, poor driver attitudes and the role of alcohol as contributing factors. Nell and Brown[6] adopt a more sociological approach in their attempt to explain why blacks are approximately 9 times more likely to sustain traumatic brain injury than whites, arguing that this reflects the effects of personal and political disempowerment. However, because there are few studies that have systematically examined the incidence of all trauma in a particular catchment area, it is difficult to evaluate such hypotheses, which requires an overview of how different causes account for different proportions of all trauma, and how aetiological and diagnostic patterns relate to demographic factors such as sex, social class, occupation, place of residence and the effects of urbanisation. The absence of such knowledge also makes it difficult to plan appropriate treatment facilities and develop primary prevention programmes tailored to local needs and risk factors. It was in attempt to fill this knowledge gap that the present study was undertaken, and its aims were to: (*i*) determine the incidence and causes of non-fatal injuries due to external causes in Johannesburg-Soweto; (*ii*) describe the relationships between the incidence of trauma due to different causes and the demographic characteristics of victims; (*iii*) describe how temporal and spatial factors such as time of day, place of injury and suburb of injury pattern the distribution of trauma; and (*iv*) establish what proportion of all trauma is due to assault, and identify the demographic characteristics of assault victims, so creating a database for a sequence of studies focusing in the determinants and primary prevention of assault.

The aim of this paper is to describe the methodology used in this study. Results are reported in a companion paper in this issue.

Materials

Catchment area

The catchment area was the Johannesburg magisterial district, which includes Soweto as well as Diepkloof and Meadowlands. These boundaries were selected because they constitute an area of rapid metropolisation, in which data restricted to historically established city boundaries (such as greater Johannesburg or Soweto in isolation), provide little information about the true population involved in the economic life of the area.[7] Fig. 1 displays the catchment area, and approximate locations of the catchment hospitals.

The Town Planning branch of the Johannesburg City Engineer's Department has divided this area into 668 suburbs, such as Newtown, Eldorado Park Extension 1 and Pimville, each of which is clearly identified on the City Engineer's 1 : 10 000 map of the area.[8] To map the spatial distribution of incidents of trauma, these suburbs were sequentially numbered. These numbers were used to code the geographical location of each incident, and the suburb of residence of victims.

Fig. 1. Johannesburg-Soweto, with approximate location of catchment hospitals.

Catchment hospitals

The study was a prospective hospital-based survey of trauma victims. It was conducted in 11 hospitals located in or near the catchment area (see Fig. 1 and Table I). These hospitals were selected through examination of the casualty records of all state and private hospitals in the area. In this way it was decided to exclude 10 private hospitals and the 12 clinics making up the Soweto primary health care system, because they treated few or no victims meeting the case admission criteria (defined below). Also excluded was Lenasia Hospital, because it only opened in July 1989 and as of July 1990 was still referring casualty victims to Baragwanath and Coronation hospitals. Main Reef, the only catchment hospital located outside the catchment area, was included because it is dedicated to the treatment of workmen's compensation injuries, and it was assumed that employees resident in the catchment area would be referred to it. Other hospitals falling just outside the catchment area, such as Edenvale Hospital, were excluded. In addition, an unknown number of trauma victims receive treatment from general practitioners and chemists, or else at home. These sampling limitations mean the incidence figures for Johannesburg-Soweto underestimate true rates.

Subjects

The target population was all persons resident in the catchment area. As is common to epidemiological research,[9] the survey population differed from the target population. In this study, the survey population consisted of all victims of trauma identified at the catchment hospitals during the survey, who met the case admission criteria for medical eligibility, incidence, and place of residence.

Medical eligibility

Case inclusion required outpatient or inpatient admission to one of the 11 catchment hospitals as a direct result of injury due to external physical force, heat or drowning. These conditions include all injuries coded under chapter XIX of the 10th revision of the *International Classification of Diseases* (ICD 10),[10] with the exception of those due to poisoning (codes T36 - T50 inclusive). Also excluded were early complications of trauma (code T75), complications of medical care (codes T76 - T89 inclusive), and sequelae of injuries, poisoning, toxic effects and other external causes (codes T90 - T98 inclusive). These categories were excluded because they concern complications and sequelae not directly related to a traumatic event. Medical eligibility also required that patients met the criterion for non-fatality, which was that they be alive on arrival at the casualty department.

Incident cases

The incidence rate refers to the number of new cases of trauma per 100 000 of a known population in a calendar year. Incident cases were defined as all persons meeting the criteria for medical eligibility and place of residence who were injured no longer than 24 hours before being interviewed. This criterion was applied to avoid the inclusion of prevalent cases, which would have systematically overinflated the true incidence rate.

Place of residence

Because of the calculation of an incidence rate demands that all new cases be drawn from a known population, only persons who met the other admission criteria and who gave a residential address in the catchment area were admitted to the incidence count. A separate count of medically eligible non-residents was kept, which showed that 22,3% of all cases were non-residents. The percentage of residents treated at hospitals outside the catchment area was not established, and Nell and Brown,[6] commenting on their study of the epidemiology of traumatic brain injury, note that although leakage in this reverse direction is likely to be less, it may nonetheless result in a substantial underestimate.

Methodology

Sampling procedure

The limited staff and funds available to the project meant that it was not possible to count all trauma victims presenting at all catchment hospitals on each of the 365 days in a calendar year. It was therefore necessary to conduct the survey on a representative sample of days so that inferences could be made about the annual number of incident cases. The study ran from 8 June 1989 to 24 August 1990. For inpatient incident cases, sampling proceeded through cycles of early morning ward rounds in the catchment hospitals. For incident cases identified in casualty departments, sampling was conducted through a series of continuous 24-hour watches in each hospital's casualty department(s).

Ward rounds

Before sampling inpatient cases, field workers consulted medical and nursing staff at each catchment hospital to identify those departments to which incident cases were not admitted. They then visited the remaining departments and used bed letters to identify all inpatient incident cases, who were then interviewed using the protocol described below. At four state hospitals (Baragwanath, Coronation, Hillbrow and Johannesburg), these ward rounds comprised 12 cycles of 5 visits each, with no visits every 6th day so as to ensure that the rest day fell on a different day each week. Sampling in Baragwanath hospital was delayed by difficulties in gaining permission to conduct the study there, as well as by the strike by hospital workers early in 1990, and so took place 6 months later than for the remaining hospitals. In South Rand Hospital casualty records indicated an admission rate too low to justify ward rounds, and sampling therefore consisted only of casualty watches. During the course of the study, the status of J. G. Strijdom Hospital was changed from provincial to 'own affairs', and it lost its academic status. This was associated with a sharp fall-off in the number of incident cases identified at the hospital, and so the proposed 12 cycles of ward rounds were reduced to 4.

Hospital records for the private hospitals sampled indicated very few trauma cases, and ward rounds were therefore limited to 3 days per hospital. These took place on days of the week determined by the hospital managers and on dates that corresponded with the cycles of ward rounds in state hospitals.

Casualty watches

Data derived from a count of inpatients only would systematically underestimate the incidence of trauma, because most victims (for example, 62,9% and 74,2% at Baragwanath and Johannesburg hospitals respectively) are discharged after casualty treatment. Therefore, at each of the hospitals sampled, a number of continuous 24-hour casualty watches were conducted in their casualty departments. During these watches all patients were screened after treatment, and those identified as trauma victims were interviewed.

The decision about when to perform the watches was made after scrutinising the casualty register at each catchment hospital so as to establish daily fluctuations in the number of cases seen in casualty. This revealed that in general the 4-day period from Fridays to Mondays was busiest. It was therefore decided that at each state hospital watches would be conducted for a full weekend (Friday - Monday inclusive), and for 2 midweek (Tuesday - Thursday) days. This amounted to 6 watches per state hospital, but owing to staff complications the actual number of watches per hospital varied between 6 and 7. Very few incident cases were recorded in the casualty registers at private hospitals, and they were therefore allocated only 1 watch each. As for ward rounds, the order in which the watches were conducted and the dates on which they took place were randomised. Table I summarises details of the catchment hospitals and sampling procedure.

TABLE I. ANALYSIS OF CATCHMENT HOSPITALS, WARD ROUNDS AND CASUALTY WATCHES

Hospital	Beds*	Ward rounds†	Casualty watches‡
State (low fee)			
Baragwanath	**2 459**	**61**	**6**
Coronation	**529**	**60**	**6**
Hillbrow	**795**	**60**	**7**
Johannesburg	**874**	**55**	**7**
J. G. Strijdom	**452**	**20**	**6**
South Rand	**234**	**—**	**7**
Private (full fee)			
Garden City	**300**	**3**	**1**
Lady Dudley	**83**	**3**	**1**
Main Reef	**116**	**3**	**1**
Milpark	**265**	**3**	**1**
Princess	**209**	**3**	**—**

* Engelhardt, 1990.[11]
† By hospital, each ward round represents a separate day.
‡ Each casualty watch lasted 24 hours.

Interview protocol and coding templates

The interview protocol consisted of 39 questions about the demographic characteristics of victims, details of the time, place and cause of injury, values for vital signs, diagnoses, injury severity, type of treatment, placement after casualty treatment, self-reported involvement with alcohol or drugs, projected disability and projected time off work. The protocol was 'fine-tuned' over the course of the first 200 interviews, after which a small number of additional questions pertaining to incidents of assault were added and some minor format changes made.

Non-numerical raw data (such as name of hospital, victim's occupation and suburb of residence, scene and cause of injury, and diagnosis) were given numerical codes. Cause of injury was coded using Van der Spuy's classificatory system (J. W. van der Spuy, 1989 — personal communication), and diagnoses were coded using chapter XIX of the ICD 10.[10]

Reliability. All coding was done by two fieldworkers with extensive training and experience in the allocation of ICD 10 codes to diagnoses copied from patient files. Reliability checks were conducted on those raw data that were not coded at the point of data collection. These were ICD 10 codes for nature of injury, and the codes for suburb of injury and suburb of residence. Two random samples of 100 protocols were selected from the first 300 protocols coded by each fieldworker. These were recoded by an independent rater (the first author) familiar with the ICD[10] and the procedure for coding suburbs. Satisfactory agreement was obtained in the identification and allocation of ICD 10 codes to the major injury sustained by each patient, with the percentage agreement between fieldworkers and the independent rater being 89% and 91%. Most of the disagreements concerned coding of the major injury for patients who received diagnoses of severe injuries to multiple body regions including the head (e.g. 'acute abdomen, head injury and fractured left tibia and fibia'). The fieldworkers allocated T codes classifying the major injury in such cases among the group of 'injuries involving multiple body regions' (ICD 10 codes T00 - T06 inclusive). It was the opinion of the independent rater that in such cases the diagnosis of head injury should be identified as the major injury, since it was more likely to imply severe, chronic disability. However, the diagnostic notes entered by admitting doctors were usually too vague to infer the relative severity and importance of injuries. It was therefore agreed that all such cases would be allocated an appropriate T code.

For suburb of injury and suburb of residence, fieldworker A and the independent rater agreed in 98% and 100% of cases, with the equivalent figures for fieldworker B being 99% and 97%.

Interviewing

The interview protocol described above was administered to all cases meeting the admission requirements. Before being interviewed, the informed consent of each patient was sought. An attempt was made to ensure that all patients who were fully conscious and able to speak were interviewed in their vernacular language. However, in some cases this was not possible, and interviews were conducted in the language that both interviewer and subject were most fluent in. For patients who could not be interviewed because they were unconscious or unable to speak, as much of the protocol as possible was completed from their files. In some cases relatives and friends present during the interview gave proxy information. These different sources of information were not, however, identified as such on the protocols. Data such as diagnoses, blood pressure, respiratory rate and Glasgow Coma Scale rating on admission were copied from patients' files onto the interview sheet.

Determining base population

A reliable estimate of the size, sex and age distribution of the population in Johannesburg-Soweto is needed to calculate incidence rates. However, arriving at such an estimate was perhaps the most difficult aspect of this study, for reasons that include the following.

Since 1985 when the last official census was conducted, wide ranging sociopolitical and economic changes (in particular the scrapping of influx control legislation), have taken place. Consequently there has been a major influx of people into metropolitan areas such as Johannesburg-Soweto. For example, Segal, Padayachee, Zach and Hurwitz (unpublished data) estimate that the percentage of persons classified as black who are resident in Hillbrow rose from less than 10% in 1980 to approximately 40% in 1989. While a number of post-census counts have been performed, there are great disparities in the figures arrived at by different agencies. For example, the population of Soweto in 1988 was estimated by the South African Institute for Race Relations to be 1 195 000,[12] whereas Davies, Bristow, Small and Associates gave a figure of 3 000 000 for the same year.[12] Although part of the same magisterial district, agencies performing post-census population counts have treated Johannesburg and Soweto as separate entities. Consequently, there is little consistency in the methodologies applied and the statistical rigor with which results for these areas are presented. For example, while Van Zyl's[13] report on Soweto's population in 1988 gives detailed analyses of its age and sex structure complete with 95% and 98% confidence levels, the most recent figures available for Johannesburg[14] give totals for people classified as white, coloured, Asian and black, and the percentage of residents aged between 0 and 4 years and 65 years or more, but no information concerning people between these ages, no data on sex structure, and no confidence levels.

Population size. Faced with this bewildering array of estimates, it was decided to utilise the population totals provided by the Johannesburg Medical Officer of Health[14] for members of the background population classified as Asian, coloured and white, since these are based on cluster sampling performed during 1989, and appear to be the best available estimate. For black members of the background population, the Urban Foundation's[15] projected population totals for 1990 were used, since these appear to be the most rigorously derived estimate of the black population in the entire catchment area. While they were extrapolated from the 1985 census, the model used in the Urban Foundation's calculations adjusts the 1985 census totals for their severe underenumeration, and in projecting totals for 1990 takes into account factors such as rural-urban differentials in fertility rates, in- and out-migration, and estimated numbers of people residing in informal dwellings. However, the Urban Foundation figures treat Johannesburg and Randburg as a single entity. It was therefore necessary to adjust these figures to reflect only the population of Johannesburg-Soweto. This was done by establishing the percentage distribution of the black population in Johannesburg and Randburg, using 1985 census data.[16] The population percentages for Randburg were then subtracted from the Urban Foundation's projected 1990 totals of black residents of Johannesburg and Randburg.

Age and sex structure. Following Padayachee (personal communication, February 1990), 1985 census data for the age and sex structure of the base population made up of Asians, coloureds and whites can be generalised to 1990, since these groups are relatively stable. However, the extent of urbanisation among blacks means that 1985 census data on the age and sex structure of this component cannot be generalised to 1990. Accordingly, it was decided to use 1985 census data for calculating the percentage age and sex structure of the background population for Asians, coloureds and whites. For blacks it was decided to use that calculated by Van Zyl[13] for the Soweto population on residential stands. Although the age and sex structure of blacks resident in Johannesburg is undoubtedly different, no viable alternative to Van Zyl's[13] figures is available for this 12% segment of the black population.

Table II sets out the estimated race, sex and age distribution of the population in Johannesburg-Soweto for 1990.

Data analysis

Annual incidence

To calculate incidence rates, it is necessary to estimate the absolute annual number of trauma cases. To do this, the method developed by Nell and Brown[6] was followed. The number of incident trauma cases identified in each hospital was divided by the number of sampling days on which those cases were found, and the quotient multiplied by 365,25. Since the number of sampling days per hospital differed, 'annualised' figures were calculated separately for each hospital and then summed to give a grand total. These annualised totals for various categories of victims (e.g. black, female, 15 - 24 years of age) were then divided by the number of people in the equivalent categories of the target population, and the results multiplied by 100 000 to give annualised incidence rates per 100 000 population. Casualty watch data (which include cases discharged after casualty treatment and patients admitted after casualty treatment) were used to calculate incidence rates for all trauma. Data for cases discharged after casualty treatment were used to calculate incidence rates for outpatients, and data collected during ward rounds were used to calculate incidence rates for trauma leading to hospital admission.

Severity

Injury severity was estimated using the Revised Trauma Score (RTS).[17] This is a physiological index calculated using a patient's Glasgow Coma Scale, systolic blood pressure and respiratory rate on admission. Each of these variables is assigned a coded value from 0 to 4 based upon its raw value. Each coded value is then multiplied by an empirically derived weight, and the RTS is scored by summing the products of these weights and the coded values of the associated variables.

Discussion

Sampling adequacy

Bias to inpatient incident cases. The sampling procedure followed in this study allocated substantially more time to recording data from cases seen during ward rounds than from those seen in casualty departments. Since cases identified during casualty watches included those who were later admitted as inpatients, it is apparent that rates derived from casualty watch data will more accurately reflect the incidence of all trauma than rates derived from data gathered during ward rounds. This implies that findings concerning the incidence rates of trauma severe enough to warrant hospital admission are more robust than those concerning the incidence rate of all trauma. Future studies attempting to establish rates for trauma should accord primary importance to sampling cases seen in hospital casualty departments, rather than inpatients.

Influence of contextual factors. That sampling was not performed over a continuous period of 1 year means that seasonal variations in the pattern and distribution of traumatic incidents have not been adequately captured in the dataset. A possible way of overcoming this limitation in future studies is to allocate equal numbers of sampling days to each month of the year.

It will be more difficult to design studies that accurately reflect the influence of other contextual factors. Of particular importance with regard to trauma in South Africa is the influence of sociopolitical factors on the incidence of injuries due to interpersonal violence, which in the present study

TABLE II. DISTRIBUTION OF THE JOHANNESBURG-SOWETO POPULATION BY AGE, SEX AND RACE (%)

Age (yrs)/sex	Asian*	Black†	Coloured*	White*	All
0 - 9					
Female	10,6	9,8	11,6	6,5	9,2
Male	10,8	9,7	11,8	6,4	9,1
Both	21,4	19,5	23,4	12,9	18,3
10 - 14					
Female	5,3	4,4	6,3	3,9	4,5
Male	5,6	4,1	6,2	4,2	4,3
Both	10,9	8,5	12,5	8,1	8,8
15 - 19					
Female	4,6	5,3	6,0	4,7	5,2
Male	4,8	4,8	5,8	4,5	4,8
Both	9,5	10,1	11,8	9,2	10,0
20 - 24					
Female	5,0	6,0	5,9	5,2	5,8
Male	4,9	4,5	5,2	5,2	5,2
Both	9,9	10,5	11,1	10,1	10,4
25 - 34					
Female	8,9	11,2	9,1	7,7	10,2
Male	9,2	10,7	7,7	7,7	9,7
Both	18,1	21,9	16,8	15,4	19,9
35 - 44					
Female	6,6	6,5	5,6	6,9	6,5
Male	6,8	6,9	4,4	6,8	6,7
Both	13,4	13,4	10,0	13,7	13,2
45 - 54					
Female	4,3	4,0	3,9	5,8	4,4
Male	4,2	3,6	3,2	5,5	4,0
Both	8,5	7,6	7,1	11,3	8,4
55 - 64					
Female	2,6	2,8	2,4	4,8	3,2
Male	2,3	2,3	1,8	4,2	2,7
Both	4,9	5,1	4,2	9,0	5,9
65 - 74					
Female	1,3	1,3	1,3	3,7	1,9
Male	1,2	1,3	0,8	2,7	1,6
Both	2,5	2,6	2,1	6,4	3,4
⩾ 75					
Female	0,6	0,4	0,7	2,6	0,9
Male	0,4	0,4	0,3	1,3	0,6
Both	1,0	0,8	1,0	3,9	1,5
All ages					
Female	49,8	51,7	52,8	51,8	51,7
Male	50,2	48,3	47,2	48,2	48,3
Both	100,0	100,0	100,0	100,0	100,0
Actual count	66 209‡	1 222 096§	150 674‡	532 433‡	1 971 412

* Calculated from 1985 population census.[16]
† Percentages from Van Zyl.[13]
‡ From the Medical Officer of Health for Johannesburg.[14]
§ Calculated from Urban Foundation[15] projections for 1990.

accounted for 50% of all resident incident cases. Some of these violent incidents may be related to sub-cultural factors and unpredictable events, such as the emergence of street gangs (e.g. the 'Jackrollers' in Soweto), the wide-ranging reforms announced by President F. W. de Klerk in February 1990, the 'taxi-war' of July 1990, and the recent outbreak of widespread violence in Soweto and central Johannesburg. It is therefore apparent that questionnaire-based methods of researching the determinants of trauma due to violence are unlikely to produce data that reflect the influence of such factors on the amount and spatial distribution of trauma due to interpersonal violence. Accordingly, it is appropriate to complement quantitative epidemiological studies with ethnomethodological approaches that reveal local perspectives and interpretations of why violence occurs.

Accuracy of diagnoses

While adequate inter-rater reliability was obtained in the coding of hospital diagnoses, this does not imply that the diagnoses were accurate. Fieldworkers noted that the diagnoses recorded by doctors at the point of admission or during casualty treatment were often nonspecific and provisional. Later in the course of patients' treatment they would be finalised and given greater detail, usually after further investigations or surgery. However, staff limitations precluded the

racking of patients so that these final diagnoses could be recorded. These difficulties were particularly pronounced in cases involving head injuries and patients presenting with trauma due to gunshot. In cases of head injury, provisional diagnoses were often recorded simply as 'head injury'. Such cases were allocated the ICD 10 code for 'unspecified intracranial injury'. In cases of trauma due to gunshot, provisional diagnoses frequently failed to indicate the range of injuries sustained. For example, the provisional diagnosis of 'gunshot abdomen' might later be finalised to cover spinal, intestinal and pelvic injuries. Accordingly, injuries in such cases were coded as 'open wound (of the body region most ostensibly damaged)', or 'unspecified injury (of the body region most ostensibly damaged)'. Fieldworkers also noted that as the case load on admitting doctors working in casualty departments increased, so did these problems with diagnostic clarity. This was particularly so during casualty watches at Baragwanath Hospital.

Adequacy of severity rating

Ideally, injury severity should be evaluated using a score that combines physiological and anatomical measures, such as the Revised Injury Severity Scale (TRISS).[17] TRISS combines an injury severity score obtained by evaluating a patient's anatomical lesions using the Abbreviated Injury Severity Scale (AIS) with the RTS score and a weighted value depending on a patient's age, and 'its value as a predictor of survival/death outcome was from 75% to 90% as good as a perfect index, depending on the patient data set used'.[16] However, Morgan *et al*.[18] note that rating with the AIS may take between 10 and 25 minutes depending on the user's clinical knowledge and familiarity with the AIS dictionary. They add that in a study where nurse raters using the AIS evaluated 104 patients within 24 hours of admission, accurate scores were calculated in only 51,9% of cases.[18] In the present study, staff limitations and time pressure precluded the possibility of applying the AIS. It was therefore decided to use only the RTS, because it was assumed that values for the three variables it uses would be available in the majority of cases. However, this was not found to be so, as only in the more severe cases, usually of head injury, were values for all three variables recorded on admission. Consequently, data concerning severity rating are of uneven quality.

Conclusion

The prospective methodology outlined in this paper represents a low-cost approach to the gathering of epidemiological data that, while circumventing the inadequacies of archival methods,[6] has internal limitations. These have been discussed above; perhaps the most important concerns the employment of non-specialist fieldworkers in the collection of data concerning diagnosis and injury severity. This means that such data replicate whatever errors are being made by admitting doctors, and therefore are of limited value for the improvement of secondary interventions such as surgery. However, this limitation is balanced by the fact that data important for trauma prevention programmes, such as the demographic characteristics of victims and temporal and spatial distribution of incidents, appear to be robust. This suggests that it can be usefully applied to other studies in South Africa where the emphasis is on primary rather than secondary prevention.

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