

## A PROFILE OF FATAL INJURIES IN SOUTH AFRICA:

# A PLATFORM FOR SAFETY PROMOTION

Richard Matzopoulos, Mohamed Seedat, Sandra Marais, Ashley van Niekerk

Crime, Violence and Injury Lead Programme,  
co-directed by the Medical Research Council and  
the UNISA Institute for Social and Health Sciences

Medical Research Council, PO Box 19070,  
Tygerberg 7505 South Africa;

Tel: (021) 938-0536; Fax: (021) 938-0381;

E-mail: [Richard.matzopoulos@mrc.ac.za](mailto:Richard.matzopoulos@mrc.ac.za);

<http://www.mrc.ac.za/crime/crime.htm>

### SUMMARY

Injuries are a pervasive feature of South African life and a priority public health concern. Launched in 1999, the National Injury Mortality Surveillance System (NIMSS) provides information about the extent of deaths due to non-natural causes. The 2002 NIMSS report indicates that homicide remains the most significant contributor to non-natural mortality in South Africa, accounting for half of all injury deaths.

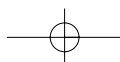
Approximately 81% of all non-natural deaths occurred among males, and the average age of the victims was 34 years. Firearms were the most common external cause of homicide (54%). More than half

of all road fatalities involved pedestrians, and road traffic collisions were the leading cause of injury death among females (33%). Suicide accounted for approximately 10% of injury deaths, and most injury deaths among children younger than 14 years were unintentional (burns, drowning or road traffic-related).

With increasing coverage the NIMSS will be able to identify injury prevention priorities at both provincial and city level, and inform efforts to reduce non-natural mortality. Currently the NIMSS indicates that violent and traffic injuries remain key public health priorities.

### ACKNOWLEDGEMENTS

We wish to acknowledge the Departments of Health and Safety and Security for supporting this project. In particular, we would like to thank the staff of the various forensic departments and police personnel at the different mortuaries, who made these data available to us. The contributions of the Centres for Disease Control (USA) and the World Health Organisation, as well as our previous funders, the Department of Arts, Culture, Science and Technology, are also acknowledged.



## THE 2002 NIMSS DATA

### APPARENT MANNER OF DEATH

The 2002 NIMSS data indicated that homicide remains the most significant contributor to non-natural mortality in South Africa, accounting for 45% of all 25 494 non-natural deaths (or 50% of non-natural deaths where the cause of death could be determined). Approximately 54% of these homicides were perpetrated with a firearm, while 30% was caused by sharp objects. Unintentional incidents (transport and non-transport combined) accounted for 37%, and suicide for 10% of all non-natural deaths. In 8% of non-natural deaths the manner of death was undetermined, but it is likely that a large percentage of the undetermined deaths were also due to homicide.

### GENDER

Males accounted for approximately 81% of the non-natural deaths and females 19% (ratio 4:1). The leading manner of death among males was homicide (50%), while among females it was transport (33%).

## OVERVIEW OF THE NIMSS

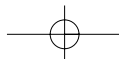
The National Injury Mortality Surveillance System (NIMSS) was established to address the absence of valid, ongoing timeous information about the basic determinants of violence and injury in South Africa by providing basic information about deaths due to external causes. Since 1999 non-natural fatality information has been collated from existing investigative procedures at mortuaries and state forensic chemistry laboratories. All deaths due to external causes are included, generating an overview of how different categories of external cause (e.g. gunshots, burns) contribute to the deaths of men, women and children.

Thirty-four mortuaries in six provinces collected data for the period 1 January to 31 December 2002. Although the system captures data from rural mortuaries in Mpumalanga and the North-West Province, the bulk of the caseload occurs through investigations at urban mortuaries, hence the data set is currently more representative of the urban rather than the rural mortality injury profile. The data were biased to

TABLE I DISTRIBUTION OF FATAL INJURIES BY APPARANT MANNER OF DEATH

	0-4		5-9		10-14		15-19		20-24		AGE IN 25-29	
	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
<b>MALE</b>												
HOMICIDE	35	(8)	19	(8)	54	(19)	654	(57)	1644	(62)	1910	(61)
SUICIDE					24	(9)	123	(11)	256	(10)	291	(9)
TRANSPORT	108	(25)	148	(64)	117	(42)	232	(20)	496	(19)	615	(20)
OTHER UNINTENTIONAL	173	(40)	55	(24)	65	(23)	71	(6)	139	(5)	181	(6)
UNDETERMINED	114	(27)	10	(4)	19	(7)	58	(5)	104	(4)	112	(4)
<b>TOTAL</b>	<b>430</b>		<b>232</b>		<b>279</b>		<b>1138</b>		<b>2639</b>		<b>3109</b>	
<b>FEMALE</b>												
HOMICIDE	28	(8)	12	(7)	17	(11)	105	(33)	182	(37)	165	(37)
SUICIDE					11	(7)	55	(17)	69	(14)	47	(11)
TRANSPORT	75	(23)	104	(61)	77	(48)	100	(31)	152	(31)	139	(31)
OTHER UNINTENTIONAL	127	(38)	44	(26)	33	(21)	33	(10)	57	(12)	53	(12)
UNDETERMINED	100	(30)	11	(6)	22	(14)	25	(8)	35	(7)	38	(9)
<b>TOTAL</b>	<b>330</b>		<b>171</b>		<b>160</b>		<b>318</b>		<b>495</b>		<b>442</b>	

\* This policy brief uses terms such as 'African', 'Coloured', 'Asian' and 'White'. The use of these terms does not imply any acceptance of the racist assumptions on which these labels were based during the apartheid era. The terms are used to reflect the differential manner in which apartheid impacted (and still does) on the lives and health of South Africans. They are used as a gross proxy measure of social groupings in South Africa and give no indication of inter-group diversity.

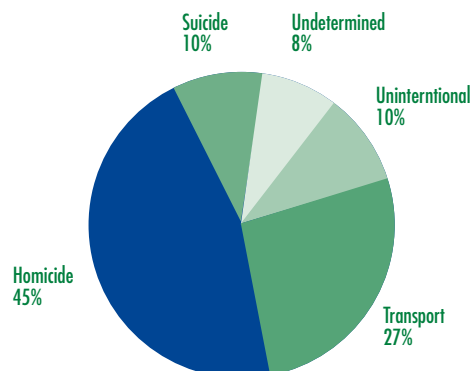


large urban areas, and full citywide coverage was reported for Cape Town, Durban, East London Johannesburg, Kimberley, Port Elizabeth, and Pretoria. Data collected by NIMSS in 2002 accounted for between 35% and 40% of all non-natural mortality in South Africa. The ultimate goal is to establish a permanent system that will record all such deaths that occur annually in South Africa.

Data are collected by the police and forensic pathologists at each site, and captured into a computerised database by clerks and secretarial staff at the mortuaries. The data are then combined with those from the other mortuaries as well as blood alcohol data supplied by the forensic chemistry laboratories, cleaned and analysed by specialised research scientists. Annual and half-yearly reports are produced for the South African Police and forensic pathologists at each facility.

The current report is available at [www.sahealthinfo.org.za/violence/nimssannual2002.pdf](http://www.sahealthinfo.org.za/violence/nimssannual2002.pdf)

FIGURE 1. APPARENT MANNER OF DEATH (N = 25494)



POPULATION GROUP

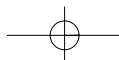
Africans constituted 74% of all non-natural deaths, 'coloureds' 12%, whites 11% and Asians 3%\*.

AGE

Most non-natural deaths were young adults, with 37% aged 15-29 and 36% aged 30-44. Three percent were younger than 5 years old, another 4% were aged 5-14, 14% were aged 45-59 and 6% were aged 60 years and older.

DEATHS IN YEARS

	15-29		30-35		36-39		40-44		45-49		50-54		55-59		60-64		65+		TOTAL	
	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
1999	1618	(61)	56	(9)	1149	(51)	733	(46)	469	(44)	302	(36)	150	(32)	113	(30)	137	(27)	8987	(51)
2000	261	(9)	218	(10)	167	(11)	126	(12)	102	(12)	72	(15)	54	(14)	65	(13)	1759	(10)		
2001	689	(20)	588	(26)	421	(27)	291	(27)	274	(33)	141	(30)	130	(34)	152	(30)	4402	(25)		
2002	170	(6)	157	(7)	158	(10)	103	(10)	91	(11)	51	(11)	40	(10)	77	(15)	1531	(9)		
2003	135	(4)	122	(5)	104	(7)	79	(7)	72	(9)	57	(12)	46	(12)	73	(14)	1105	(6)		
<b>2004</b>	<b>2873</b>		<b>2234</b>		<b>1583</b>		<b>1068</b>		<b>841</b>		<b>471</b>		<b>383</b>		<b>504</b>		<b>17784</b>			
2005	221	(37)	161	(43)	105	(35)	84	(31)	64	(29)	37	(26)	28	(20)	55	(18)	1264	(29)		
2006	48	(11)	54	(9)	44	(12)	28	(10)	23	(10)	24	(17)	12	(9)	20	(7)	435	(10)		
2007	146	(31)	143	(28)	122	(31)	88	(33)	84	(38)	47	(33)	57	(41)	88	(29)	1422	(33)		
2008	49	(12)	50	(9)	41	(11)	28	(10)	24	(11)	19	(13)	26	(19)	85	(28)	669	(15)		
2009	54	(9)	47	(10)	40	(11)	39	(15)	28	(13)	16	(11)	17	(12)	56	(18)	528	(12)		
<b>2010</b>	<b>518</b>		<b>455</b>		<b>352</b>		<b>267</b>		<b>223</b>		<b>143</b>		<b>140</b>		<b>304</b>		<b>4318</b>			



## LEADING EXTERNAL CAUSES OF DEATH

Firearms overshadowed all other external causes, accounting for 29% of non-natural deaths, while sharp objects accounted for 15%. The 7081 firearm deaths exceeded all transport-related deaths combined (6878 deaths).

## EXTERNAL CAUSE OF DEATH AND AGE

Drowning and burns were the leading causes of injury death for children up to the age of two, whereas motor-vehicle pedestrian collisions were the leading cause of injury death for older children (3 to 14 years). For all other age groups older than 14 years firearms ranked first. Sharp object-related deaths ranked second for 15-49-year olds, and motor vehicle accidents involving pedestrians second for those aged 45 and older.

## EXTERNAL CAUSE OF HOMICIDE AND GENDER

The NIMSS findings indicated female vulnerability for strangulation, killing with blunt objects and killing by burning. Although victim-perpetrator information is not currently available, previous studies have shown that perpetrators are usually male. This is consistent with national findings about women abuse and domestic violence.

## EXTERNAL CAUSE OF HOMICIDE AND CHILDREN

The data also identified a relatively high proportion of child homicide victims (4% under the age of 18). Firearms followed by stabbings were the leading external causes of death in the 15-19-year age group.

## EXTERNAL CAUSES OF HOMICIDE AND ALCOHOL

Seventy three per cent of the sharp object-related homicide victims had positive blood alcohol concentrations (BACs) compared to 40% of the firearm homicide victims.

## EXTERNAL CAUSE OF TRANSPORT DEATHS

Of the 6878 transport-related deaths, 94% involved road users, and 6% were railway-related. Pedestrians accounted for 56% of the road deaths in which the road user category (cyclists, pedestrians, drivers and passengers) could be determined.

## EXTERNAL CAUSE OF TRANSPORT DEATHS AND GENDER

The male to female ratio in transport-related fatalities was 3:1.

## EXTERNAL CAUSE OF TRANSPORT DEATHS AND AGE

As well as being the leading external cause of death in the 3 – 14-years age group, pedestrian deaths ranked among the top three causes for all other age groups, except for those under 1 year of age.

## EXTERNAL CAUSE OF TRANSPORT DEATHS AND TIME OF DAY

Road transport deaths peaked between 18h00 and 20h00 and on weekends.

## EXTERNAL CAUSE OF TRANSPORT DEATHS AND ALCOHOL

The highest proportion of transport-related deaths with positive BACs (59%) as well as the highest mean BACs (0.22g/100ml) were among pedestrians. The mean BAC among fatally injured drivers was 0.17g/100ml. More than half tested positive for alcohol in the blood, and of these 90% were above the legal limit for driving, which is 0.05g/100ml.

## MOBILISATION OF THE SAFETY PROMOTION SECTOR

The private sector and non-governmental organisations have important roles to play in product stewardship, education and injury prevention. Effective injury pre-

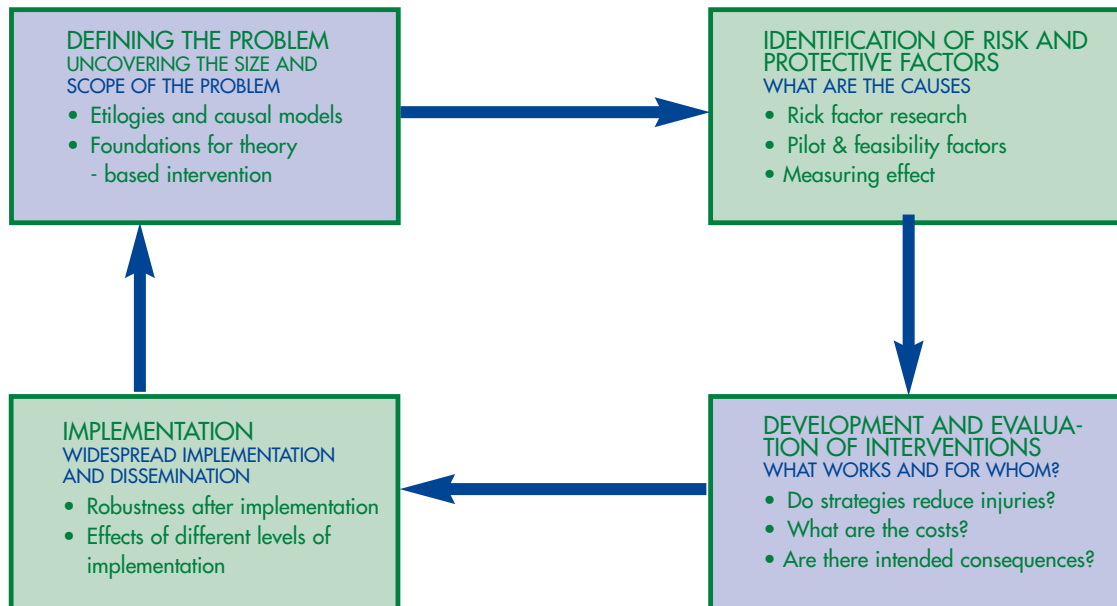
vention clearly depends on mobilisation of a range of stakeholders in government, the private sector and civil society.

## CONCLUSION AND RECOMMENDATIONS

Public health interventions in the USA, Canada, Europe and Australia have already demonstrated that deaths due to homicide, traffic and other unintentional incidents, such as may be caused by fires, falls or drowning, are preventable. The core public health strategies, or platform that may be directed at injury reduction and

prevention includes legislative, engineering, education, environmental and community mobilisation. These strategies are supported by rigorous epidemiological or information gathering strategies that inform the different stages in public health prevention programming (Figure 2).

FIGURE 2. THE PUBLIC HEALTH APPROACH TO INJURY PREVENTION



The World Health Organisation's World Report on Violence (2002) and the United Nation's Report on the Global Road Safety Crisis (Item 162 of 2003) provide recommendations to mobilise action in response to violence and injury. It is with reference to these two reports that we propose the following:

- A systemic review of the South African violence and injury sector should be conducted along the lines of the two World Health Organisation's World Reports on Violence (2002) and Road Traffic Injuries (2004). Such a review will provide information on the magnitude and risks for injuries and the many social responses that require evaluations.
- Effective resource allocation to treat and prevent injuries can only be optimised through a co-ordinated national, provincial, and city or regional programmes. These programmes should be housed within the health departments, which can act as focal points, but should also include interdepartmental collaboration with directorates at all levels to ensure ownership, and multi-sectoral partnership with the non-governmental, research and private sectors. See programme depicted in Table II.
- Prevention programmes should be underpinned by comprehensive fatal and non-fatal injury registration systems.
- Research and implementation priorities should be defined on the causes, consequences, costs and prevention of violence and injuries.
- Primary and secondary prevention responses should be strengthened.
- Prevention should be integrated into social and educational policies, thereby promoting gender and social equity.
- Collaboration and exchange of information on injury prevention should be increased.
- Adherence to international treaties, laws and other mechanisms to protect human rights should be promoted and practical, internationally agreed responses to the global drugs and arms trades should be sought.

- Prevention programmes should embrace a documentation, monitoring and evaluation component to assure quality and impact over time.

The NIMSS provides information about the extent and scope of deaths due to non-natural causes, providing an initial guide that may be used to inform efforts to reduce the extent of non-natural mortality. Without accurate, reliable and timely information on injury events and risk factors, design and evaluation of interventions and prevention programmes are seriously compromised.

Focused areas of intervention are required to prevent and contain violence. Consistent with international norms proposed for example by the WHO, we assert that a multi-faceted and holistic approach is needed to address the massive public health threats facing South Africa, in particular violence. Examples of such programme are detailed in Table II below. The programmes must focus on infrastructure, environmental design and the social environment.

Much of South Africa has inadequate basic infrastructure, e.g. street lighting and electricity, all increasing the risk of victimisation, especially among vulnerable groups. Adequate crime prevention through environmental design measures are suggested to reduce opportunity and motive for crime, at the same time protecting and reducing the vulnerability of potential victims. Concurrently, the social environment in high-risk areas needs to be modified to encourage societal harmony through active youth and other recreational programmes.

The literature indicates that child violence results from the complex interaction of the social environment and various perpetrator and victim factors. In South Africa, young urban children are also increasingly engaging in 'risky lifestyles'. Children are often raised in a culture that condones hostility, and therefore youth outreach, mentorship and social development programmes may be necessary to encourage positive socio-cultural values.

## INSTITUTIONALISATION OF INJURY REGISTRATION

Major implementation partners for injury registration systems are all State Departments (at national and provincial level) and non-governmental agencies with roles in reducing risk factors for violence and 'accidental' injuries through environmental, engineering, enforcement and educational interventions. Among the more important State departments and allied organisations are:

- Health (e.g. pre-hospital and emergency care of injured victims, mental health and substance abuse prevention);
- the Medicines Control Council (e.g. distribution of medicines with child-resistant tops);
- Safety and Security (e.g. monitoring of firearm-related injuries, tracking violence not reported to the police);
- Justice (e.g. improved understanding of the precursors and contexts of criminal violence);
- Housing (e.g. housing characteristics of high- and low-violence communities, aspiration of paraffin fumes in RDP housing);
- Trade and Industry (e.g. sub-standard and dangerous products in the market place); South African Bureau of Standards;
- Agriculture (e.g. disposal of pesticides and chemicals);
- Environment;
- Transport;
- Tourism;
- Mineral and Energy Affairs (e.g. electrification to reduce fire-related burn injuries; safe practices for electricity, gas, coal and paraffin); and
- Education (e.g. safety curriculum at schools).

**TABLE II. EXAMPLES OF PREVENTION STRATEGIES FOR VIOLENCE AND TRAFFIC INJURIES BY ECOLOGICAL CONTEXT**

<b>VIOLENCE</b>	<b>TRAFFIC</b>	<b>CHILD BURN INJURIES</b>
<p><b>INDIVIDUAL</b></p> <ul style="list-style-type: none"> <li>• Social development programmes</li> <li>• Incentivising education speeding laws</li> <li>• Vocational training</li> <li>• Firearm control</li> </ul>	<ul style="list-style-type: none"> <li>• Strict enforcement of drunk driving&amp;</li> <li>• Pedestrian visibility campaigns</li> <li>• Harm reduction approaches (e.g. sensible drinking, designated driver, etc)</li> <li>• Rehabilitation of chronic offenders</li> </ul>	<ul style="list-style-type: none"> <li>• Behaviour modification, skills transfer and psycho-educational support</li> <li>• Rehabilitation of substance abusers and individuals with impulse control disorders.</li> <li>• Educational campaigns: "Stop, drop and roll" and the "learn not to burn" programmes</li> </ul>
<p><b>RELATIONSHIP</b></p> <ul style="list-style-type: none"> <li>• Training in parenting</li> <li>• Home visitation</li> <li>• Mentoring programmes</li> <li>• Family therapy</li> </ul>	<ul style="list-style-type: none"> <li>• Increasing responsibility and providing skills in child traffic safety to caregivers</li> <li>• Training in parenting</li> <li>• Family therapy</li> <li>• Encouraging safe and responsible behaviour on an interpersonal level</li> </ul>	<ul style="list-style-type: none"> <li>• Promoting accompaniment of younger children by parents or older siblings</li> <li>• Parenting skills: child development and safety product operation</li> <li>• Home visitation</li> </ul>
<p><b>COMMUNITY</b></p> <ul style="list-style-type: none"> <li>• Monitoring levels of lead and other toxins</li> <li>• Increasing the availability of child-care facilities and pre-school enrichment programmes &amp; extracurricular activities for children</li> <li>• Community policing</li> <li>• Reducing availability of alcohol</li> <li>• Adult recreational programmes</li> </ul>	<ul style="list-style-type: none"> <li>• Monitoring magnitude and severity of injuries</li> <li>• Increasing the availability of child-care facilities and pre-school enrichment programmes and extracurricular activities for children</li> <li>• Reducing availability of alcohol</li> <li>• Traffic calming</li> <li>• Increasing separation of vehicles and pedestrians</li> <li>• Providing safe recreational areas (and safe access)</li> <li>• Improving public transport</li> <li>• "Safe routes to school" initiatives</li> <li>• Scholar patrols</li> <li>• Addressing other social problems that impact on traffic safety (e.g. crime and municipal services)</li> </ul>	<ul style="list-style-type: none"> <li>• Monitoring safe home construction</li> <li>• Make available accessible, quality child-care facilities</li> </ul>
<p><b>SOCIETAL</b></p> <ul style="list-style-type: none"> <li>• Deconcentrating poverty</li> <li>• Reducing income inequality</li> <li>• Reducing media violence</li> <li>• Public information campaigns</li> <li>• Reforming educational systems</li> <li>• Strengthening and improving police and judicial systems</li> <li>• Reforming education systems</li> </ul>	<ul style="list-style-type: none"> <li>• Monitoring magnitude and severity of injuries</li> <li>• Deconcentrating poverty</li> <li>• Curriculum development</li> <li>• Reducing income inequality</li> <li>• Public information campaigns</li> <li>• Encouraging responsible societal norms and value systems</li> </ul>	<ul style="list-style-type: none"> <li>• Poverty alleviation</li> <li>• Reducing income inequality</li> <li>• Public information campaigns</li> <li>• Legislation development and enforcement: Clothing and cigarette flammability standards; stove design; safe home construction.</li> </ul>

## UTILITY OF ROUTINELY COLLECTED DATA

We suggest that the NIMSS provides a useful basis for development of safety promotion priorities.

A selection of issues requiring further attention in the ongoing development of an injury registration system useful to safety promotion practitioners, researchers, and policy-makers, are examined below.

The review of mortality data through the NIMSS is just one component of a broader injury registration initiative being co-ordinated by the Crime, Violence and Injury Lead Programme. Other activities include the Non-fatal Injury Surveillance System (NANFISS) currently being piloted at two hospitals, the Trauma and Drug Surveillance System (TADSS) that collects information on alcohol and drug using profiles of trauma victims at three coastal cities, and the Injury Costing Project, which will describe the individual and societal costs incurred by various injury types.

There are numerous advantages to effective permanent data collection systems. The data can be used for prioritising and driving public health programmes on an ongoing basis. Comprehensive violence and injury data are also vital for identifying emerging trends and problem areas, and later evaluating the effectiveness of programmes administered by a range of organisations, which include injury prevention components such as traffic safety, policing and safe packaging.

Whereas cross-sectional studies can provide incidence data and highlight prevention priorities from a specific

period, ongoing data collection means that, at a regional or provincial level, administrators can use caseload information to plan staffing and resource requirements, monitor staff performance and react to emerging injury trends. The proportion of injuries attributed to specific causes differs considerably for fatal and non-fatal injuries, as illustrated by the 1990 Cape Metropolitan <sup>STUDY</sup><sup>1</sup>. Certain categories of frequently occurring non-fatal injuries may require more resources and be more responsive to prevention programmes. The indirect and human value costs of severe injuries may be higher than for fatal injuries, particularly if they occur more frequently. The higher incidence of non-fatal injuries also implies that collection of non-fatal data is more sensitive for the identification of trends and the design and evaluation of injury prevention initiatives. <sup>2, 3</sup>

1. National Trauma Research Programme. The Cape Metropolitan Study. Parow: Medical Research Council, 1990 (Unpublished raw data).
2. Baker SP, O'Neill B, Karpf RS. The Injury Fact Book, 2nd ed. New York: Oxford University Press, 1992.
3. Kobusingye OC, Left RR. Hospital-based trauma registries in Uganda. *J Trauma: Injury, Infection and Critical Care* 2000; 48(3): 498-502.