Estimates of Injury Mortality and Disability based on the Cape Metropole Study

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Rosana Norman

Burden of Disease Research Unit

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Acronyms and Abbreviations

AIS	Abbreviated Injury Scale
BOD	Burden of Disease
CMS	Cape Metropole Study
DALYs	Disability-adjusted life years
EME	Established Market Economies
GBD List	Global Burden of Disease list
GBD	Global Burden of Disease
ICD-9	International Classification of Diseases, 9th revision
ICD-10	International Classification of Diseases, 10th revision
ISS	Injury Severity Score
MRC	Medical Research Council
NIMSS	National Injury Mortality Surveillance System
PTO	Person trade-off valuation method
RTIs	Road traffic injuries
SAS	Statistical Analysis System software package
SSA	Sub-Saharan Africa
Stats SA	Statistics South Africa
WHO	World Health Organization
YLDs	Years lived with disability
YLLs	Years of life lost due to premature mortality

Table of contents

List of Tables

List of Figures

1 INTRODUCTION

1.1 Concepts and definitions

The following terminology is used in this report and is briefly explained and contextualised below:

Burden of disease is a comprehensive measure of ill-health that includes fatal and non-fatal outcomes. The burden of disease approach attempts to derive consistent and coherent estimates of all causes of ill-health and death. **The disability adjusted life year (DALY)** is a summary measure of burden of disease that uses time to equate death and disability. It comprises the **years of life lost due to premature death (YLLs)** and the **years of life lived with a disability (YLDs)**, weighted according to the severity of the disability .

Following the Global Burden of Disease (GBD) terminology, and consistent with the proposed revision to the International Classification of Impairments, Disabilities and Handicaps (ICIDH) (WHO 1999a), the term **disability** is used broadly in this report to refer to departures from good or ideal health in any of the following domains of health: mobility, self-care, participation in usual activities, pain and discomfort, anxiety and depression, and cognitive impairment, as summarised in the modified EuroQol descriptions used in the Dutch study (Stouthard *et al*. 1997; Mathers *et al*., 1999). In some contexts, the word 'healthy' is understood to mean 'absence of illness', however, in this report, a broader meaning of **health** is used. It implies absence of illness as well as absence of impairments or functional limitations due to previous illness or injury.

The reference state for **good or ideal health** is defined as a health state where the individual has:

- no pathological processes (disease or disease precursors);
- no mental health problems, no injuries;
- no impairments resulting from congenital, disease or injury causes; and
- no functional limitations resulting from current or former health problems or impairments.

A year of healthy life refers to a year lived in the reference state of good health. Note that **disability** (i.e. states other than ideal health) may be **short-term** or **long-term** for example: a day with a common cold is a day lived with disability (Mathers *et al*., 1999).

This report uses **sex** rather than gender to distinguish between male and female cases. In general the term sex is used to describe distinctive physiological features related to being

male or female. In contrast, the term gender comprises different occupational, social and psychological attributes that are variously attributed to being male or female. The latter concept depends on societal norms and is not internationally comparative.

An **injury** can be defined as damage to a person caused by an acute transfer of energy (mechanical/kinetic, thermal, chemical, electrical, radiation) or by a sudden absence of heat (hypothermia) or oxygen (asphyxiation, drowning). Injury refers to all kinds of damage to the body that are manifested within 48 hours, or usually within considerably shorter periods.

This report follows the rules of the International Classification of Diseases and related health problems ninth revision (ICD-9) (WHO, 1977) which allows for the coding of injuries along two dimensions: according to the **external cause of the injury**, or according to the physiological damage arising from an injury (**nature of injury**). The GBD 1990 study established that disability is estimated most accurately from knowledge of the nature of injury, but that estimates should ultimately be attributed back to a cause for policy relevance (Murray and Lopez, 1996a).

The **external cause** or **type of injury** refers to the cause of the bodily harm and the mechanism, circumstance or event that preceded the injury. Examples of the external cause or type of injury include road traffic injuries, interpersonal violence, drowning, burns and poisonings, all of which may result in injury and eventually death (Begg and Tomijima, 2002). Unless otherwise stated, the WHO definitions for external cause or type of injury are followed (WHO, 2002).

The **nature of injury** is a description of the actual bodily harm caused by the type of injury, e.g. a fractured hip, brain injury (Begg and Tomijima, 2002).

Trauma refers to both the physical and psychological damage resulting from an injury, although in this report the primary concern is with physical trauma. The use of the term physical injury is preferred in this report.

Deaths due to injury may also be classified as "**non-natural deaths**".

Intentional injuries: are due to violence, and are distinguished from **unintentional** injuries. To eliminate the idea that injuries are due to fate, accidents, or other unpredictable and uncontrollable events, the term unintentional injury is preferred over accident.

In the initial **South African Burden of Disease list** (based on the GBD cause list and the Australian BOD cause list), the two main injury categories, intentional and unintentional injuries are defined in terms of a series of ICD-9 external cause codes. **Unintentional injuries** are subdivided into road traffic injuries, poisoning, falls, fires, drowning, surgical and medical misadventure, suffocation and foreign bodies and other unintentional injuries. **Intentional injuries** are subdivided into self-inflicted injuries, interpersonal violence, legal intervention and war-related injuries.

A **road traffic injury** (RTI) is any injury due to crashes originating, terminating or involving a vehicle partially or fully on a public highway (WHO, 2002). It includes pedestrian and pedal cyclists injuries.

A **burn** occurs when some or all of the different layers of cells in the skin are destroyed by a hot liquid (scald) a hot solid (contact burns) or a flame (flame burns). Skin injuries due to ultraviolet radiation, radioactivity, electricity or chemicals, as well as respiratory damage resulting from smoke inhalation, are also considered to be burns (WHO, 2002). Results presented in this report refer to **fire-related injuries** only (includes flame burns and respiratory damage due to smoke inhalation) and do not include burns due to contact with hot substances. These other burns are included under other unintentional injuries.

Fall-related deaths and non-fatal injuries exclude those due to assault and intentional self-harm (WHO, 2002). Falls from animals, burning buildings and transport vehicles, and falls into fire, water and machinery are also excluded.

Violence is defined as the intentional use of physical force or power, threatened or actual, against another person, against oneself, or against a group or community, that either results in or has a high likelihood of resulting in injury, death or deprivation. The definitions of the categories of violent death are based on Krug *et al*., 2002 and WHO 2002.

Self-inflicted violence is subdivided into suicidal behaviour (including attempted suicides and completed suicides) and self abuse which includes acts of self-mutilation. A **suicide** is defined as a death arising from an act inflicted upon oneself with the intent to kill oneself.

Interpersonal violence is divided into two sub-categories: family and intimate partner violence (includes child abuse, elder abuse and intimate partner violence) and community violence (violence between unrelated individuals such as assault, rape or sexual assault by strangers). The nature of these violent acts can be physical, sexual, psychological or involve

deprivation or neglect. Interpersonal violence related injuries presented in this report are as a result of exposure to either physical or sexual interpersonal violence. These fatal injuries are also referred to as **homicides**.

Collective violence is subdivided into social, political and economic violence and includes terrorist acts and mob violence. Political unrest and violence includes **war** and related violent conflicts. Collective violence also includes **gang violence** and organised crime. Collective violence is classified as **war** in this report although, due to data limitations, gang related violence may have been misclassified as interpersonal rather than collective violence in local data sources.

Legal intervention related injuries include injuries inflicted by the police or other law-enforcing agents, including military on duty, in the course of arresting or attempting to arrest lawbreakers, suppressing disturbances, maintaining order, and other legal action and includes legal execution. Legal intervention related injuries may have been misclassified as interpersonal violence in local data sources.

War related injuries include injuries to military personnel and civilians caused by war and civil insurrections and occurring during the time of war and insurrection.

1.2 Overview of injuries in South Africa

Injuries are a leading cause of death and burden of disease in persons younger than 60 years of age (Peden *et al*., 2002) and it has been estimated that in 2000, injuries accounted for 9% of the world's deaths and 12% of the world's burden of disease (WHO, 2002). Injuries follow a strong gender pattern and injury mortality among men is twice that among women. Injuries affect mainly young, economically active adults between the ages of 15 and 44 years with this age group accounting for almost 50% of the world's injury-related mortality (WHO, 2002).

More than 90% of the world's deaths from injuries occur in low- and middle-income countries (WHO, 2002). Males in Africa and the low- and middle-income countries of Europe have the highest injury-related mortality rates worldwide. Among females, the highest injury-related mortality rates are found in Africa and India. Zwi *et al*. highlight this neglected health problem in developing countries and argue for an immediate policy response (Zwi *et al*., 1996).

Decreasing the burden of injuries is among the main challenges for public health (Krug *et al*, 2000). Public health officials have recognized that injuries are preventable and they have established methods of scientific study for the prevention of injuries (Haddon, 1968). The first step in a public health approach to injury prevention is to gain a better understanding of the magnitude and characteristics of the problem (Mercy *et al*., 1993). Although mortality is an important indicator of the magnitude of a health problem, it is important to realise that for each injury death, there are many more injury survivors who are left with permanent disabling sequelae. These non-fatal outcomes must also be measured in order to describe the burden of disease due to injury accurately (Krug *et al*., 2000).

Despite poor quality vital statistics, studies of the cause of death profile in South Africa have identified the high proportion of deaths due to injuries, particularly among young adult men (Bradshaw *et al*., 1992). The mortality profile has been characterised as a triple burden with the combination of pre-transitional causes related to under-development, the emerging chronic diseases and the high injury burden. In recent years, it has been argued that this has changed into a quadruple burden with the additional impact of the HIV/AIDS epidemic (Bradshaw *et al*, 2002).

The lack of reliable health statistics has made it difficult to appreciate the impact of injuries in South Africa. In the first National Burden of Disease study, an initial attempt is being made to derive coherent and consistent estimates of the contribution of all causes to the burden of disease experienced in the year 2000 (Bradshaw *et al*., work in progress). This involves the analysis of data from multiple sources to derive a best estimate. However, the main problem with attempting a national burden of disease study in middle- or low-income countries, is the weak information base for disability for most diseases (Bobadilla, 1996), and given the paucity of population based morbidity data, the main focus of the first South African national burden of disease study is on mortality. Nevertheless, attempts will be made to estimate Disability Adjusted Life Years (DALYs) using local data sources where possible.

The DALY is a relatively new metric introduced by the global burden of disease study (Murray and Lopez, 1996a). It is a summary measure of population health, combining information on death and non-fatal health outcomes. It was developed to provide information to support health policy and priority setting at a global level. This was used to provide a comprehensive assessment of the global burden of disease and injury in 1990 (World Bank 1993, Murray and Lopez, 1996a, 1996b) and has been adopted by the World Health Organization (WHO) to inform global health planning (WHO, 1999b).

This is the first attempt in South Africa to carry out a systematic and comprehensive analysis of the incidence, case fatality and severity of injuries, ensuring internal consistency and using a common currency, the DALY, to measure the burden of mortality and morbidity. A local data source, namely the Cape Metropolitan injury study (Van der Spuy, 1993; Peden *et al*, 1996a; Peden *et al*., 1997), has been identified with the best available data requirements for the computation of years lived with a disability (YLDs), the non-fatal component of DALYs. This report addresses an important information need by providing the first detailed estimates of the incidence, duration, mortality and disability for a set of injury categories. The aim and objectives of the study are listed below.

1.3 Aim and objectives

The aim of this study is to quantify the burden due to injuries in the Cape Metropolitan area in 1990 using CMS data and Global Burden of Disease (GBD) DALY methodology thereby making it possible to compare local estimates with global and regional estimates from the GBD 1990 and 2000 projects and other international burden of disease studies.

The specific objectives include:

1. to review the GBD methodology and Australian burden of disease study methodology and its applicability for this local analysis;

2. to explore the Cape Metropolitan injury study data as a possible source of injury incidence data;

3. to estimate injury burden in the Cape Metropole in 1990;

4. to determine the ratio of disability to premature mortality for each cause of injury by age and sex; and

5. to compare estimates of YLLs, YLDs and DALYs as well as the ratio of YLDs to YLLs for specific injuries with that reported for Sub Saharan Africa (SSA) in the Global Burden of Disease 1990 (GBD 1990) study (Murray & Lopez 1996a and b); African region of GBD 2000 project (Murray *et al*., 2001) and various other international burden of disease studies, including the Burden of Disease and Injury in Australia (Mathers *et al*., 1999) and the Mauritius Burden of Disease study (Vos *et al*., 1995).

The ratios of disability to premature mortality will be used in the first South African National Burden of Disease study to estimate local injury YLDs for South Africa 2000 (Bradshaw *et al*., work in progress).

1.4 Disability-adjusted life years

The DALY methodology provides a way to link information on disease causes and occurrence to information on both short-term and long-term health outcomes, including impairments, functional limitations (disability) and, potentially, restrictions in participation in usual roles (handicap), and death. The DALY was designed:

- to allow estimates of health impact to be mapped to causes, whether in terms of disease and injury, or risk factors and broader social determinants;
- to provide a common metric for estimating population health impact and cost-effectiveness of interventions;
- to use common values and health standards for all regions of the world; and
- to provide a common metric for fatal and non-fatal health outcomes.

Two complementary classes of summary measures of population health have been developed, namely, health expectancies and health gaps. The DALY is an example of a health gap and measures the difference between the actual population health and some specified norm. It is a single indicator that uses time to equate death and disability. In its most commonly used form, it is an incidence-based rather than prevalence-based measure. It measures the future stream of healthy years of life lost due to each incident case of disease or injury. The DALY comprises Years of Life Lost, (YLLs), due to premature mortality and Years lived with disability, (YLDs), weighted according to the severity of the disability.

The computation of the DALY for any given condition is simply the sum of YLLs and YLDs for that condition:

$$DALYi = YLL_i + YLD_i$$

The aim of health interventions is to minimise the number of DALYs thereby promoting a longer and healthier life for people.

The DALY is based on the following principles:

- any health outcome that represents a loss of welfare should be included;
- age and sex are the only individual characteristics included in the set of variables used to calculate the DALY; and,

- like health outcomes are treated as like, irrespective of where or to whom they occur.

The DALY is considered the same in all settings. No preferences for individuals across socio-economic groups are incorporated into its calculation. This is important for the issue of equity in health and the use of the DALY as a measure of population health.

In contrast to previous composite health indicators, four key social preferences or values are incorporated in the DALY (Murray, 1994; Murray and Lopez, 1996a).

1.4.1 Life expectancy for calculating premature mortality

In order to ensure equity and comparability across countries the highest observed national life expectancy in any population by 1990, namely that of Japanese women, has been chosen as the standard for the GBD study. This can be represented by a model life table, Coale and Demeny West Level 26, with a life expectancy at birth of 82.5 years for females (Coale and Demeny, 1966). An arbitrary biological difference of life expectancy at birth of 2.5 years was chosen. Thus, the standard life expectancy at birth for males was 80 years, modelled on the West Level 25 life table for females.

1.4.2 Comparing time lived in different health states

The disability component of the DALY is calculated on the basis of incidence and duration of conditions resulting in non-fatal outcomes that are weighted according to the severity or the sequelae of the disability. The 'valuation' of time lived in non-fatal health states formalises and quantifies social preferences for different states of health as health state weights. This is a critical step in combining information on mortality and non-fatal health outcomes into summary measures. Without the use of such weights, summary measures of population health cannot be responsive to changes in the severity distribution of health states (Murray *et al*., 2000). These weights can be referred to as disability weights, quality adjusted life years (QALY) weights, or health state preferences depending on how they are derived. Disability weights used in this study are measured on a scale of 0 to 1, where 0 is assigned to a state of ideal health and 1 is assigned to a state comparable to death.

The GBD weighting studies used small groups of health experts who were asked to determine weights for a set of indicator health conditions using the person trade-off (PTO) method. This method is a measurement protocol developed to investigate variation in health state preferences. It is based on a deliberative process, where individuals are faced with the policy consequences of their values choices (Murray and Lopez, 1996a). For reasons of convenience, health experts were used to overcome some of the practical difficulties in ensuring that lay

persons fully understood the impact and severity distribution of the conditions being valued. The Dutch disability weight study attempted to address this problem by defining the distribution of health states associated with a disease stage, sequela or severity level using the modified EuroQol health profile to describe the health states. The Dutch project used three panels of physicians with broad medical knowledge and experience and one lay panel comprising people with an academic background but no medical knowledge (Stouthard *et al*. 1997). Few differences were seen in the average PTO preferences assigned by the lay panel compared with those of the panels of medical experts. The Dutch study concluded that it makes little difference whether the valuation panel is composed of health care experts or lay people, as long as accurate functional health state descriptions are included in the specifications of the health problems being valued.

An important aspect in the decision of which weights to use is whether social preferences for health states vary within or across populations. It seems very possible that health state preferences could vary markedly between populations that have different cultural beliefs, conceptualisations of health, and expectations for health and wellbeing. The GBD disability weights were validated as part of the Zimbabwean national burden of disease study (Jelsma *et al*. 2000). The Shona people of Zimbabwe define themselves in terms of the group and their health or illness is actualised within that context. This is in marked contrast to Western individualism and emphasis on independence. Infertility, for example, is regarded as a serious disability as it threatens collective survival and renders the individual incapable of playing his/her part in the collective process. The authors concluded that it is extremely difficult to generate weights that are universally applicable. It might be useful to utilise the GBD weights for international comparison. However, countries should examine the values of their own citizens before these weights are used as a basis of resource allocation (Jelsma *et al*. 2000).

The WHO is promoting the collection of population based data on health state values to enhance the weights used in calculating DALYs.

1.4.3 Discounting

This value relates to time preference and involves the choice of a discount rate for future loss. The discounting of future health implies that individuals prefer time lived now rather than some time in the future. The GBD study selected a discount rate of three percent per year for years of life lost in the future. For example, a year of healthy life gained in 10 years time is worth 24% less than one year gained now. For this study a 3 percent discount rate was chosen to allow for international comparisons and because this rate is recommended by the International Panel on Cost Effectiveness in Health and Medicine (Gold, *et al*. 1996). A

consequence of discounting life years is that prevention is devalued as costs are incurred now with benefits only years later. On the other hand, in terms of cost effectiveness analyses if health costs and benefits are not similarly discounted, it will always seem more cost effective to defer treatment.

1.4.4 Age weighting

The DALY formula includes a continuous age-weighting function that assigns a greater value to a year of life lived in a young or middle-aged adult versus the very young or elderly. Age weighting does not imply preference for any age group, as it is assumed that an individual's life span encompasses all ages.

The focus of the criticisms of the DALY relates to these explicitly stated values. However, the very explicitness of the DALY values, enables one to choose which values to include in the measure. This means that age weighting and discount values can be altered and the life-expectancy can vary from study to study. The Australian burden of disease studies use uniform age weights so that a year of healthy life is valued equally at all ages (Mathers *et al*., 1999).

A recent study to determine the age-weighting preferences of urban Zimbabweans in relation to health care priorities, showed that, although the age-weighting curves did not correspond exactly with the GBD age-weights, Zimbabweans showed a preference for saving the lives of young adults (Jelsma *et al*., 2002).The authors concluded that GBD age-weights should be used to determine DALYs in Zimbabwe (Jelsma *et al*., 2002).

The DALY is described in detail in Murray and Lopez (1996a). This study departs from the GBD methods in the following areas (see section 2 for further details):

- South African life expectancies for 1990 are used to calculate long term duration in the calculation of years lived with a disability;
- disability weights for non-fatal health outcomes are derived from the Dutch study (Stouthard *et al*., 1997, supplemented by weights used in the Global Burden of Disease Study (Murray and Lopez, 1996a) for some conditions with modifications from the Australian burden of disease study (Mathers *et al*., 1999);
- the duration of disability is modified in certain instances as in the Australian burden of disease study (Mathers *et al*., 1999).

1.5 Years of life lost (YLLs)

The GBD approach for measuring the disease burden due to premature mortality has been adopted from the Standard Expected Years of Life Lost method. The expectation of life at a given age is used as an optimal value from which to calculate the loss of life associated with the specific death at a particular age.

The number of years of life lost (YLLs) due to premature mortality are then calculated as the difference between a selected life expectancy and age at death. This study estimates YLLs using the life expectancies used in GBD studies (please see section 1.4.1) for purposes of comparison.

1.6 Years lived with disability (YLDs)

The YLD is the disability component of the DALY based on non-fatal health outcomes. Disability has many dimensions including pain, discomfort, physical dysfunction, emotional distress, inability to carry out usual activities and loss of dignity, among others. The YLD takes the severity and duration of the disability into account using the basic formula (Mathers, *et al*., 2001):

YLD = I x DW x L

I is the number of incident cases for the reference period

DW is the disability weight in the range 0 – 1

L is the average duration of disability (measured in years)

The duration can be modulated to incorporate discounting and age weighting (as for YLLs). The data requirements for the computation of YLDs are (disaggregated by age and sex):

- Incidence of disability
- Duration of disability
- Age of onset
- Distribution by severity class

Disability is coded according to the nature of the disability whether it is short-term or life-long. In addition, there are severity weights for disability that depend on treatment status, i.e. treated or untreated.

2 METHODS

2.1 The Cape Metropolitan Injury study: a source of injury mortality and incidence data

The National Trauma Research Programme of the South African Medical Research Council undertook a large trauma survey in the Cape Metropole in 1990. The aim of the study was to accurately describe the extent, management and service requirements of trauma in the city. The Cape Metropolitan study of trauma (CMS) constituted the first complete cross-sectional metropolitan trauma study in Africa and served 2 essential purposes: it provided data and served as a laboratory for developing streamlined methodologies for wider use (Van der Spuy, 1993). The CMS covered fatal and non-fatal injury cases first presenting at any level (primary, secondary and tertiary facilities and mortuaries) of the public and private sectors in the Cape Metropole.

The data characters, which were captured on a one page, multi-option, tick-off, user friendly questionnaire (see Appendix A), were structured for designing clinical trauma services and providing a basis for prioritising and developing injury prevention strategies. The data obtained by means of the questionnaire included the following: patient demographics, cause of injury, place and date of injury, mode of transport to the hospital, type of treatment service first attended, time and date of attendance, place of residence, place of injury, family income, whether the patient had medical aid cover or not, educational level, injury diagnosis and severity, main surgical disciplines involved in treating the injury, disposal after initial treatment, the level of institutional facilities required to treat the lesions as well as the level of professional expertise required, and the projected duration and degree of disability sustained. The CMS covered a population of 2,517 million. The CMS random sample of 8 493 “fresh”/incident trauma cases extrapolated to an annual caseload of 248 843 patients for 1990, or 1 in 10 people based on metropolitan population figures obtained from the City Planners Department of the City of Cape Town. For this study, 1991 Census population figures were used (Central Statistical Services, 1992) to calculate rates.

Incidence data on nature of injury (see section 2.4) categories by age and sex and type of injury (see section 2.2) category, as well as mortality data, were extracted from the CMS data base. Descriptive statistics were calculated with SAS version 8 (SAS Institute Inc., 1999). CMS data presented for 1990 are weighted to the annual caseload.

2.2 Coding systems for external cause of injury

In the Global Burden of Disease studies of 1990 and 2000, deaths and health states are categorically attributed to one underlying cause using the rules and conventions of the International Classification of Diseases (ICD-9 and ICD-10, respectively) (WHO, 1977; WHO, 1992-1994). In the initial South African Burden of Disease list (based on the GBD cause list and the Australian BOD cause list), the two main injury categories, intentional and unintentional injuries are defined in terms of a series of external cause codes using ICD-9 (Bradshaw *et al*., work in progress). Unintentional injuries are subdivided into road traffic injuries, other transport injuries, mining accidents, poisonings, falls, fires, drownings, surgical and medical misadventure, suffocation and foreign bodies, natural and environmental factors and other unintentional injuries. Intentional injuries are subdivided into self-inflicted injuries (fatal self inflicted injuries are also referred to as suicides), legal intervention and war-related injuries and interpersonal violence (Table 1). Interpersonal violence fatal injuries are also referred to as homicides (see section 1.1 Concepts and definitions).

2.2.1 Limitations of CMS questionnaire

Table 1 shows the categorization of the CMS questionnaire codes to match the South African BOD cause of injury list. For external cause of injury, the CMS data were recoded to the list in Table 1 within the limitations of the questionnaire (see Appendix A). In this analysis, the term unintentional injury is preferred over accident (the term used in the CMS data) (see section 1.1 Concepts and definitions). Many mechanisms of unintentional injury were not listed separately in the CMS questionnaire (Table 1), but specified on the South African BOD list. These included *poisonings* which are admitted to Medical Wards in the Cape Metropole while the CMS study only included admissions to Trauma Wards. *Mining injuries* would be unlikely in the Cape Metropole. Injuries from *surgical and medical misadventure*, and *suffocation and foreign bodies* could not be identified. A few of these injuries may have been misclassified and included in the category *Other unintentional injuries* which included CMS "accidental" injuries where the mechanism was specified as "other" (Table 1). There were no *drownings* in the CMS data, even though it was listed as a mechanism of "accidental death".

With regard to intentional injuries, the perpetrator was unknown in CMS data and hence it was not possible to distinguish between the different sub-categories of interpersonal violence (see section 1.1 concepts and definitions). Rape and assault were combined to indicate *interpersonal violence*, and civil unrest and terrorism were combined for the category *legal intervention and war*. Another data limitation is that injuries resulting from exposure to gang violence (a collective rather than an interpersonal form of violence) would have been coded

as rape or assault (depending on whether the violent act was of a physical or sexual nature) and could not be distinguished from interpersonal violence when using the CMS questionnaire. Furthermore, some injuries related to legal intervention may have been misclassified as interpersonal violence.

2.3 Redistributions of fatal and non-fatal injuries

Deaths from injuries that were undetermined or ill-defined were re-allocated proportionally using the customised MS Excel spreadsheets (based on the Australian BOD worksheets). Additional MS Excel spreadsheets were specifically created in this study for the redistribution of non-fatal injuries.

The counts in the group *ill-defined unintentional* injuries (fatal and non-fatal) were allocated proportionally across the other unintentional injury groups within the particular age and sex group. These included "accidents" where the external cause of injury was not specified.

The counts in the group *undetermined intent* (undetermined whether intentional or unintentional injuries: fatal and non-fatal) were allocated proportionally across the other unintentional and intentional injury categories.

The counts in the group *ill-defined interpersonal violence* injuries (fatal and non-fatal) were allocated proportionally across the interpersonal violence with firearm and without firearm categories.

2.4 Coding systems for nature of injury

In the GBD studies of 1990 and 2000, the International Classification of Diseases ICD-9 and ICD-10 codes, respectively, were used to code nature of injury. In the CMS, on the other hand, two factors were determined when classifying the actual bodily harm due to injuries: the anatomy of the lesion and its severity on a six point scale. The 1985 edition of the abbreviated injury scale (AIS85) was used to code nature of Injury and the Injury severity Score (ISS) was calculated to determine the overall injury severity in patients with multiple injuries (Steenkamp, 1995). This scoring system was chosen for the CMS in preference to the International Classification of Diseases (ICD) codes because the AIS was specifically designed for blunt injuries such as those sustained in motor vehicle collisions and is the scoring system most frequently used by trauma researchers (Peden, 1997). The AIS and ISS are described in more detail in sections 2.4.1 and 2.4.2 below.

For every patient in the CMS database a maximum of three diagnoses could be recorded. In the case of multiple injuries, the three worst lesions were noted (Steenkamp, 1995). In most cases, three injury diagnoses with corresponding severity scores were available per patient record. For each injury record, the diagnosis with the highest severity score was chosen.

Table 1 Comparison of external cause of injury categorization using ICD-9 and CMS codes

SA NBD code			Title of SA NBD cause	ICD-9 Code	CMS questionnaire
III			**Injuries**	**E800-807, E810-838, E840-858, E860-888, E980-999**	**All categories**
III	**V**		**Unintentional**	**E800-807, E810-838, E840-858, E860-888, E890-949**	**Categories: Drowning, Sport, Accident, Transport Accident**
III	**V**	**ZA117**	Road traffic injuries	E810-819, 826-829	Category: Transport accident: motor vehicle, minibus,bus, motorcycle, bicycle
III	**V**	**ZA118**	Other transport injuries	E800-807, 820-825, 830-838, 840-848	Category: Transport accident: train, aircraft, watercraft
III	**V**	**ZA119**	Mining injuries	E849	None
III	**V**	**ZA120**	Poisonings	E850-858, E860-869	None
III	**V**	**ZA121**	Surgical / medical misadventure	E870-879	None
III	**V**	**ZA122**	Falls	E880-888	Category:Accident/Sport, Mechanism:fall/stumble
III	**V**	**ZA123**	Fires	E890-899	Category: Accident/Sport, Mechanism: fire
III	**V**	**ZA124**	Natural and environmental factors	E900-909	None
III	**V**	**ZA125**	Drownings	E910	Category: Drowning
III	**V**	**ZA126**	Suffocation and foreign bodies	E911-915	None
III	**V**	**ZA127**	Other unintentional injuries specified	E839, E916-927, E930-949	Category: Accident/Sport, Mechanisms: all other specified exclude fall, fire
			Ill-defined	E928-E929	Category: Accident/Sport, Mechanism :unknown
			Undetermined intent	**E980-989**	**Category:other**
III	**W**		**Intentional injuries**	**E950-979, E990-999**	**Category: Rape, Assault, Civil Unrest, Terrorism, Intentional self inflicted**
III	**W**	**ZA128**	Suicide and self-inflicted violence	E950-959; E979	Category: Intentional self inflicted, Mechanisms: all specified
III	**W**	**ZA129**	Homicide and interpersonal violence	E960-969	Category: Rape and Assault
III	**W**	**ZA129a**	with firearm	E965	Mechanism: firearm
III	**W**	**ZA129b**	without firearm	E960-964, E966-967	Mechanism: all other specified
			Ill-defined	E968, E969	Mechanism: unknown
III	**W**	**ZA130**	Legal intervention and war	E889, E970-978, E990-999	Category: Civil Unrest, Terrorism, Mechanism: all specified

None: this mechanism was not listed in CMS questionnaire

2.4.1 The Abbreviated Injury Scale (AIS)

The AIS provides health care workers and researchers with a simple numerical method of ranking and comparing injuries by severity, and to standardise the terminology used to describe injuries (Joint Committeee on Injury Scaling, 1990; Peden, 1998). The AIS describes injuries according to body region, type of anatomic structure involved, specific anatomic

structure and level of injury, resulting in a six-digit code. A seventh digit is assigned to the injury severity: 1 (minor), 2 (moderate), 3 (serious), 4 (severe), 5 (critical) and 6 (invariably fatal) (Copes *et al*., 1988, Peden, 1998). The 1985 version of the AIS included severity scores for penetrating trauma for the first time (Copes *et al*., 1988).

2.4.2 The Injury Severity Score (ISS)

The ISS (Baker and O'Neill, 1976) is a method of combining AIS severity codes into a single score in order to reflect multiple injuries sustained by a patient. It is attained by adding together the squares of the three highest AIS scores in three different body regions. An ISS greater than 15 is taken as a severe injury by most researchers (Peden, 1998).

2.4.3 Limitations of AIS and ISS

The abbreviated injury scale diagnosis codes, which had been used to code actual bodily harm in CMS data, had to be collapsed into the 33 nature of injury categories (combining similar outcomes using ICD-9 codes) based on the work that was developed for the Mauritius Burden of Disease study (Vos *et al*., 1995) and applied by the Global Burden of Disease study (Murray and Lopez, 1996a; Begg and Tomijima, 2002) as shown in Table 2.

The AIS and ISS do have definite limitations (Steenkamp, 1995, Peden 1998). The ISS only takes into account the worst injury in a region and cannot accommodate multiple injuries in one body region (Peden 1998). Not all types of injuries have been included in the AIS dictionary (no provision has been made for comminuted or open fractures (Osler, 1993)).

The AIS recognizes nine anatomical areas. For this analysis all open wounds recorded in the CMS were required. This involved adjustment of the classification of skin wounds by including all the lacerations with no underlying pathology, irrespective of the body region in which they fell, as open wounds. It should also be noted that fractured ankles are included under tibia/fibula/patella and foot fractures in AIS85, and amputated thumbs are included under finger amputations. It was only possible to distinguish traumatic amputations to the lower extremities as those occurring either below or above the knee and hence foot amputations were combined with leg amputations. Another limitation is that burns could only be divided into two categories (burns to less than 20% of the body and burns to more than 20% of the total body surface), while with ICD-9 it is possible to distinguish between burns to less than 20%, burns to between 20% and 60% of the body, and burns to more than 60% of the total body surface.

Table 2 Comparison of 33 nature of injury codes using ICD-9 and AIS85 classification systems

Category	ICD9 diagnosis codes	AIS diagnosis codes
		(The abbreviated Injury scale
	(GBD study--Murray & Lopez 1996)	1985)
Fractured skull	800, 801	20701-20708
Fractured face bones	802	32101-32305, 32402-32503, 32603, 32801
Fractured vertebral column	805	70203, 70205, 70601-70611, 73203, 73205, 73601-73610, 76203, 76205, 76303, 76305, 76701-76710
Injured spinal cord	806, 952	70206-70315, 73206-73311, 76206-76215, 76306-76411
Fractured rib or sternum	807	41101-41102, 52501-52602
Fractured pelvis	808	92801-93101
Fractured clavicle, scapula or humerous	810-812	82501-82801
Fractured radius or ulna	813	82301-82403
Fractured hand bones	814-817	82101-82202
Fractured femur	820, 821	92601
Fractured patella, tibia or fibula	822, 823	92401-92403, 92503-92505, 92701
Fractured ankle	824	
Fractured foot bones	825, 826	92001-92201, 92302
Other dislocation	830, 833, 834, 836-839	30501, 32602, 32703, 70204, 70209, 70501-70509, 73204, 73501-73507, 76204, 76304, 76601-76607, 81601, 81701, 82005, 91503, 91603, 91705, 91805
Dislocated shoulder, elbow or hip	831, 832, 835	81404, 81504, 81804, 81904, 91902
Sprains	840-848	32702, 70101, 73101, 76101, 81406, 81508, 81806, 81903, 82003, 91502, 91602, 91703, 91803, 91901
Intracranial injuries	850-854	20101, 20301-20637
Internal injuries	860-869	40701-41002, 50102-50106, 51201-52400, 60101-60199, 60801-65000
Open wound	870, 872-884, 890-894	10103, 10301, 10303-10401, 10403-10503, 10601-10608, 30101-30104, 30201-30401, 30601, 31901, 31903-31904, 32001, 32003, 32604, 40101-40104, 80103-80105, 80901-81301, 81405, 81505-81507, 81805, 81905, 82004, 90105-90107, 91001-91402, 91704, 91804
Injury to eyes	871, 950	30701-31801
Amputated thumb	885	
Amputated finger	886	82204
Amputated arm	887	80101
Amputated toe	895	92304
Amputated foot	896, 897.0, 897.1	
Amputated leg	897.2. 897.3	90101-90102
Crushing	925-929	20102, 50101, 80102, 81403, 81503, 81803, 81906, 82006, 82203, 90103-90104, 91706, 91806, 92303
Burns < 20%	940-947, 948.0, 948.1	10701-10705
Burns >20%	948.2-948.5, 968.6-948.9	10706-10709
Injured nerves	951, 953-957	20201-20202, 40201, 70401, 70701-70703, 73401, 73701-73703, 76501, 76801-76803, 80801-80802, 90801-90902, 92502
Poisoning	960-979, 980-989	
Residual	900-924, 930-939	0-3000, 10101-10102, 10201-10203, 10302, 10402, 31902, 32002, 32401, 40301-40619, 50201-51109, 60201-60709, 70201-70202, 70205, 72308, 73201-73202, 76201-76202, 76301-76302, 80201-80709, 81401-81402, 81501-81502, 81801-81802, 81901-81902, 82001-82002, 90201-90709, 91501, 91601, 91701-91702, 91801-91802, 92301, 92501

Please note that only two burn categories have been included (burns to less than 20% and more than 20% of the total boy surface) instead of three burn categories as in other burden of disease studies

2.5 Injury incidence adjustment factors

Incidence data often need to be to be adjusted to account for less severe injuries coded to some of the injury categories. In this study, the only incidence adjustment is to the amputation of finger category. A proportion of these cases are amputations of a small part of the finger, with negligible disability (Mathers *et al.,*1999). Table 3 gives the adjustment factors that have been used in this study.

Table 3 Incidence adjustment factors

Category	Incidence adjustment factor
Fractured skull	100%
Fractured face bones	100%
Fractured vertebral column	100%
Injured spinal cord	100%
Fractured rib or sternum	100%
Fractured pelvis	100%
Fractured clavicle, scapula or humerous	100%
Fractured radius or ulna	100%
Fractured hand bones	100%
Fractured femur	100%
Fractured patella, tibia or fibula	100%
Fractured ankle	100%
Fractured foot bones	100%
Other dislocation	100%
Dislocated shoulder, elbow or hip	100%
Sprains	100%
Intracranial injuries	100%
Internal injuries	100%
Open wound	100%
Injury to eyes	100%
Amputated thumb	100%
Amputated finger	50%
Amputated arm	100%
Amputated toe	100%
Amputated foot	100%
Amputated leg	100%
Crushing	100%
Burns < 20%	100%
Burns > 20%	100%
Injured nerves	100%
Poisoning	100%
Residual	100%

2.6 Age groups

Nine age groups, as defined in the Australian burden of disease study (Mathers *et al*., 1999) :0-4, 5-14, 15-24, 25-34, 35-44, 45-54, 55-64, 65-74, 75+ were used in this study.

2.7 Disability weights

The GBD disability weights (Murray and Lopez 1996a, page 214) were adopted with the following minor modifications as outlined in the Australian BOD study (Mathers *et al* 1999):

1. The zero weight for 'other dislocations' seemed inconsistent with the weighting given to 'shoulder dislocations' so the weight for 'dislocated shoulder' was used for 'other dislocations'.

2. In the absence of a weight for the proportion of 'eye injuries' with short term disability, the weight for 'open wounds' was used.

3. The discrepancy between the weights for amputated arm on pp. 216 and 416 (Murray and Lopez, 1996a) were assumed to be a misprint and the higher weight was used (0.308 as opposed to 0.102).

4. All injuries were assumed to be treated as CMS covered non-fatal injury cases first presenting at any level (primary, secondary and tertiary facilities) of the public and private sectors in the Cape Metropole.

5. In many cases, "the duration and severity of disability from a nature of injury category is the same for the treated and untreated individuals that survive, although for those cases, the initial case-fatality rate may be different" (Murray and Lopez 1996a, p217).

6. For fractured clavicle, scapula or humerus, the treated GBD weight is 0.153 (p 214 Murray and Lopez, 1996a) for ages 0-14 and then 0.136 for ages 15+. The Australian BOD disability weights were used in the CMS (0.153 for ages 0-54 and 0.136 for ages 55+).

7. For intracranial injuries (lifelong) the treated GBD weight is 0.350 for ages 0-59 and then 0.404 for ages 60+ (p215). In the Australian BOD study, the disability weight is set at 0.350 for all age groups and this Australian modification was also adopted in the CMS where the disability weight was set at 0.350 for ages 0-75+.

8. The residual category has no disability weight and it was excluded from the analysis in the Australian BOD study. In the CMS study, however, injuries classified to the

residual category were proportionally redistributed across the other 33 diagnosis categories.

The final composite disability weights are:

Table 4 Short term disability weights

Category	0-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75+
Fractured skull	0.431	0.431	0.431	0.431	0.431	0.431	0.431	0.431	0.431
Fractured face bones	0.223	0.223	0.223	0.223	0.223	0.223	0.223	0.223	0.223
Fractured vertebral column	0.266	0.266	0.266	0.266	0.266	0.266	0.266	0.266	0.266
Injured spinal cord	-	-	-	-	-	-	-	-	-
Fractured rib or sternum	0.199	0.199	0.199	0.199	0.199	0.199	0.199	0.199	0.199
Fractured pelvis	0.247	0.247	0.247	0.247	0.247	0.247	0.247	0.247	0.247
Fractured clavicle, scapula or hu	0.153	0.153	0.153	0.153	0.153	0.153	0.136	0.136	0.136
Fractured radius or ulna	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180
Fractured hand bones	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
Fractured femur	0.372	0.372	0.372	0.372	0.372	0.372	0.372	0.372	0.372
Fractured patella, tibia or fibula	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
Fractured ankle	0.196	0.196	0.196	0.196	0.196	0.196	0.196	0.196	0.196
Fractured foot bones	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.077
Other dislocation	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074
Dislocated shoulder, elbow or hip	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074
Sprains	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064
Intracranial injuries	0.359	0.359	0.359	0.359	0.359	0.359	0.359	0.359	0.359
Internal injuries	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208
Open wound	0.108	0.108	0.108	0.108	0.108	0.108	0.108	0.108	0.108
Injury to eyes	0.108	0.108	0.108	0.108	0.108	0.108	0.108	0.108	0.108
Amputated thumb	-	-	-	-	-	-	-	-	-
Amputated finger	-	-	-	-	-	-	-	-	-
Amputated arm	-	-	-	-	-	-	-	-	-
Amputated toe	-	-	-	-	-	-	-	-	-
Amputated foot	-	-	-	-	-	-	-	-	-
Amputated leg	-	-	-	-	-	-	-	-	-
Crushing	0.218	0.218	0.218	0.218	0.218	0.218	0.218	0.218	0.218
Burns < 20%	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158
Burns >20%	0.441	0.441	0.441	0.441	0.441	0.441	0.441	0.441	0.441
Injured nerves	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064
Poisoning	0.611	0.611	0.608	0.608	0.608	0.608	0.608	0.608	0.608

Table 5 Long term disability weights

Category	0-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75+
Fractured skull	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.404	0.404
Fractured face bones	-	-	-	-	-	-	-	-	-
Fractured vertebral column	-	-	-	-	-	-	-	-	-
Injured spinal cord	0.725	0.725	0.725	0.725	0.725	0.725	0.725	0.725	0.725
Fractured rib or sternum	-	-	-	-	-	-	-	-	-
Fractured pelvis	-	-	-	-	-	-	-	-	-
Fractured clavicle, scapula or hu	-	-	-	-	-	-	-	-	-
Fractured radius or ulna	-	-	-	-	-	-	-	-	-
Fractured hand bones	-	-	-	-	-	-	-	-	-
Fractured femur	0.272	0.272	0.272	0.272	0.272	0.272	0.272	0.272	0.272
Fractured patella, tibia or fibula	-	-	-	-	-	-	-	-	-
Fractured ankle	-	-	-	-	-	-	-	-	-
Fractured foot bones	-	-	-	-	-	-	-	-	-
Other dislocation	-	-	-	-	-	-	-	-	-
Dislocated shoulder, elbow or hip	-	-	-	-	-	-	-	-	-
Sprains	-	-	-	-	-	-	-	-	-
Intracranial injuries	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350
Internal injuries	-	-	-	-	-	-	-	-	-
Open wound	-	-	-	-	-	-	-	-	-
Injury to eyes	0.301	0.300	0.298	0.298	0.298	0.298	0.298	0.298	0.298
Amputated thumb	0.165	0.165	0.165	0.165	0.165	0.165	0.165	0.165	0.165
Amputated finger	0.102	0.102	0.102	0.102	0.102	0.102	0.102	0.102	0.102
Amputated arm	0.257	0.257	0.257	0.257	0.257	0.257	0.257	0.257	0.257
Amputated toe	0.102	0.102	0.102	0.102	0.102	0.102	0.102	0.102	0.102
Amputated foot	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300
Amputated leg	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300
Crushing	-	-	-	-	-	-	-	-	-
Burns < 20%	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Burns >20%	0.255	0.255	0.255	0.255	0.255	0.255	0.255	0.255	0.255
Injured nerves	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064
Poisoning	-	-	-	-	-	-	-	-	-

2.8 Duration of disability

The GBD Short and Long-term durations (Murray & Lopez 1996a, page 214) were adopted with some minor modifications outlined in the Australian BOD study (Mathers *et al*. 1999) and with some additional modifications also listed below:

2.8.1 Short-term

1. In the absence of a duration for treated 'other dislocations', a duration of 7 days was assumed.

2. In the absence of a duration for the proportion of 'eye injuries' with short term disability, a duration of 7 days was assumed for both treated and untreated cases with this injury.

The short-term durations presented in Table 6 are a composite of the GBD treated and untreated durations assuming the proportion of injuries that were treated was 100%.

2.8.2 Long-term

1. 10% of individuals with 'eye injuries' and 20% with 'injured nerves' were assumed to experience life long disability, not 100% as assumed in the GBD (pp216-217).

2. In accordance with CMS data, 10% of individuals with 'fractured femurs' were assumed to experience life long disability, not 5% as assumed in the GBD (p215 Murray and Lopez, 1996a) and in Australian BOD study (Mathers *et al*., 1999).

3. Life long durations by age category and sex were taken as the South African life expectancy in 1990 (pre-AIDS) at the mid point of each age interval derived from the GBD study (p17 Murray and Lopez, 1996a).

4. With amputations and spinal cord injuries when only a long-term disability weight is used, the short-term duration figure is set to 0.

The short term durations, the proportion of injuries with long term effects and the long term durations are presented in Tables 6 and 7.

Table 6 Short-term durations and the proportion of injuries with long term effects

Injury category	Short term duration (Days)	(Years)	% with long term effects
Fractured skull	39	0.107	15%
Fractured face bones	43	0.118	-
Fractured vertebral column	51	0.140	-
Injured spinal cord	-	-	100%
Fractured rib or sternum	42	0.115	-
Fractured pelvis	46	0.126	-
Fractured clavicle, scapula or hu	41	0.112	-
Fractured radius or ulna	41	0.112	-
Fractured hand bones	26	0.070	-
Fractured femur	51	0.140	10%
Fractured patella, tibia or fibula	33	0.090	-
Fractured ankle	35	0.096	-
Fractured foot bones	27	0.073	-
Other dislocation	7	0.019	-
Dislocated shoulder, elbow or hip	13	0.034	-
Sprains	14	0.038	-
Intracranial injuries	25	0.067	5%
Internal injuries	16	0.042	-
Open wound	9	0.024	-
Injury to eyes	7	0.019	10%
Amputated thumb	-	-	100%
Amputated finger	-	-	100%
Amputated arm	-	-	100%
Amputated toe	-	-	100%
Amputated foot	-	-	100%
Amputated leg	-	-	100%
Crushing	34	0.094	-
Burns < 20%	30	0.083	100%
Burns >20%	102	0.279	100%
Burns > 60%	102	0.279	100%
Injured nerves	-	-	20%
Poisoning	3	0.008	-

Table 7 Long-term durations

Long term duration (yr)	0-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75+
Age for life expectancy	2	10	20	30	40	50	60	70	80
SA 1990 life expectancy- males	58.6	54.7	45.3	36.1	27.4	19.3	12.1	6.2	2.3
SA 1990 life expectancy- females	66.5	62.6	53.1	43.6	34.4	25.5	17.1	9.7	4.1

2.9 Estimation of years of life lost due to premature mortality (YLLs)

Premature mortality was estimated using the same assumptions used in the Global Burden of Disease study (Murray and Lopez, 1996a). CMS fatal injury data were used to calculate years of life lost from premature death (YLLs) using age weighting, discounting at 3% per annum and standard life expectancies (see section 1.4.1) using MS Excel worksheets adapted from the Australian burden of disease study (Mathers *et al.*, 1999).

2.10 Estimation of years lived with disability (YLDs)

For each of the type of injury categories, YLDs were calculated for all 33 nature of injury categories by age and sex using the above mentioned incidence, disability weights and average duration of disability (measured in years) as described in section 1.6. The duration was modulated to incorporate discounting at 3% per annum and age weighting as for YLLs. YLDs were added using MS Excel worksheets adapted from the Australian burden of disease study (Mathers *et al.*, 1999).

2.11 Age standardization of rates

Age standardized mortality and DALY rates per 100 000 for each injury category were calculated using the standard world population following the method of Ahmad *et al*. and were compared with the geographic regional estimates from the WHO Global Burden of Disease study for 2000, Version 1.

3 RESULTS

3.1 Injury mortality

The total injury deaths and rates per 100 000 population by age, sex and cause are presented in Tables 8 and 9, respectively. There were 2928 injury deaths with more intentional (1541) than unintentional (1386) injury deaths (Table 8). About 5 times as many men die as a result of injury as women. Almost half of all injury deaths were due to interpersonal violence (1 427 homicides). Mortality from interpersonal violence is more than seven times higher in males than in females and mortality from road traffic injuries in males is almost 4 times higher than that in females (Table 8).

Injuries selectively kill young, economically active adults. The age specific mortality rates by sex for the different types of injury are shown in Figures 1-6. In females there are more unintentional than intentional deaths and the total injury rates peak is in the older 75+ age group at 182.6 per 100 000 (Figure 1 and Table 9). This peak is due mainly to the high unintentional injury rates in females in the 75+ age group (Table 9 and Figure 2). In males, there are more intentional than unintentional injuries and the total injury mortality rate peaks in the 15-24 age group at 432.4 per 100 000 population due to high rates of intentional injuries in these younger age groups (Figure 3).

For total unintentional injuries and road traffic injuries (Figures 2 and 4), the mortality rate is highest in the older age groups with peaks at 65-74 years in males and 75+ years in females. However, for total intentional injuries and interpersonal violence (homicide) the mortality rate peaks in the younger age groups (Figures 3 and 5). In males, the interpersonal violence mortality rate peaks in the 15-24 year age group at 290.1 per 100 000 while for females the peak is in the 25-34 year age group at 57.1 per 100 000 (Table 9 and Figure 5). As can be seen in Figure 6, in the Cape Metropole in 1990, rates for homicide with and without firearm both peak in the 15-24 year age group and most of the interpersonal violence-related mortality is without firearm.

The cause profile also varies by sex and age. The causes of injury deaths, ranked by persons deaths, are presented in Figure 7. Interpersonal violence is the leading cause of fatal injury in persons and in males while road traffic injuries rank second. This order is reversed in females (Figure 7).

Table 8 Deaths by age, sex and cause, CMS 1990

	Males										Females										Persons
	0-4	5 -14	15- 24	25-34	35-44	45-54	55-64	65-74	75+	Total	0-4	5 -14	15 -24	25- 34	35 -44	45-54	55 -64	65-74	75+	Total	Total
Total injuries	**60**	**136**	**833**	**692**	**385**	**118**	**125**	**71**	**12**	**2 432**	**48**	**60**	**66**	**166**	**60**	**24**	**12**	**18**	**42**	**496**	**2 928**
Unintentional injuries	**60**	**106**	**250**	**275**	**166**	**71**	**77**	**53**	**12**	**1 069**	**48**	**48**	**54**	**59**	**30**	**12**	**6**	**18**	**42**	**317**	**1 386**
Road traffic injuries	30	88	190	214	106	59	53	41	12	**793**	24	42	54	41	24	12	6	12	12	**227**	**1 020**
Other transport injuries	-	-	24	37	48	6	12	-	-	**127**	-	6	-	-	-	-	-	-	-	**6**	**133**
Falls	-	6	12	6	12	-	12	12	-	**60**	-	-	-	6	-	-	-	6	30	**42**	**102**
Fires	18	-	18	12	-	6	-	-	-	**54**	18	-	-	12	6	-	-	-	-	**36**	**90**
Other unintentional injuries	12	12	6	6	-	-	-	-	-	**36**	6	-	-	-	-	-	-	-	-	**6**	**42**
Intentional injuries	**-**	**30**	**583**	**417**	**219**	**47**	**48**	**18**	**-**	**1 362**	**-**	**12**	**12**	**107**	**30**	**12**	**6**	**-**	**-**	**179**	**1 541**
Self-inflicted violence	-	-	24	48	24	-	-	6	-	**102**	-	-	-	6	-	-	-	-	-	**6**	**108**
Interpersonal violence	-	30	559	369	189	47	48	12	-	**1 254**	-	12	12	101	30	12	6	-	-	**173**	**1 427**
with firearm	-	18	73	31	18	6	-	-	-	**147**	-	-	6	-	-	-	-	-	-	**6**	**153**
without firearm	-	12	486	338	171	41	48	12	-	**1 107**	-	12	6	101	30	12	6	-	-	**167**	**1 274**
Legal intervention and war	-	-	-	-	6	-	-	-	-	**6**	-	-	-	-	-	-	-	-	-	**-**	**6**

Table 9 Deaths per 100 000 population by age, sex and cause, CMS 1990

	Males										Females										Persons
	0-4	5 -14	15- 24	25-34	35-44	45-54	55-64	65-74	75+	Total	0-4	5 -14	15 -24	25- 34	35 -44	45-54	55 -64	65-74	75+	Total	Total
Total injuries	**68.5**	**82.7**	**432.4**	**403.9**	**310.5**	**139.0**	**230.2**	**257.2**	**87.6**	**264.2**	**55.9**	**36.6**	**34.3**	**93.8**	**47.9**	**28.3**	**20.5**	**47.1**	**182.6**	**52.3**	**156.6**
Unintentional injuries	**68.5**	**64.5**	**129.7**	**160.3**	**133.9**	**83.6**	**141.8**	**192.0**	**87.6**	**116.2**	**55.9**	**29.3**	**28.1**	**33.3**	**23.9**	**14.2**	**10.3**	**47.1**	**182.6**	**33.4**	**74.2**
Road traffic injuries	34.2	53.5	98.4	125.0	85.5	69.5	97.6	148.6	**87.6**	**86.1**	27.9	25.6	28.1	23.2	19.2	14.2	10.3	31.4	**52.2**	23.9	**54.6**
Other transport injuries	-	-	12.5	21.3	38.7	7.1	22.1	-	**-**	**13.8**	-	3.7	-	-	-	-	-	-	**-**	0.6	**7.1**
Falls	-	3.6	6.3	3.5	9.7	-	22.1	43.5	**-**	**6.5**	-	-	-	3.4	-	-	-	15.7	**130.4**	4.4	**5.5**
Fires	20.5	-	9.4	7.0	-	7.1	-	-	**-**	**5.9**	21.0	-	-	6.8	4.8	-	-	-	**-**	3.8	**4.8**
Other unintentional injuries	13.7	7.3	3.1	3.5	-	-	-	-	**-**	**3.9**	7.0	-	-	-	-	-	-	-	**-**	0.6	**2.2**
Intentional injuries	**-**	**18.2**	**302.7**	**243.6**	**176.6**	**55.4**	**88.4**	**65.2**	**-**	**148.0**	**-**	**7.3**	**6.2**	**60.5**	**23.9**	**14.2**	**10.3**	**-**	**-**	**18.9**	**82.5**
Self-inflicted violence	-	-	12.6	28.2	19.4	-	-	21.7	**-**	**11.1**	-	-	-	3.4	-	-	-	-	**-**	0.6	**5.8**
Interpersonal violence	-	18.2	290.1	215.4	152.4	55.4	88.4	43.5	**-**	**136.2**	-	7.3	6.2	57.1	23.9	14.2	10.3	-	**-**	18.2	**76.3**
with firearm	-	10.9	38.0	18.3	14.5	7.1	-	-	**-**	**15.9**	-	-	3.1	-	-	-	-	-	**-**	0.6	**8.2**
without firearm	-	7.3	252.1	197.1	137.9	48.3	88.4	43.5	**-**	**120.3**	-	7.3	3.1	57.1	23.9	14.2	10.3	-	**-**	17.6	**68.2**
Legal intervention and war	-	-	-	-	4.8	-	-	-	**-**	**0.7**	-	-	-	-	-	-	-	-	**-**	-	**0.3**

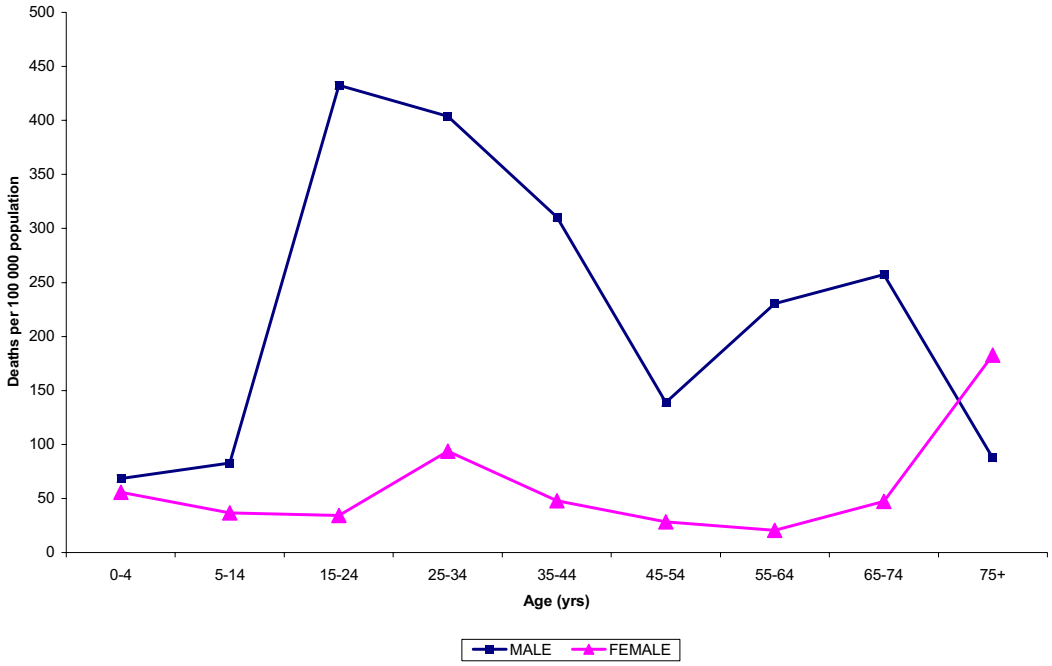

Figure 1 Total injury mortality rate per 100 000 population by age and sex, CMS 1990

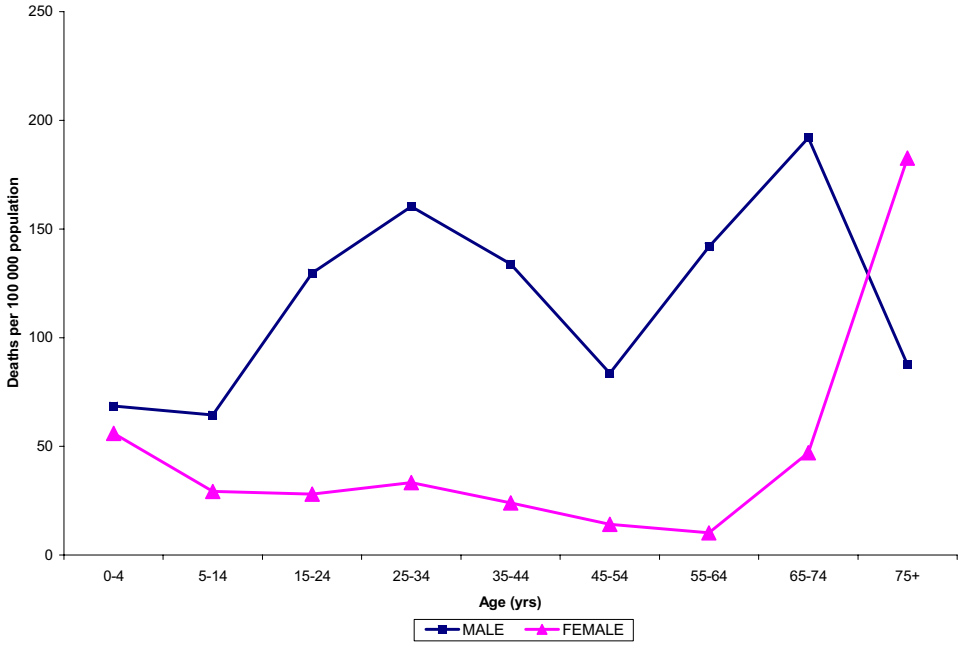

Figure 2 Unintentional injury mortality rate per 100 000 population by age and sex, CMS 1990

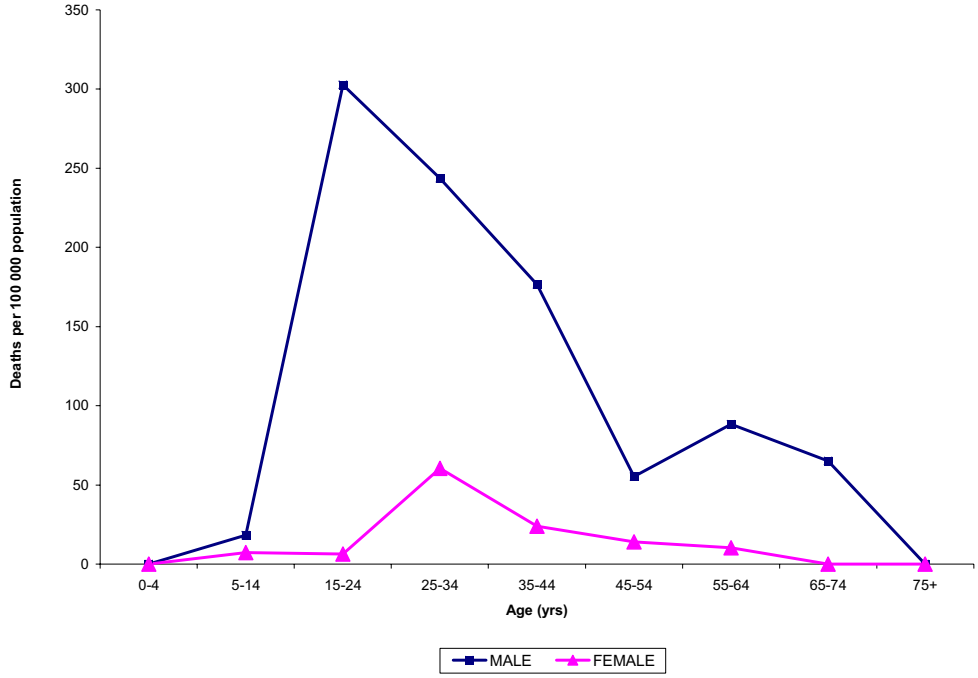

Figure 3 Intentional injury mortality rate per 100 000 population by age and sex, CMS 1990

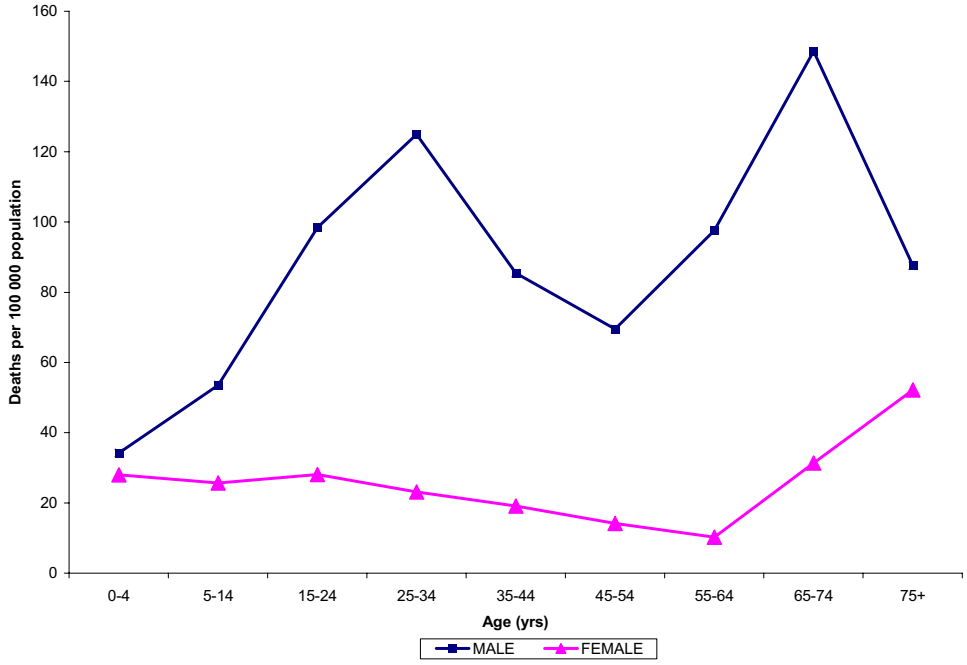

Figure 4 Road traffic injury mortality rate per 100 000 population by age and sex, CMS 1990

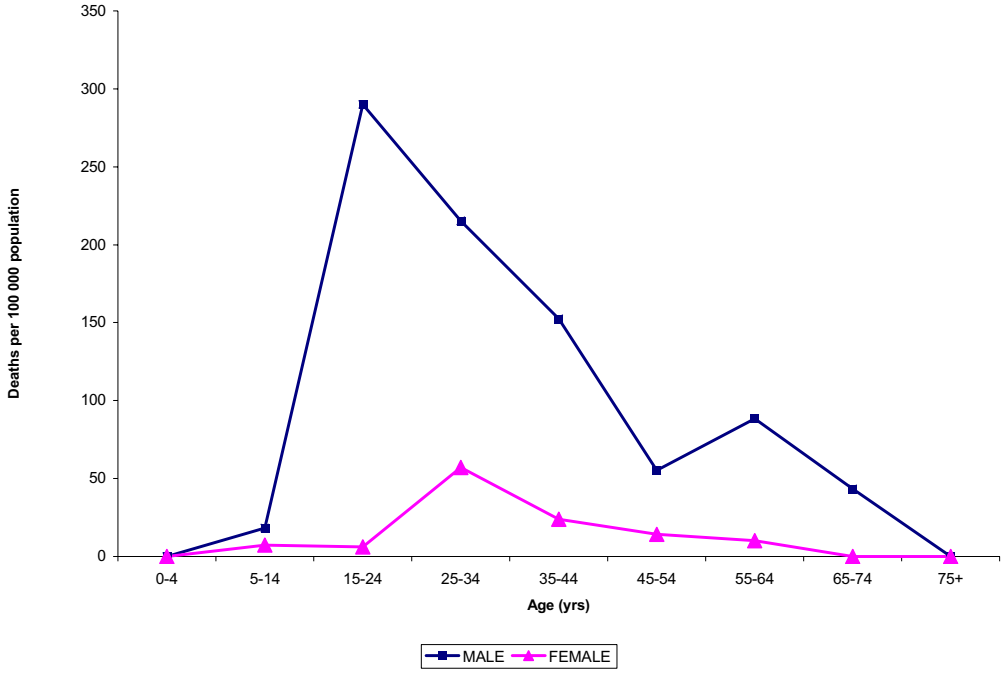

Figure 5 Interpersonal violence mortality rate per 100 000 population by age and sex, CMS 1990

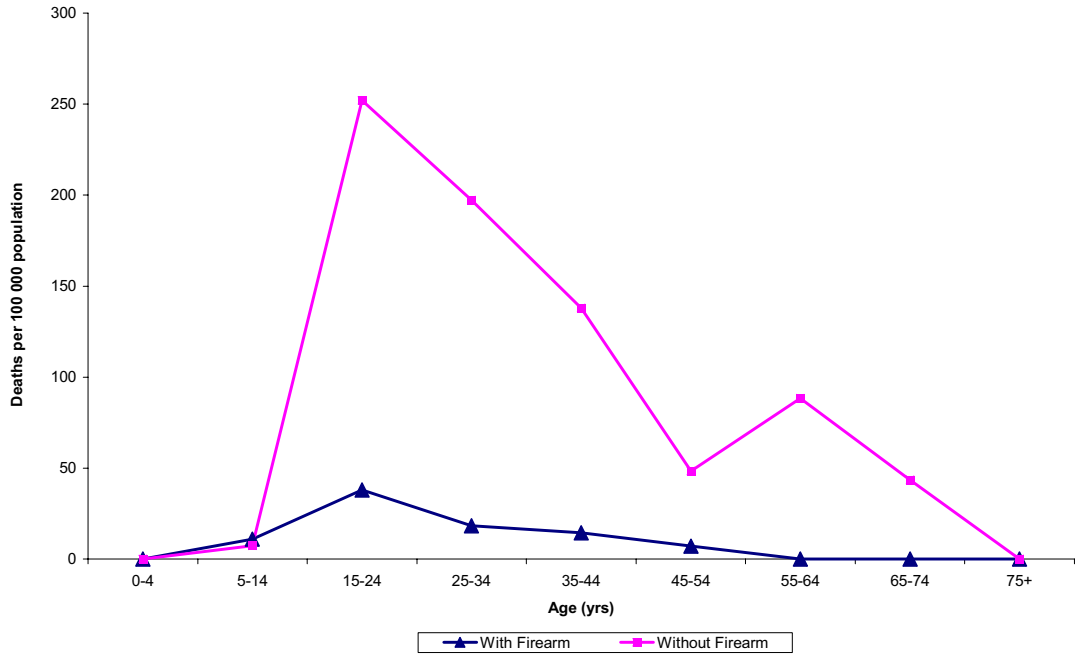

Figure 6 Interpersonal violence mortality rate per 100 000 population among males by age and cause, CMS 1990

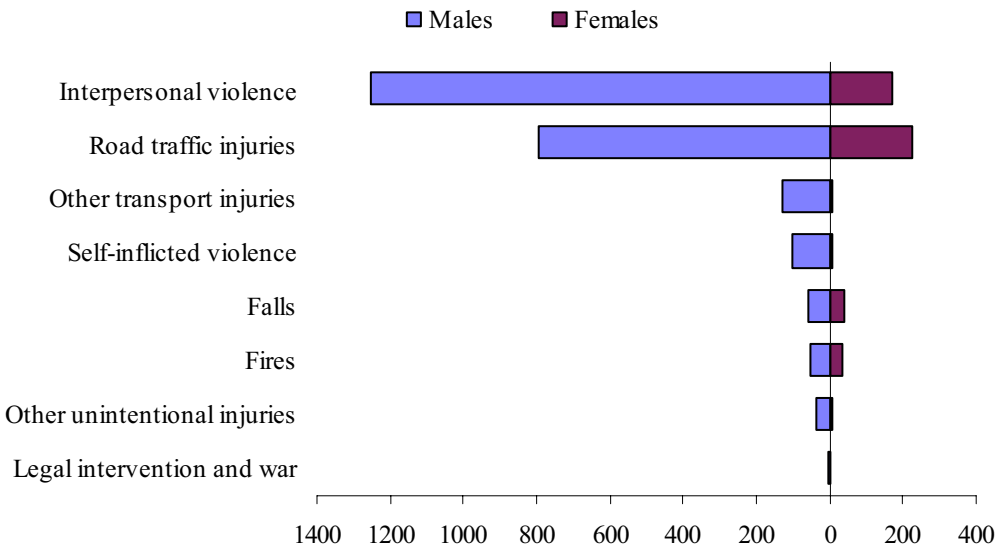

Figure 7 Injury deaths by sex and cause, CMS 1990

The injury mortality profile in the Cape Metropole in 1990 is fairly similar to the global injury mortality distribution for unintentional causes in 2000. Road traffic injuries account for 25% of all injury deaths globally (WHO 2002) which is slightly lower than the CMS proportion (34.8%) (Figure 8). Falls and fires account for 6% and 5% of the global injury mortality and about 3% each of the CMS injury mortality (Figure 8). With regard to intentional injuries, however, self inflicted violence accounts for 16% of global injury mortality compared with only 3.7% in CMS. Interpersonal violence, however, dominates the Cape Metropole injury mortality profile accounting for 48.7% of injury deaths in 1990 while it accounts for only 10% of global injury deaths in 2000 (WHO, 2002).

Table 10 shows the age standardized injury mortality rates for intentional, unintentional and total injuries as well as selected specific causes compared with estimates for the WHO regions. The extremely high death rates due to interpersonal violence and road traffic injuries make the overall CMS injury mortality rate for persons (148.7 per 100 000 population) even higher than that of the African region and almost double the global rate. The age standardised homicide rate (68.9 per 100 000) is almost 7 times the global average. Road traffic injury rates are also exceedingly high (54 per 100 000). Suicide rates are lower than the global average and similar to the African region.

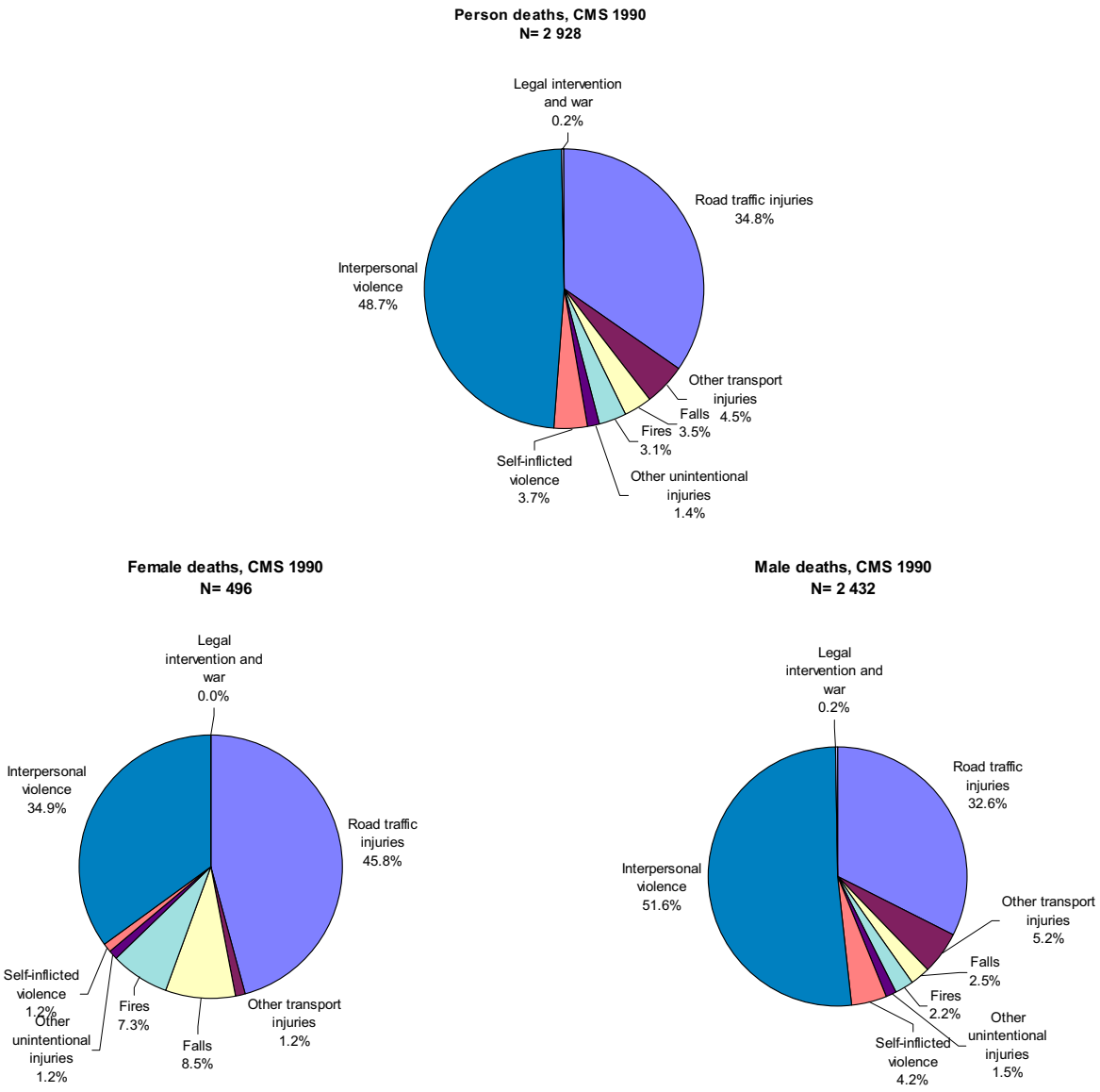

Figure 8 Distribution of injury mortality by cause, CMS 1990

Table 10 Age standardized mortality rates for persons by cause for CMS 1990 and WHO regions, 2000

	CMS 1990	Africa[a]	Americas[a]	Eastern Mediterranean[a]	Europe[a]	South-East Asia[a]	Western Pacific[a]	World[a]
Total Injuries	**148.7**	**139.5**	**67.9**	**79.0**	**85.1**	**98.7**	**74.5**	**86.9**
Total unintentional	74.2	79.1	40.2	57.5	53.0	76.0	50.1	58.2
Road traffic injuries	54.0	34.0	17.2	22.0	13.1	31.4	18.1	21.6
Total intentional	74.5	60.4	27.7	21.5	32.1	22.8	24.4	28.7
Homicide/ interpersonal violence*	68.9	22.1	19.4	7.5	8.8	6.3	3.5	9.0
Suicide and self inflicted	5.3	6.5	8.1	5.8	19.1	12.0	20.8	14.5

*Although the proportion of deaths from legal intervention is probably small, it was necessary to combine homicide and legal intervention (other intentional) injuries when comparing this data with data from WHO regions due to possible misclassification in local data sources. [a]Source: WHO Global Burden of Disease study for 2000, Version 1

3.2 Premature mortality

In the Cape Metropole in 1990, injuries accounted for a total of 69 865 years of life lost (YLLs) due to premature mortality in males and 13 465 YLLs in females. YLLs by sex and type of injury are shown in Figure 9. There is a striking loss of years of life from interpersonal violence (51.1%) and the proportion is higher for males (53.8%) than for females (37.0%). Road traffic injuries, on the other hand, accounted for higher proportion of female (47.8%) than male (31.0%) YLLs.

Interpersonal violence was the leading cause of years of life lost in males accounting for 37 574 YLLs while road traffic injuries were the leading cause in females accounting for 6 442 YLLs (Table 11). In both males and females, the majority (87.5% in males and 95.6% in females) of the years of life lost due to interpersonal violence were not firearm related. Premature mortality rates are presented in Table 12.

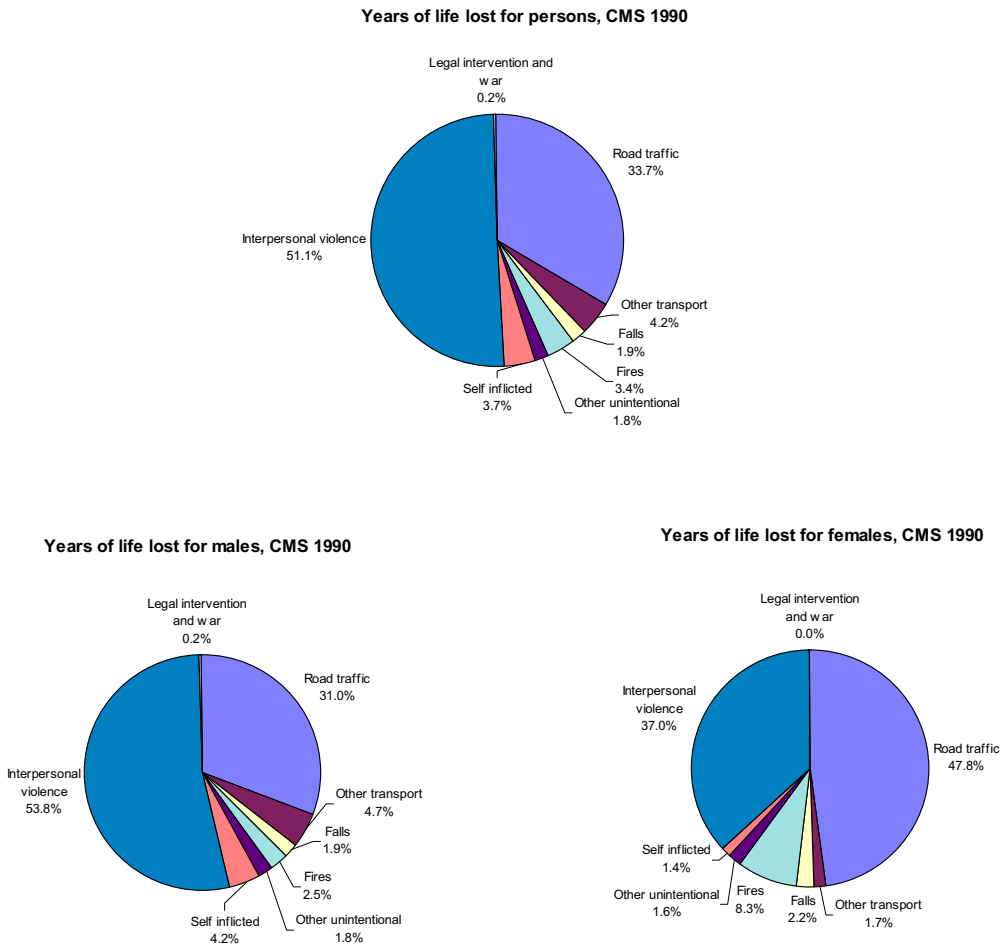

Figure 9 Years of life lost by sex and injury type, CMS 1990

Table 11 YLLs by age, sex and cause, CMS 1990

	Males										Females										Persons
	0-4	**5 -14**	**15- 24**	**25-34**	**35-44**	**45-54**	**55-64**	**65-74**	**75+**	**Total**	**0-4**	**5 -14**	**15 -24**	**25- 34**	**35 -44**	**45-54**	**55 -64**	**65-74**	**75+**	**Total**	**Total**
Total injuries	2 097	5 065	28 844	20 683	9 046	2 091	1 493	516	30	**69 865**	1 681	2 244	2 326	4 981	1 406	442	147	116	122	**13 465**	**83 330**
Unintentional injuries	2 097	3 947	8 638	8 178	3 815	1 233	924	376	30	**29 238**	1 681	1 794	1 904	1 712	666	213	81	116	122	**8 289**	**37 527**
Road traffic injuries	1 042	3 277	6 519	6 369	2 415	1 028	648	307	30	**21 637**	847	1 570	1 904	1 182	533	213	81	77	35	**6 442**	**28 079**
Other transport injuries	0	0	843	1062	1 120	94	138	0	0	**3 257**	0	224	0	0	0	0	0	0	0	**224**	**3 481**
Falls	0	223	422	187	280	0	138	69	0	**1 318**	0	0	0	170	0	0	0	39	87	**296**	**1 614**
Fires	633	0	638	373	0	112	0	0	0	**1 756**	623	0	0	359	133	0	0	0	0	**1 115**	**2 870**
Other unintentional injuries	422	446	216	187	0	0	0	0	0	**1 271**	212	0	0	0	0	0	0	0	0	**212**	**1 483**
Intentional injuries	0	1 118	20 207	12 505	5 231	858	568	140	0	**40 627**	0	450	422	3 269	740	230	66	0	0	**5 176**	**45 803**
Self-inflicted violence	0	0	832	1 464	579	0	0	47	0	**2 922**	0	0	0	188	0	0	0	0	0	**188**	**3 111**
Interpersonal violence	0	1 118	19 374	11 041	4 521	858	568	94	0	**37 574**	0	450	422	3 081	740	230	66	0	0	**4 988**	**42 562**
with firearm	0	671	2 531	935	448	112	0	0	0	**4 697**	0	0	217	0	0	0	0	0	0	**217**	**4 914**
without firearm	0	447	16 843	10 106	4 073	746	568	94	0	**32 877**	0	450	204	3 081	740	230	66	0	0	**4 771**	**37 648**
Legal intervention and war	0	0	0	0	130	0	0	0	0	**130**	0	0	0	0	0	0	0	0	0	**0**	**130**

Table 12 YLLs per 100 000 by age, sex and cause, CMS 1990

	Males										Females										Persons
	0-4	5 -14	15- 24	25-34	35-44	45-54	55-64	65-74	75+	Total	0-4	5 -14	15 -24	25- 34	35 -44	45-54	55 -64	65-74	75+	Total	Total
Total injuries	**2 394**	**3 081**	**14 976**	**12 074**	**7 295**	**2 463**	**2 749**	**1 870**	**220**	**7 591**	**1 957**	**1 369**	**1 210**	**2 814**	**1 122**	**522**	**252**	**304**	**530**	**1 419**	**4 458**
Unintentional injuries	**2 394**	**2 401**	**4 485**	**4 774**	**3 077**	**1 453**	**1 702**	**1 361**	**220**	**3 177**	**1 957**	**1 095**	**990**	**967**	**531**	**251**	**139**	**304**	**530**	**874**	**2 008**
Road traffic injuries	1 190	1 994	3 385	3 718	1 948	1 210	1 194	1 113	**220**	**2 351**	986	958	990	668	425	251	139	203	152	679	**1 502**
Other transport injuries	-	-	438	620	903	111	254	-	**-**	**354**	-	137	-	-	-	-	-	-	-	24	**186**
Falls	-	136	219	109	226	-	254	248	**-**	**143**	-	-	-	96	-	-	-	101	379	31	**86**
Fires	722	-	331	218	-	132	-	-	**-**	**191**	725	-	-	203	106	-	-	-	-	117	**154**
Other unintentional injuries	482	272	112	109	-	-	-	-	**-**	**138**	246	-	-	-	-	-	-	-	-	22	**79**
Intentional injuries	**-**	**680**	**10 491**	**7 300**	**4 218**	**1 010**	**1 046**	**509**	**-**	**4 414**	**-**	**274**	**219**	**1 847**	**591**	**271**	**113**	**-**	**-**	**546**	**2 450**
Self-inflicted violence	-	-	432	855	467	-	-	170	**-**	**318**	-	-	-	106	-	-	-	-	-	20	**166**
Interpersonal violence	-	680	10 059	6 445	3 646	1 010	1,046	339	**-**	**4 082**	-	274	219	1,740	591	271	113	-	-	526	**2 277**
with firearm	-	408	1 314	546	362	132	-	-	**-**	**510**	-	-	113	-	-	-	-	-	-	23	**263**
without firearm	-	272	8 745	5 900	3 285	879	1 046	339	**-**	**3 572**	-	274	106	1,740	591	271	113	-	-	503	**2 014**
Legal intervention and war	-	-	-	-	105	-	-	-	**-**	**14**	-	-	-	-	-	-	-	-	-	-	**7**

3.3 Years lived with disability

Years lived with disability (YLDs) by age, sex and cause are presented in Table 13. It was interesting to note that although road traffic injuries were the leading cause of injury mortality and premature mortality in females, interpersonal violence was the leading cause of injury YLDs in both females and males accounting for 2 786 YLDs in females and 8 750 YLDs in males. Road traffic injuries were the second leading cause of YLDs in both males and females, followed closely by fall-related injury YLDs. Disability from self inflicted injuries, other transport and legal intervention and war was low.

3.4 Disability Adjusted Life Years

Disability Adjusted Life Years (DALYs) by age, sex, and cause are presented in Table 14. Injuries accounted for a total of 114 989 healthy years of life lost in the Cape Metropole in 1990. Cause specific DALYs for males and females are shown in Figure 10. Injuries caused by interpersonal violence contribute the most DALYs in males followed by road traffic injuries. In females, road traffic injury DALYs are only slightly higher than interpersonal violence DALYs, both being important causes of healthy years of life lost due to injuries in females. For all types of injuries, both YLLs and YLDs are greater in males than females. For interpersonal violence, road traffic, other transport and self-inflicted injuries, most of the burden is from premature mortality while in the case of falls and other unintentional injuries the majority of the burden is from disability caused by non-fatal outcomes.

Table 13 YLDs by age, sex and cause, CMS 1990

	Male										Female										Persons
	0-4	**5 -14**	**15- 24**	**25-34**	**35-44**	**45-54**	**55-64**	**65-74**	**75+**	**Total**	**0-4**	**5 -14**	**15 -24**	**25- 34**	**35 -44**	**45-54**	**55 -64**	**65-74**	**75+**	**Total**	**Total**
Total injuries	2 722	3 530	6 803	5 679	2 663	2 722	179	44	20	**24 362**	1 970	745	1 675	1 291	1 234	200	69	70	42	**7 296**	**31 658**
Unintentional injuries	2 637	3 304	3 032	2 334	2 132	1 960	113	38	19	**15 569**	1 724	641	989	622	233	118	68	70	42	**4 508**	**20 076**
Road traffic injuries	352	720	876	644	685	102	11	4	1	**3 395**	316	415	495	166	31	22	10	14	1	**1 470**	**4 865**
Other transport injuries	0	0	84	0	1	0	1	0	0	**85**	0	0	0	0	0	23	0	0	0	**23**	**108**
Falls	1 325	860	299	261	111	37	73	18	18	**3 003**	781	116	182	83	73	45	51	54	40	**1 425**	**4 427**
Fires	45	14	515	563	22	2	0	0	0	**1 160**	20	1	13	4	2	1	0	0	0	**42**	**1 201**
Other unintentional injuries	916	1 711	1 258	865	1 314	1 819	27	16	0	**7 927**	607	110	298	370	126	27	7	2	1	**1 548**	**9 475**
Intentional injuries	84	226	3 772	3 345	531	762	66	6	1	**8 793**	246	103	686	669	1 001	82	1	0	0	**2 789**	**11 582**
Suicide and self-inflicted violence	0	0	0	2	0	0	0	0	0	**3**	0	0	0	2	0	0	0	0	0	**2**	**5**
Homicide and interpersonal violence	84	226	3 732	3 343	531	762	66	6	1	**8 750**	246	103	686	667	1 001	82	1	0	0	**2 786**	**11 536**
with firearm	0	0	2	51	0	0	0	0	0	**53**	0	0	0	0	0	0	0	0	0	**1**	**54**
without firearm	84	226	3 730	3 292	531	762	66	6	1	**8 697**	246	103	686	666	1 001	82	1	0	0	**2 786**	**11 482**
Legal intervention and war	0	0	39	1	0	0	0	0	0	**41**	0	0	0	0	0	0	0	0	0	**0**	**41**

Table 14 DALYs by age, sex and cause, CMS 1990

	Males										Females										Persons
	0-4	**5 -14**	**15- 24**	**25-34**	**35-44**	**45-54**	**55-64**	**65-74**	**75+**	**Total**	**0-4**	**5 -14**	**15 -24**	**25- 34**	**35 -44**	**45-54**	**55 -64**	**65-74**	**75+**	**Total**	**Total**
Total injuries	4819	8595	35648	26362	11709	4813	1672	560	50	**94227**	3651	2989	4001	6272	2640	643	216	186	164	**20761**	**114989**
Unintentional injuries	4735	7252	11669	10512	5946	3193	1037	414	50	**44807**	3405	2436	2893	2334	898	331	149	186	164	**12796**	**57603**
Road traffic injuries	1394	3997	7395	7013	3100	1130	659	311	31	**25031**	1163	1985	2399	1348	564	235	91	91	36	**7912**	**32944**
Other transport injuries	0	0	927	1062	1120	94	139	0	0	**3342**	0	224	0	0	0	23	0	0	0	**247**	**3589**
Falls	1325	1084	721	448	391	37	211	86	18	**4321**	781	116	182	253	73	45	51	93	127	**1721**	**6041**
Fires	678	14	1152	936	22	114	0	0	0	**2915**	643	1	13	363	135	1	0	0	0	**1156**	**4072**
Other unintentional injuries	1338	2157	1475	1052	1314	1819	27	16	0	**9198**	819	110	298	370	126	27	7	2	1	**1760**	**10958**
Intentional injuries	84	1344	23978	15851	5762	1620	635	146	1	**49420**	246	553	1108	3938	1741	312	67	0	0	**7965**	**57385**
Self-inflicted violence	0	0	833	1466	579	0	0	47	0	**2925**	0	0	0	190	0	0	0	0	0	**191**	**3116**
Interpersonal violence	84	1344	23106	14384	5052	1619	634	99	1	**46324**	246	553	1108	3748	1741	312	67	0	0	**7774**	**54098**
with firearm	0	671	2533	986	449	112	0	0	0	**4750**	0	0	218	0	0	0	0	0	0	**218**	**4968**
without firearm	84	673	20573	13398	4604	1508	634	99	1	**41574**	246	553	890	3747	1741	312	67	0	0	**7556**	**49130**
Legal intervention and war	0	0	39	1	131	0	0	0	0	**171**	0	0	0	0	0	0	0	0	0	**0**	**171**

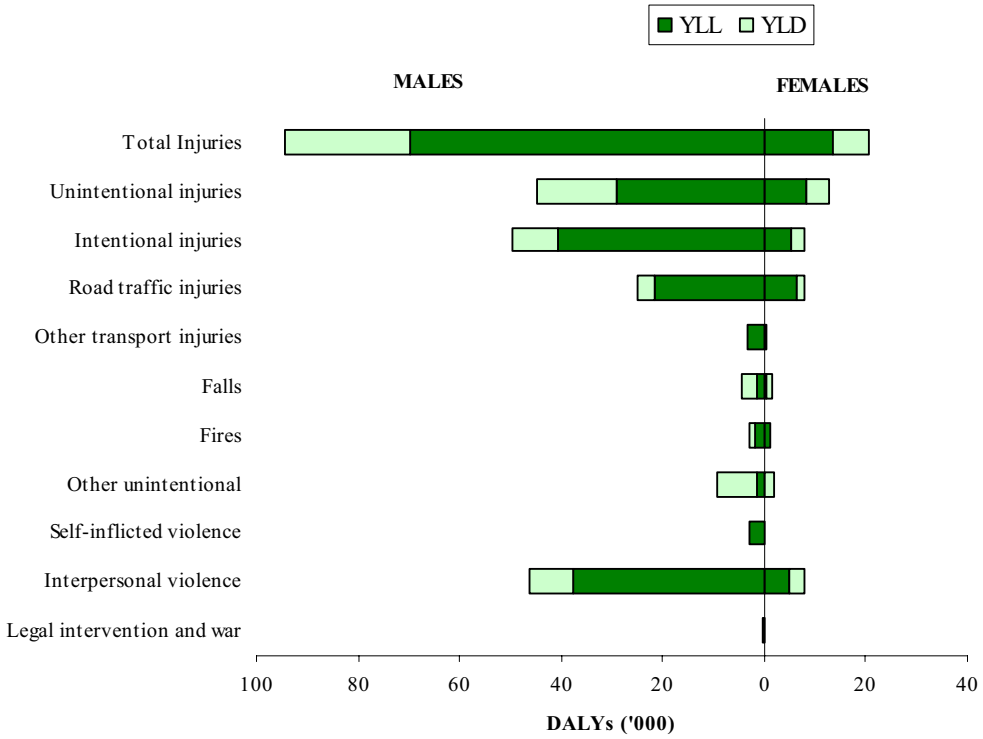

Figure 10 DALYs by sex and cause of injury, CMS 1990

3.5 Disability estimates: comparisons with other burden of disease studies

Incidence, age at onset, duration and disability weights used in the calculation of YLDs for each external cause of injury are presented in Tables 15-32. Cause, sex and age specific incidence rates as well as YLD and DALY rates are also compared with estimates from the GBD 1990 (Murray and Lopez, 1996 a and b) and 2000 studies (Murray *et al*., 2001) (where possible), Australian 1996 (Mathers *et al*., 1999) and Mauritius 1995 (Vos *et al*., 1995) Burden of Disease studies in Tables 15-32.

3.5.1 Road traffic injuries

In all age groups, the road traffic injury incidence in CMS 1990 males was higher than all other regions including the Sub-Saharan Africa (SSA) and Established Market Economies (EME) of the GBD 1990 study, as well as Australia and Mauritius (Table 16). CMS 1990 males also had the highest reported road traffic YLD rates (368.8 per 100 000) while CMS 1990 female rates (154.9 per 100 000) ranked second to the Afro E region (170.2 per 100 000). CMS persons DALY rates (1915.1 per 100 000) for road traffic injuries were also higher than for any other region. When looking at the proportion of YLDs out of total DALYs for road traffic injuries, it appears that the non-fatal component relative to the fatal component of the DALY is slightly smaller when compared with other regions (Table 16).

3.5.2 Other transport injuries

The incidence of other transport injuries was low in CMS 1990 data (Tables 17 and 18). Since other transport injuries are not available for WHO regions, comparisons could only be made with Australia 1996 data. Incidence of non-fatal other transport injuries and YLD rates in Australia were several fold higher than CMS rates. However, mortality from these injuries was high in CMS data and as a result, CMS DALY rates for other transport injuries (192 per 100 000) was more than 4 fold higher than the Australian DALY rate for this type of injury (Table 18). The proportion of disability out of all healthy years of life lost caused by other transport injuries was only 3% in CMS data. In Australia 1996 data, YLDs accounted for a much higher proportion of healthy years lost suggesting that these injuries tended to be more fatal in the CMS 1990 sample of injury data.

3.5.3 Falls

The incidence of falls was high in both males (3 992) and females (2 520 per 100 000) in the CMS, higher than for any other region (Table 20). Of special concern is the very high incidence of falls in children under 5 which is 4 times higher than the incidence in Sub-Saharan African boys and about double the incidence in Sub-Saharan African girls. In most regions, the incidence of falls decreases substantially in young adults 15-44 years, while in CMS the incidence in young adults remains high. The YLD rate for falls in CMS males for all ages (326.2 per 100 000) is lower than the rate in Sub-Saharan Africa (378.5). In CMS females, the fall YLD rate (150.1 per 100 000) is lower than both the Afro E and Sub-Saharan African regions. Fall DALY rates for persons in the CMS (323.2 per 100 000) are similar to rates reported for the African region for 1990 and 2000 but higher than rates for Established Market Economies (1990), Mauritius (1995) and Australia (1996) (Table 20).

3.5.4 Fires

The incidence of fires in CMS females was low when compared with incidence in Sub-Saharan Africa, especially in the age group 5-14 years where the incidence in CMS girls is only 17 per 100 000, about 40 times lower than for girls in the same age group in Sub-Saharan Africa (662 per 100 000) (Table 22). Although the YLD rate in males (126 per 100 000) was similar to the rate reported for the Afro E region, the YLD rate in females was very low (4.4 per 100 000), about 22 times lower than the African regions (1990 and 2000). The low rate in females impacts on the overall person DALY rate (217.8 per 100 000) which is lower than the Sub-Saharan Africa estimate for 1990 and the estimate for the Afro E region in 2000 (Table 22).

3.5.5 Other unintentional injuries

The incidence of non-fatal other unintentional injuries was high in CMS data and comparable to incidence rates reported for Sub-Saharan Africa 1990 and Australia 1996 data (Table 24). YLD rates in males were similar to rates reported for Afro E (2000) but lower than rates reported for Sub-Saharan Africa (1990). Other unintentional YLD rates in CMS females were lower than Australian and African rates (Table 24). Most other unintentional injuries were non-fatal and the proportion of disability out of all healthy years of life lost due to other unintentional injuries was 86%. DALY rates (586.2 per 100 000) for CMS persons was low compared with rates reported for other African regions.

3.5.6 Self-inflicted injuries

The incidence of self-inflicted injuries in males (59 per 100 000) was higher than in males in SSA 1990 and similar to the incidence in EME 1990. The incidence in females (14 per 100 000), however, was similar to the incidence reported for females in Sub-Saharan Africa and Mauritius. YLD rates for self-inflicted injuries was very low in both males and females, 0.3 and 0.2 per 100 000, respectively. Similar low rates were also reported for Mauritius. Persons DALY rates were low compared with established market economies but slightly higher than rates reported for Africa 1990 and 2000 (Table 26).

3.5.7 Interpersonal violence

The incidence of interpersonal violence is exceedingly high for both males and females in CMS. The incidence is higher in males than in females in all age groups, except in children under 5 where the incidence in girls is higher than in boys. In both males and females the incidence peaks in the 15-44 year age group at 10 634 and 4 156 per 100 000 for males and females, respectively. The incidence in males was about 9-fold higher than the incidence for males in Sub-Saharan Africa. In females, the overall incidence was more than 20-fold higher than the incidence in the African region. Interpersonal violence YLD rates for both males (950.6) and females (293.7 per 100 000) were also several fold higher than any other region. The non-fatal component of the interpersonal violence DALYs was about 21% which is similar to the proportion reported in other regions. Although DALY rates for interpersonal violence are high in Sub-Saharan Africa (1288.7 per 100 000), CMS DALY rates (2894.2 per 100 000) are still about 2.2-fold higher than this region and about 23-fold higher than the DALY rate in EME 1990 (Table 28).

In CMS 1990 data, the incidence of non-fatal firearm related interpersonal violence injuries was low compared with non-firearm related injuries. The YLD rate in males for interpersonal violence without firearm was more than 160 fold higher than the rate for interpersonal violence with firearm (Tables 29 and 30). In addition the proportion of YLDs out of total

DALYs for non-firearm related injuries was similar to that for total interpersonal violence while the proportion of YLDs to DALYs in firearm related interpersonal violence injuries was only 1% for persons (data not presented). This indicates that disability from firearm related interpersonal violence is low compared with the mortality component as these injuries tend to be more fatal.

3.5.8 Legal intervention and war

The incidence of legal intervention and war was low in CMS data compared with Sub-Saharan Africa. It is important to note, that the majority of these injuries in Sub-Saharan Africa are probably war related with a small legal intervention component. In the CMS data source, most of the injuries in this category are due to civil unrest and terrorism and some misclassification may have occurred (see section 2.2.1 Limitations of the CMS questionnaire). In CMS, as in other regions, the peak in both males and females is in the 15-44 year age group. The incidence in EME 1990 and in Australia 1996 was close to 0 for all age groups (Table 31). The YLD rate for males and females was low and similar to the very low rates presented for males and females in Australia and EME 1990 countries and several fold lower than the rates for the African region in 1990 and 2000. Although YLD and DALY estimates for war in the African region are in a different order of magnitude, when looking at the proportion of YLD/DALYs, the proportion in CMS data was similar to that reported for Sub-Saharan Africa, while in Australia and EME countries the majority of DALYs caused by legal intervention and war were non-fatal (Table 32).

Table 15 YLDs for Road traffic injuries

CMS	Population ('00000)	Incidence	Incidence per 100,000	Age at onset	Duration	Disability Weight	YLDs[3,1]	YLDs[3,1] per 100 000
Males								
0-4	0.876	1,089	1244	2	1.7	0.274	351.8	401.6
5-14	1.644	2,872	1747	10	1.2	0.220	719.6	437.7
15-24	1.926	4,863	2525	20	0.6	0.206	875.9	454.8
25-34	1.713	3,949	2305	30	0.6	0.211	644.4	376.2
35-44	1.24	2,170	1750	40	0.7	0.191	684.8	552.3
45-54	0.849	1,158	1363	50	0.4	0.228	102.3	120.5
55-64	0.543	502	925	60	0.1	0.199	11.0	20.3
65-74	0.276	82	297	70	0.3	0.229	4.0	14.7
75+	0.14	53	389	80	0.1	0.271	0.7	5.1
All Ages	**9.20**	**16,738**	**1819**	**25.8**	**0.8**	**0.21**	**3394.6**	**368.8**
Females								
0-4	0.859	556	647	2	3.4	0.316	316.1	368.0
5-14	1.639	1,692	1032	10	1.2	0.215	414.6	252.9
15-24	1.923	2,891	1504	20	0.7	0.220	495.1	257.5
25-34	1.77	1,714	968	30	0.4	0.198	165.8	93.7
35-44	1.253	767	612	40	0.2	0.199	31.3	25.0
45-54	0.848	661	779	50	0.1	0.201	22.1	26.0
55-64	0.584	467	800	60	0.1	0.210	10.1	17.4
65-74	0.382	195	510	70	0.4	0.304	13.6	35.5
75+	0.23	130	565	80	0.1	0.213	1.4	6.2
All Ages	**9.49**	**9,073**	**956**	**26.8**	**0.8**	**0.22**	**1470.1**	**154.9**

Table 16 Road traffic injuries: Comparison with estimates from GBD and Australian and Mauritius BOD studies

	Incidence/100,000				
	SSA	**CMS**	**Mauritius**	**EME**	**Australia**
Males					
0-4	151	1244	195	78	100
5-14	982	1747	389	304	544
15-44	450	2251	983	507	875
45-59	428	1257	844	321	375
60+	336	565	650	340	314
All ages	535	1819	750	393	601
Females					
0-4	105	647	113	61	67
5-14	477	1032	182	185	348
15-44	115	1086	279	229	471
45-59	115	784	383	121	306
60+	77	618	478	160	351
All ages	209	956	276	181	363

YLD[3,1] per 100,000	**Males**	**Females**
CMS 1990	368.8	154.9
Mauritius 1995	82.9	35.1
Australia 1996*	85.0	34.6
EME 1990	233.6	107.3
SSA 1990	298.0	119.8
Afro E 2000	302.4	170.2

	Persons YLD/DALY (%)	**Persons DALYs/100,000**
CMS 1990	18%	1915.1
Mauritius 1995	15%	396.6
Australia 1996*	18%	304.2
EME 1990	31%	540.2
SSA 1990	19%	1122.7
Afro E 2000	23%	1005.1

*Australian data not age weighted
Data sources: Mauritius 1995 (Vos *et al*. 1995), Australia 1996 (Mathers *et al*., 1999),
EME and SSA 1990 (Murray and Lopez, 1996 a and b),
AfroE 2000 (Murray *et al*., 2001), WHO GBD study for 2000, version 1

Table 17 YLDs for Other transport injuries

CMS	Population ('00000)	Incidence	Incidence per 100,000	Age at onset	Duration	Disability Weight	YLDs[3,1]	YLDs[3,1] per 100 000
Males								
0-4	0.876	0	0	2	0.0	0.000	0.0	0.0
5-14	1.644	0	0	10	0.0	0.000	0.0	0.0
15-24	1.926	106	55	20	3.0	0.319	83.7	43.4
25-34	1.713	56	32	30	0.0	0.108	0.2	0.1
35-44	1.24	32	26	40	0.1	0.220	0.5	0.4
45-54	0.849	0	0	50	0.0	0.000	0.0	0.0
55-64	0.543	41	76	60	0.1	0.199	0.8	1.6
65-74	0.276	0	0	70	0.0	0.000	0.0	0.0
75+	0.14	0	0	80	0.0	0.000	0.0	0.0
All Ages	**9.20**	**235**	**26**	**32.1**	**1.4**	**0.23**	**85.2**	**9.3**
Females								
0-4	0.859	0	0	2	0.0	0.000	0.0	0.0
5-14	1.639	0	0	10	0.0	0.000	0.0	0.0
15-24	1.923	0	0	20	0.0	0.000	0.0	0.0
25-34	1.77	0	0	30	0.0	0.000	0.0	0.0
35-44	1.253	0	0	40	0.0	0.000	0.0	0.0
45-54	0.848	55	65	50	1.9	0.285	22.9	27.1
55-64	0.584	0	0	60	0.0	0.000	0.0	0.0
65-74	0.382	0	0	70	0.0	0.000	0.0	0.0
75+	0.23	0	0	80	0.0	0.000	0.0	0.0
All Ages	**9.49**	**55**	**6**	**50.0**	**1.9**	**0.28**	**22.9**	**2.4**

Table 18 Other transport injuries: Comparison with estimates from Australian BOD study

	Incidence/100,000 CMS	Australia
Males		
0-4	0	75
5-14	0	416
15-44	40	349
45-59	18	103
60+	30	34
All ages	26	250
Females		
0-4	0	24
5-14	0	111
15-44	0	65
45-59	48	42
60+	0	23
All ages	6	57

YLD[3,1] per 100,000	Males	Females
CMS 1990	9.3	2.4
Australia 1996*	21.6	6.6

	Persons YLD/DALY (%)	Persons DALYs/100,000
CMS 1990	3%	192
Australia 1996*	27%	40.2

*Australian data not age weighted
Data sources: Australia 1996 (Mathers *et al.*, 1999)

Table 19 YLDs for falls

CMS	Population ('00000)	Incidence	Incidence per 100,000	Age at onset	Duration	Disability Weight	YLDs[3,1]	YLDs[3,1] per 100 000
Males								
0-4	0.88	5,673	6476	2	1.3	0.235	1324.6	1512.1
5-14	1.64	9,568	5820	10	0.4	0.163	860.3	523.3
15-24	1.93	7,981	4144	20	0.2	0.138	299.1	155.3
25-34	1.71	5,624	3283	30	0.7	0.144	261.5	152.6
35-44	1.24	3,596	2900	40	0.1	0.153	110.8	89.3
45-54	0.85	1,536	1809	50	0.1	0.171	37.1	43.7
55-64	0.54	1,228	2262	60	0.3	0.179	73.4	135.2
65-74	0.28	888	3217	70	0.1	0.172	17.6	63.8
75+	0.14	650	4745	80	0.2	0.283	18.3	133.9
All Ages	**9.20**	**36,744**	**3992**	**23.0**	**0.5**	**0.17**	**3002.7**	**326.2**
Females								
0-4	0.86	3,584	4173	2	1.3	0.226	780.6	908.7
5-14	1.64	4,624	2821	10	0.7	0.154	115.8	70.6
15-24	1.92	3,164	1645	20	0.3	0.130	182.1	94.7
25-34	1.77	3,033	1713	30	1.2	0.151	82.8	46.8
35-44	1.25	2,747	2193	40	0.1	0.132	73.3	58.5
45-54	0.85	1,952	2302	50	0.1	0.170	45.2	53.4
55-64	0.58	1,961	3359	60	0.1	0.164	51.1	87.5
65-74	0.38	1,353	3541	70	0.3	0.197	53.9	141.2
75+	0.23	1,489	6475	80	0.2	0.228	39.8	172.9
All Ages	**9.49**	**23,908**	**2520**	**31.2**	**0.6**	**0.17**	**1424.5**	**150.1**

Table 20 Falls: Comparison with estimates from GBD and Australian and Mauritius BOD studies

	Incidence/100,000				
	SSA	**CMS**	**Mauritius**	**EME**	**Australia (excludes sports related)**
Males					
0-4	1660	6476	1707	709	3455
5-14	3278	5820	1566	489	3169
15-44	892	3526	1724	428	1557
45-59	626	1919	2016	566	1203
60+	452	3144	2115	847	1894
All ages	1661	3992	1752	543	1922
Females					
0-4	1800	4173	1319	461	2792
5-14	2030	2821	843	206	3583
15-44	454	1808	766	198	1009
45-59	712	2572	1498	712	1344
60+	975	4228	3602	1844	3596
All ages	1174	2520	1187	643	2000

YLD[3,1] per 100,000	**Males**	**Females**
CMS 1990	326.2	150.1
Mauritius 1995	176.7	106.2
Australia 1996*	60.0	43.2
EME 1990	134.6	96.1
SSA 1990	378.5	292.7
Afro E 2000	250.6	217.9

	Persons YLD/DALY (%)	**Persons DALYs/100,000**
CMS 1990	73%	323.2
Mauritius 1995	83%	170.4
Australia 1996*	57%	128.9
EME 1990	68%	169.4
SSA 1990	80%	416.6
Afro E 2000	82%	286.5

*Australian data not age weighted
Data sources: Mauritius 1995 (Vos *et al*. 1995), Australia 1996 (Mathers *et al*., 1999),
EME and SSA 1990 (Murray and Lopez, 1996 a and b),
AfroE 2000 (Murray *et al*., 2001), WHO GBD study for 2000, version 1

Table 21 YLDs for fires

CMS	Population ('00000)	Incidence	Incidence per 100,000	Age at onset	Duration	Disability Weight	YLDs[3,1]	YLDs[3,1] per 100 000
Males								
0-4	0.876	397	453	2	54.5	0.157	44.8	51.1
5-14	1.644	332	202	10	43.1	0.169	13.8	8.4
15-24	1.926	384	199	20	45.4	0.240	514.7	267.2
25-34	1.713	326	190	30	36.2	0.287	563.0	328.7
35-44	1.24	140	113	40	22.4	0.155	21.5	17.4
45-54	0.849	61	72	50	19.4	0.159	1.7	2.0
55-64	0.543	0	0	60	0.0	0.000	0.0	0.0
65-74	0.276	0	0	70	0.0	0.000	0.0	0.0
75+	0.14	0	0	80	0.0	0.000	0.0	0.0
All Ages	**9.20**	**1,639**	**178**	**18.4**	**42.4**	**0.20**	**1159.6**	**126.0**
Females								
0-4	0.859	526	612	2	66.6	0.159	20.0	23.2
5-14	1.639	28	17	10	62.7	0.159	1.4	0.9
15-24	1.923	274	142	20	48.1	0.150	13.4	7.0
25-34	1.77	85	48	30	43.7	0.159	4.1	2.3
35-44	1.253	52	42	40	34.5	0.159	2.1	1.6
45-54	0.848	26	31	50	25.5	0.159	0.8	0.9
55-64	0.584	0	0	60	0.0	0.000	0.0	0.0
65-74	0.382	0	0	70	0.0	0.000	0.0	0.0
75+	0.23	0	0	80	0.0	0.000	0.0	0.0
All Ages	**9.49**	**991**	**104**	**12.9**	**56.7**	**0.16**	**41.7**	**4.4**

Table 22 Fires: Comparison with estimates from GBD and Australian and Mauritius BOD studies

	Incidence/100,000				
	SSA	**CMS**	**Mauritius**	**EME**	**Australia (includes burns/scalds)**
Males					
0-4	305	453	440	45	403
5-14	471	202	117	69	167
15-44	86	174	227	15	212
45-59	68	55	119	18	95
60+	42	0	97	12	52
All ages	231	178	206	25	176
Females					
0-4	263	612	361	37	298
5-14	662	17	166	58	116
15-44	64	83	224	6	111
45-59	45	23	123	8	89
60+	39	0	84	9	36
All ages	259	104	201	15	108

YLD[3,1] per 100,000	**Males**	**Females**
CMS 1990	126.0	4.4
Australia 1996 (includes scalds)*	312.5	148.6
Mauritius 1995	38.2	36.2
EME 1990	11.8	7.9
SSA 1990	270.3	316.0
Afro E 2000	99.1	98.3

	Persons YLD/DALY (%)	**Persons DALYs/100,000**
CMS	30%	217.8
Australia (includes scalds)*	40%	25.7
Mauritius 1995	22%	170.2
EME 1990	30%	32.7
SSA 1990	42%	697.1
Afro E 2000	41%	242.8

*Australian data not age weighted

Data sources: Mauritius 1995 (Vos et al. 1995), Australia 1996 (Mathers et al., 1999), EME and SSA 1990 (Murray and Lopez, 1996 a and b), AfroE 2000 (Murray et al., 2001), WHO GBD study for 2000, version 1

Table 23 YLDs for other unintentional injuries

CMS	Population ('00000)	Incidence	Incidence per 100,000	Age at onset	Duration	Disability Weight	YLDs[3,1]	YLDs[3,1] per 100 000
Males								
0-4	0.876	4,574	5221	2	32.0	0.153	916.2	1045.9
5-14	1.644	6,944	4224	10	6.8	0.139	1710.7	1040.6
15-24	1.926	10,825	5620	20	4.3	0.146	1258.4	653.4
25-34	1.713	10,269	5995	30	4.3	0.138	864.8	504.9
35-44	1.24	6,277	5062	40	3.7	0.148	1313.9	1059.6
45-54	0.849	3,054	3597	50	4.7	0.182	1818.6	2142.1
55-64	0.543	1,133	2087	60	1.3	0.162	27.4	50.5
65-74	0.276	474	1718	70	1.5	0.122	16.2	58.7
75+	0.14	259	1888	80	0.0	0.108	0.4	2.7
All Ages	**9.20**	**43,808**	**4760**	**25.8**	**7.4**	**0.15**	**7926.7**	**861.2**
Females								
0-4	0.859	2,341	2725	2	30.9	0.182	607.4	707.1
5-14	1.639	3,459	2110	10	21.8	0.140	109.6	66.9
15-24	1.923	4,132	2149	20	12.6	0.134	298.0	154.9
25-34	1.77	3,421	1933	30	8.4	0.131	369.5	208.8
35-44	1.253	2,340	1867	40	8.7	0.155	126.1	100.6
45-54	0.848	1,415	1668	50	4.5	0.139	27.3	32.2
55-64	0.584	565	968	60	3.0	0.163	6.8	11.7
65-74	0.382	612	1603	70	0.8	0.118	2.4	6.2
75+	0.23	326	1417	80	0.1	0.121	1.1	5.0
All Ages	**9.49**	**18,610**	**1961**	**26.4**	**13.8**	**0.14**	**1548.2**	**163.2**

Table 24 Other Unintentional: Comparison with estimates from GBD and Australian and Mauritius BOD studies

	Incidence/100,000			
	SSA	**CMS**	**EME**	**Australia**
Males				
0-4	2234	5221	583	3396
5-14	1966	4224	201	1251
15-44	6150	5610	714	3175
45-59	4042	3231	1076	6458
60+	3438	1898	1734	13448
All ages	3965	4760	855	4988
Females				
0-4	1639	2725	390	2446
5-14	1557	2110	71	1266
15-44	847	2000	122	4526
45-59	850	1489	245	7963
60+	1191	1350	981	6588
All ages	1201	1961	331	4863

YLD[3,1] per 100,000	**Males**	**Females**
CMS 1990	861.2	163.2
Australia 1996*	313.3	227.9
EME 1990	220.8	63.9
SSA 1990	2003.8	690.8
Afro E 2000	710.9	532.4

	Persons YLD/DALY (%)	**Persons DALYs/100,000**
CMS 1990	86%	586.2
Australia 1996*	84%	125.4
EME 1990	53%	267.9
SSA 1990	58%	2317.0
Afro E 2000	56%	1115.4

*Australian data not age weighted

Data sources: Mauritius 1995 (Vos et al. 1995), Australia 1996 (Mathers et al., 1999), EME and SSA 1990 (Murray and Lopez, 1996 a and b), AfroE 2000 (Murray et al., 2001), WHO GBD study for 2000, version 1

Table 25 YLDs for self-inflicted injuries

CMS	Population ('00000)	Incidence	Incidence per 100,000	Age at onset	Duration	Disability Weight	YLDs[3,1]	YLDs[3,1] per 100 000
Males								
0-4	0.88	0	0	2	0.0	0.000	0.0	0.0
5-14	1.64	0	0	10	0.0	0.000	0.0	0.0
15-24	1.93	122	63	20	0.0	0.108	0.5	0.2
25-34	1.71	256	150	30	0.0	0.141	1.8	1.0
35-44	1.24	54	43	40	0.0	0.129	0.3	0.2
45-54	0.85	84	99	50	0.0	0.108	0.2	0.3
55-64	0.54	29	54	60	0.0	0.208	0.2	0.4
65-74	0.28	0	0	70	0.0	0.000	0.0	0.0
75+	0.14	0	0	80	0.0	0.000	0.0	0.0
All Ages	**9.20**	**546**	**59**	**33.4**	**0.0**	**0.13**	**3.0**	**0.3**
Females								
0-4	0.86	0	0	2	0.0	0.000	0.0	0.0
5-14	1.64	0	0	10	0.0	0.000	0.0	0.0
15-24	1.92	59	31	20	0.0	0.108	0.2	0.1
25-34	1.77	78	44	30	0.1	0.239	1.9	1.1
35-44	1.25	0	0	40	0.0	0.000	0.0	0.0
45-54	0.85	0	0	50	0.0	0.000	0.0	0.0
55-64	0.58	0	0	60	0.0	0.000	0.0	0.0
65-74	0.38	0	0	70	0.0	0.000	0.0	0.0
75+	0.23	0	0	80	0.0	0.000	0.0	0.0
All Ages	**9.49**	**137**	**14**	**25.7**	**0.0**	**0.18**	**2.2**	**0.2**

Table 26 Self Inflicted: Comparison with estimates from GBD and Australian and Mauritius BOD studies

	Incidence/100,000				
	SSA	**CMS**	**Mauritius**	**EME**	**Australia**
Males					
0-4	0	0	0	0	0
5-14	7	0	3	2	6
15-44	33	89	32	76	247
45-59	18	88	32	72	76
60+	16	21	27	75	31
All ages	18	59	23	60	132
Females					
0-4	0	0	0	0	0
5-14	0	0	3	3	38
15-44	26	28	21	78	317
45-59	13	0	4	75	122
60+	4	0	11	56	37
All ages	12	14	13	59	175

YLD[3,1] per 100,000	**Males**	**Females**
CMS 1990	0.3	0.2
Mauritius 1995	1.1	0.2
Australia 1996	24.9	22.8
EME 1990	20.8	20.9
SSA 1990	7.1	5.8
Afro E 2000	8.7	9.8

	Persons YLD/DALY (%)	**Persons DALY/100,000**
CMS 1990	0%	166.7
Mauritius 1995	0%	333.0
Australia 1996	1%	305.4
EME 1990	8%	270.4
SSA 1990	7%	92.5
Afro E 2000	7%	125.0

*Australian data not age weighted
Data sources: Mauritius 1995 (Vos et al. 1995), Australia 1996 (Mathers et al., 1999),
EME and SSA 1990 (Murray and Lopez, 1996 a and b),
AfroE 2000 (Murray et al., 2001), WHO GBD study for 2000, version 1

Table 27 YLDs for Interpersonal violence

CMS	Population ('00000)	Incidence	Incidence per 100,000	Age at onset	Duration	Disability Weight	YLDs[3,1]	YLDs[3,1] per 100 000
Males								
0-4	0.876	295	337	2	1.5	0.272	84.2	96.1
5-14	1.644	1,744	1061	10	0.6	0.164	225.6	137.2
15-24	1.926	21,819	11329	20	0.8	0.174	3731.8	1937.6
25-34	1.713	22,298	13017	30	1.0	0.173	3342.6	1951.3
35-44	1.24	7,764	6261	40	0.3	0.180	531.0	428.2
45-54	0.849	3,481	4100	50	1.0	0.188	761.7	897.2
55-64	0.543	834	1537	60	0.3	0.208	66.1	121.7
65-74	0.276	337	1222	70	0.1	0.179	5.8	20.9
75+	0.14	26	190	80	0.2	0.377	0.9	6.3
All Ages	**9.20**	**58,599**	**6367**	**28.7**	**0.8**	**0.18**	**8749.6**	**950.6**
Females								
0-4	0.859	443	516	2	3.3	0.236	246.4	286.8
5-14	1.639	1,000	610	10	0.5	0.169	103.3	63.0
15-24	1.923	7,035	3659	20	2.0	0.163	686.0	356.7
25-34	1.77	9,413	5318	30	0.4	0.156	666.8	376.8
35-44	1.253	4,107	3278	40	1.5	0.166	1001.0	798.8
45-54	0.848	1,637	1931	50	0.4	0.146	81.7	96.4
55-64	0.584	243	415	60	0.0	0.139	1.0	1.7
65-74	0.382	26	68	70	0.1	0.100	0.1	0.3
75	0.23	0	0	80	0.0	0.000	0.0	0.0
All Ages	**9.49**	**23,904**	**2519**	**29.1**	**1.1**	**0.16**	**2786.3**	**293.7**

Table 28 Interpersonal violence: Comparison with estimates from GBD and Australian and Mauritius BOD studies

	Incidence/100,000				
	SSA	**CMS**	**Mauritius**	**EME**	**Australia**
Males					
0-4	93	337	24	46	32
5-14	148	1061	29	23	49
15-44	1484	10634	348	219	754
45-59	423	3479	1814	61	189
60+	243	1140	202	26	68
All ages	713	6367	407	124	399
Females					
0-4	47	516	15	46	35
5-14	64	610	23	18	20
15-44	189	4156	153	60	236
45-59	81	1543	128	19	45
60+	69	163	107	13	19
All ages	114	2519	107	38	122

YLD[3,1] per 100,000	**Males**	**Females**
CMS 1990	950.6	293.7
Mauritius 1995	29.8	10.8
Australia 1996	41.3	12.7
EME 1990	41.8	12.5
SSA 1990	191.4	33.0
Afro E 2000	127.6	57.5

	Persons YLD/DALY (%)	**Persons DALYs/100,000**
CMS 1990	21%	2894.2
Mauritius 1995	25%	81.1
Australia 1996	29%	59.3
EME 1990	22%	124.6
SSA 1990	9%	1288.7
Afro E 2000	13%	700.4

*Australian data not age weighted
Data sources: Mauritius 1995 (Vos et al. 1995), Australia 1996 (Mathers et al., 1999),
EME and SSA 1990 (Murray and Lopez, 1996 a and b), AfroE 2000 (Murray et al., 2001), WHO GBD study for 2000, version 1

Table 29 YLDs for interpersonal violence with firearm

CMS	Population ('00000)	Incidence	Incidence per 100,000	Age at onset	Duration	Disability Weight	YLDs[3,1]	YLDs[3,1] per 100 000
Males								
0-4	0.876	0	0	2	0.000	0.000	0.0	0.0
5-14	1.644	33	20	10	0.024	0.108	0.1	0.1
15-24	1.926	259	134	20	0.030	0.138	1.7	0.9
25-34	1.713	198	116	30	1.193	0.212	51.1	29.8
35-44	1.24	27	22	40	0.042	0.208	0.3	0.3
45-54	0.849	0	0	50	0.000	0.000	0.0	0.0
55-64	0.543	0	0	60	0.000	0.000	0.0	0.0
65-74	0.276	0	0	70	0.000	0.000	0.0	0.0
75+	0.14	0	0	80	0.000	0.000	0.0	0.0
All Ages	**9.20**	**517**	**56**	**24.2**	**0.5**	**0.17**	**53.3**	**5.8**
Females								
0-4	0.859	0	0	2	0.0	0.000	0.0	0.0
5-14	1.639	0	0	10	0.0	0.000	0.0	0.0
15-24	1.923	27	14	20	0.1	0.100	0.3	0.1
25-34	1.77	54	31	30	0.0	0.156	0.5	0.3
35-44	1.253	0	0	40	0.0	0.000	0.0	0.0
45-54	0.848	0	0	50	0.0	0.000	0.0	0.0
55-64	0.584	0	0	60	0.0	0.000	0.0	0.0
65-74	0.382	0	0	70	0.0	0.000	0.0	0.0
75+	0.23	0	0	80	0.0	0.000	0.0	0.0
All Ages	**9.49**	**81**	**9**	**26.7**	**0.0**	**0.14**	**0.7**	**0.1**

Table 30 YLDs for interpersonal violence without firearm

CMS	Population ('00000)	Incidence	Incidence per 100,000	Age at onset	Duration	Disability Weight	YLDs[3,1]	YLDs[3,1] per 100 000
Males								
0-4	0.876	295	337	2	1.5	0.272	84.2	96.1
5-14	1.644	1,711	1041	10	0.6	0.165	225.5	137.2
15-24	1.926	21,561	11194	20	0.8	0.175	3730.1	1936.7
25-34	1.713	22,100	12902	30	1.0	0.173	3291.7	1921.6
35-44	1.24	7,737	6239	40	0.3	0.180	530.6	427.9
45-54	0.849	3,481	4100	50	1.0	0.188	761.7	897.2
55-64	0.543	834	1537	60	0.3	0.208	66.1	121.7
65-74	0.276	337	1222	70	0.1	0.179	5.8	20.9
75+	0.14	26	190	80	0.2	0.377	0.9	6.3
All Ages	**9.20**	**58,082**	**6311**	**28.8**	**0.8**	**0.18**	**8696.6**	**944.9**
Females								
0-4	0.859	443	516	2	3.3	0.236	246.4	286.8
5-14	1.639	1,000	610	10	0.5	0.169	103.3	63.0
15-24	1.923	7,008	3644	20	2.0	0.164	685.7	356.6
25-34	1.77	9,359	5287	30	0.4	0.156	666.4	376.5
35-44	1.253	4,107	3278	40	1.5	0.166	1001.0	798.8
45-54	0.848	1,637	1931	50	0.4	0.146	81.7	96.4
55-64	0.584	243	415	60	0.0	0.139	1.0	1.7
65-74	0.382	26	68	70	0.1	0.100	0.1	0.3
75+	0.23	0	0	80	0.0	0.000	0.0	0.0
All Ages	**9.49**	**23,823**	**2511**	**29.1**	**1.1**	**0.16**	**2785.5**	**293.6**

Table 31 YLDs for Legal Intervention and War

CMS	Population ('00000)	Incidence	Incidence per 100,000	Age at onset	Duration	Disability Weight	YLDs[3,1]	YLDs[3,1] per 100 000
Males								
0-4	0.876	0	0	2	0.0	0.000	0.0	0.0
5-14	1.644	66	40	10	0.0	0.108	0.2	0.1
15-24	1.926	311	161	20	0.6	0.124	39.4	20.5
25-34	1.713	150	87	30	0.0	0.108	0.6	0.3
35-44	1.24	54	43	40	0.0	0.108	0.2	0.2
45-54	0.849	70	83	50	0.0	0.108	0.2	0.2
55-64	0.543	0	0	60	0.0	0.000	0.0	0.0
65-74	0.276	0	0	70	0.0	0.000	0.0	0.0
75+	0.14	0	0	80	0.0	0.000	0.0	0.0
All Ages	**9.20**	**650**	**71**	**26.2**	**0.3**	**0.12**	**40.6**	**4.4**
Females								
0-4	0.859	0	0	2	0.0	0.000	0.0	0.0
5-14	1.639	0	0	10	0.0	0.000	0.0	0.0
15-24	1.923	59	31	20	0.0	0.108	0.2	0.1
25-34	1.77	0	0	30	0.0	0.000	0.0	0.0
35-44	1.253	0	0	40	0.0	0.000	0.0	0.0
45-54	0.848	0	0	50	0.0	0.000	0.0	0.0
55-64	0.584	0	0	60	0.0	0.000	0.0	0.0
65-74	0.382	0	0	70	0.0	0.000	0.0	0.0
75+	0.23	0	0	80	0.0	0.000	0.0	0.0
All Ages	**9.49**	**59**	**6**	**20.0**	**0.0**	**0.11**	**0.2**	**0.0**

Table 32 Legal intervention and war: Comparison with estimates from GBD and Australian and Mauritius BOD studies

	Incidence/100,000			
	SSA	**CMS**	**EME**	**Australia**
Males				
0-4	175	0	0	0
5-14	71	40	0	0
15-44	866	105	0	10
45-59	369	63	0	0
60+	237	0	0	0
All ages	448	71	0	5
Females				
0-4	177	0	0	0
5-14	95	0	0	0
15-44	564	12	0	0
45-59	226	0	0	0
60+	196	0	0	0
All ages	319	6	0	0

YLD[3,1] per 100,000	**Males**	**Females**
CMS 1990	4.4	0.0
Australia 1996*	0.2	0.0
EME 1990	0.1	0.1
SSA 1990	582.6	428.0
Afro E 2000	143.9	109.2

	Persons YLD/DALY (%)	**Persons DALYs/100,000**
CMS 1990	24%	9.2
Australia 1996*	100%	0.0
EME 1990	50%	0.3
SSA 1990	24%	2096.5
Afro E 2000	13%	986.3

*Australian data not age weighted

Data sources: Mauritius 1995 (Vos et al. 1995), Australia 1996 (Mathers et al., 1999), EME and SSA 1990 (Murray and Lopez, 1996 a and b), AfroE 2000 (Murray et al., 2001), WHO GBD study for 2000, version 1

3.6 Comparison of YLD/YLL ratios

Ratios of YLDs to YLLs by age, sex and injury cause for the CMS 1990 are presented in Table 33. It is interesting to note that, when looking at interpersonal violence, the ratios of YLD/YLLS are very different for injuries with firearm and those without firearm. In males, the ratio of YLDs/YLLs is 0.26 for interpersonal violence without firearm and 0.01 for interpersonal violence with firearm. Similarly in females, the ratio of disability to premature mortality for interpersonal violence without firearm was 0.56 while that for violence with firearm was 0.003 as firearm related injuries are mostly fatal.

CMS ratios are compared to YLD/YLL ratios for Sub-Saharan Africa (1990) and Afro E (2000) regions in Table 34. Overall, for unintentional injuries, the CMS YLDs/YLLs ratio is similar to Sub-Saharan Africa and Afro E regions. For road traffic injuries, the ratio of disability to premature mortality for both males and females in CMS was similar to the ratio for Sub-Saharan Africa and slightly lower than the ratio for Afro E. Ratios for falls in CMS males and females were again similar to the ratios reported for both Afro E and Sub-Saharan Africa. The YLD/YLL ratio for fires in males in CMS was identical to the ratios reported for the other African regions. However, the ratio in females was markedly low. The ratio of YLDs/YLLs for other unintentional injuries in both males and females in CMS was between 6 and 7-fold greater than the ratio for Sub-Saharan Africa and Afro-E. This is probably as a result of the high disability from other burns and scalds which are included in this category.

For intentional injuries, the ratios are similar for legal intervention and war, as well as self-inflicted injuries. For interpersonal violence, however, the ratio for males was about twice that reported for Africa while that in females was about 5-fold higher than the ratio for Afro-E 2000 and Sub-Saharan Africa 1990.

Table 33 Ratio of YLDs to YLLs by age, sex and cause: CMS, 1990

	Males										Females										Persons
	0-4	**5 -14**	**15- 24**	**25-34**	**35-44**	**45-54**	**55-64**	**65-74**	**75+**	**Total**	**0-4**	**5 -14**	**15 -24**	**25- 34**	**35 -44**	**45-54**	**55 -64**	**65-74**	**75+**	**Total**	**Total**
Total injuries	1.30	0.70	0.24	0.27	0.29	1.30	0.12	0.08	0.67	0.35	1.17	0.33	0.72	0.26	0.88	0.45	0.47	0.60	0.35	**0.54**	**0.38**
Unintentional injuries	1.26	0.84	0.35	0.29	0.56	1.59	0.12	0.10	0.64	0.53	1.03	0.36	0.52	0.36	0.35	0.56	0.84	0.60	0.35	**0.54**	**0.53**
Road traffic injuries	0.34	0.22	0.13	0.10	0.28	0.10	0.02	0.01	0.02	0.16	0.37	0.26	0.26	0.14	0.06	0.10	0.12	0.18	0.04	**0.23**	**0.17**
Other transport injuries	0.00	0.00	0.10	0.00	0.00	0.00	0.01	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.10**	**0.03**
Falls	0.00	3.85	0.71	1.40	0.40	0.00	0.53	0.26	0.00	2.28	0.00	0.00	0.00	0.49	0.00	0.00	0.00	1.39	0.46	**4.81**	**2.74**
Fires	0.07	0.00	0.81	1.51	0.00	0.02	0.00	0.00	0.00	0.66	0.03	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.00	**0.04**	**0.42**
Other unintentional injuries	2.17	3.83	5.82	4.63	0.00	0.00	0.00	0.00	0.00	6.24	2.87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**7.31**	**6.39**
Intentional injuries	0.00	0.20	0.19	0.27	0.10	0.89	0.12	0.04	0.00	0.22	0.00	0.23	1.63	0.20	1.35	0.36	0.01	0.00	0.00	**0.54**	**0.25**
Suicide and self-inflicted violence	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	**0.01**	**0.00**
Homicide and interpersonal violence	0.00	0.20	0.19	0.30	0.12	0.89	0.12	0.06	0.00	0.23	0.00	0.23	1.63	0.22	1.35	0.36	0.01	0.00	0.00	**0.56**	**0.27**
with firearm	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.01**
without firearm	0.00	0.50	0.22	0.33	0.13	1.02	0.12	0.06	0.00	0.26	0.00	0.23	3.35	0.22	1.35	0.36	0.01	0.00	0.00	**0.58**	**0.30**
Legal intervention and war	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.31**

Table 34 Comparison of YLD/YLL ratios from CMS 1990, Sub-Saharan Africa (GBD 1990) and Afro E region (GBD 2000)

Unintentional injuries

		YLL TOTAL	YLD TOTAL	YLD /YLL ratio TOTAL
Road traffic injuries				
SSA	**Males**	3386	753	0.22
	Females	1281	309	0.24
CMS	**Males**	21637	3395	0.16
	Females	6442	1470	0.23
AFROE	**Males**	1732	519	0.30
	Females	925	296	0.32
Falls				
SSA	**Males**	292	955	3.27
	Females	125	755	6.04
CMS	**Males**	1318	3003	2.28
	Females	296	1425	4.81
AFROE	**Males**	116	430	3.71
	Females	65	379	5.83
Fires				
SSA	**Males**	1060	683	0.64
	Females	1002	815	0.81
CMS	**Males**	1756	1160	0.66
	Females	1115	42	0.04
AFROE	**Males**	256	170	0.66
	Females	243	171	0.70
Other Unintentional				
SSA	**Males**	3729	5055	1.36
	Females	1257	1782	1.42
CMS	**Males**	1271	7927	6.24
	Females	212	1548	7.31
AFROE	**Males**	1007	1220	1.21
	Females	701	926	1.32

SSA= Sub-Saharan Africa (GBD 1990)
Afro E= African region (high child, very high adult mortality) (GBD 2000)
Data sources:
SSA 1990 (Murray and Lopez, 1996 a and b),
AfroE 2000 (Murray et al., 2001), WHO GBD study for 2000, version 1

Intentional injuries

Self-inflicted violence				
SSA	**Males**	362	18	0.05
	Females	79	15	0.19
CMS	**Males**	2922	3	0.00
	Females	188	2	0.01
AFROE	**Males**	290	15	0.05
	Females	109	17	0.16
Interpersonal violence				
SSA	**Males**	5173	482	0.09
	Females	833	85	0.10
CMS	**Males**	37574	8750	0.23
	Females	4988	2786	0.56
AFROE	**Males**	1461	219	0.15
	Females	640	100	0.16
Legal intervention and war				
SSA	**Males**	4657	1471	0.32
	Females	3468	1104	0.32
CMS	**Males**	130	41	0.31
	Females	0	0	0
AFROE	**Males**	2224	247	0.11
	Females	747	190	0.25

SSA= Sub-Saharan Africa (GBD 1990)
Afro E= African region (high child, very high adult mortality) (GBD 2000)
Data sources:
SSA 1990 (Murray and Lopez, 1996 a and b),
AfroE 2000 (Murray et al., 2001), WHO GBD study for 2000, version 1

4 DISCUSSION

GBD and Australian burden of disease study methodologies and their applicability for this local analysis were reviewed. The Cape Metropolitan injury study data was used as a source of injury incidence data to estimate injury burden in the Cape Metropole in 1990. Injury YLLs, YLDs and DALYs were calculated following GBD methodology with several adaptations including some outlined in the Australian Burden of Disease study, and some additional modifications used in this study. The ratio of disability to premature mortality (YLDs/YLLs) for each cause of injury by age and sex was determined. Estimates of mortality, YLLs, YLDs and DALYs as well as the ratio of YLDs to YLLs for specific injuries were checked for coherence and consistency by comparing with several data sources including the Global Burden of Disease 1990 (GBD 1990) study (Murray & Lopez 1996), the GBD 2000 project (Murray *et al*., 2001) and various other international burden of disease studies (Mathers *et al*., 1999; Vos *et al*., 1995).

The overall injury mortality rate for persons (148.7 per 100 000 population) in CMS 1990 is higher than that of the African region and almost double the global rate. This is mainly due to the very high intentional injury mortality rate (74.5 per 100 000), which is about double the rate in other low to middle income countries (32.1 per 100 000 population) and about five times the rate in high income countries (14.4 per 100 000) (Krug *et al*., 2002).

A closer look at intentional injuries shows that that age standardized suicide rates in the Cape Metropole (5.3 per 100 000) were similar to rates in the African region (6.5 per 100 000) but lower than the world average. The age-specific suicide rates (Table 9) peak in young males in CMS. The high rate in males in the 25-34 year age group (28.2 per 100 000) is of special concern. The WHO Global Burden of Disease study for 2000, Version 1, reports a lower world average age-specific suicide rate of 15.6 per 100 000 for males in the 15-29 year age groups and 21.5 per 100 000 for males 30-44 years.

It is the exceedingly high interpersonal violence mortality rate (68.9 per 100 000) for CMS 1990 that is of special interest as it was higher than for any other region and the situation is even more dramatic when analysed by age and sex. Young male adults and adolescents are the primary victims. The homicide rate for males peaked in the 15-24 year age group at an extremely high rate of 290.1 per 100 00. The homicide rate in women peaked in the 25-34 year age group at 57.1 per 100 000, more than ten times the global rate in females aged 15-44 (WHO GBD for 2000, version 1). High homicide rates have also been reported in Cali, Colombia (87 per 100 000). Rates for Colombian males in the age group 15-24 years (267 per 100 000) although high, are lower than those observed in CMS 1990 for males in the same

age group. In a more recent analysis of the cause of death and premature mortality in Cape Town, homicide was the leading cause of death accounting for 10.6% of all deaths in 2001. The age standardised homicide rate in 2001 was only slightly higher (70.1 per 100 000) than that in 1990. In Cape Town's poorer township of Khayelitsha, homicide rates as high as 463.9 per 100 000 have been reported in men aged 15-24 years (Groenewald *et al*., unpublished).

Recent data from the National Injury Mortality Surveillance System (NIMSS) has shown that more than half (54%) of all homicides in South Africa in 2001 were firearm-related (Harris *et al*., 2002). The 2001 study also indicated that about half (49.3%) of all homicides in Cape Town were firearm related (Groenewald *et al*. unpublished). More than a decade ago, in CMS 1990 data, the proportion of firearm related homicides was very low (only 10.7%). This may impact on the ratio of disability to premature mortality for interpersonal violence, as firearm related injuries are more fatal than non-firearm related injuries. The hospital mortality rate for gunshot wounds is about 8 times that for stab wounds (Muckart *et al*., 1995). The ratio of YLDs/YLLs for persons is very different for interpersonal violence with firearm (0.01) and for violence without firearm (0.30). Hence, the ratio of YLDs/YLLs for total interpersonal violence may have decreased since 1990 for both males and females and using the CMS 1990 ratio may overestimate the non-fatal component of the national DALY estimates.

Economic inequality and poverty, high unemployment, rapid social change, corruption and poor rule of law, gender inequalities, and collective violence are possible risk factors and determinants for the exceedingly high burden of interpersonal violence related injuries in the Cape Metropole. Substance abuse is another important risk factor with 52.9% of homicides (Harris and van Niekerk, 2002) testing positive for alcohol in urban areas of South Africa in 2001. In the Cape Metropole study of 1990, a staggering 63.6% of non-fatal interpersonal violence injuries and more than 75% of all homicides tested positive for alcohol. The mean BAC for violent deaths was 0.2g/100ml (Peden, 1996).

In most regions of the world, road traffic injuries are responsible for the highest injury mortality, with the highest rates in males in South East Asia and Africa. Although road traffic injuries ranked second to interpersonal violence in persons in CMS 1990, the age standardized road traffic fatality rate (54.0 per 100 000) was still higher than for any other region and more than double the global rates. Pedestrian involvement is high in South Africa, accounting for more than half (52%) of traffic fatalities (Sukhai and van Niekerk, 2002). In Cape Town, the pedestrian component is usually worse than the national average accounting for 66% of all traffic deaths (Peden *et al*., 1996b). Many of the pedestrian collisions in Cape Town involve children under 15 years of age. The age specific road traffic mortality rate in boys 5-14 years

(53.5 per 100 000) is almost 5 times higher than the global average for the same age group (11.2 per 100 000). For girls, the age specific rates are about 3-fold higher than world rates.

The reasons for this high burden from road traffic injuries are multifactorial and include unsafe road environment, poor enforcement of existing traffic laws, road rage and aggressive driving. Alcohol misuse also appears to be one of the major contributors to this problem in the Cape Metropole. Currently in South Africa, despite legislation stipulating the blood alcohol concentration (BAC) among drivers being set at the internationally acceptable level of 0•05 g/100ml, nearly half (46.5%) of all drivers killed in motor vehicle collisions were above the legal limit (Sukhai and Van Niekerk, 2002). Results from the Cape Metropole Study indicated that 24.5% of all road traffic non-fatal injuries in 1990 were alcohol related. These results are probably a conservative estimate since no objective measures were used and alcohol-relatedness was based on clinical judgement only. Of the road traffic fatalities in CMS 1990, where BAC levels were available, about 50% of cases were above the then legal limit of 0•08 g/100ml (Peden 1997).

Alcohol also plays a major role in pedestrian traffic injuries as it may impair a person's ability to judge distances and the speed of oncoming vehicles, especially at night (Peden *et al*., 1996b). The CMS 1990 study found that 67% of fatally injured pedestrians tested positive for alcohol. Nevertheless, equal attention should also be given to safe and convenient crossing points, good lighting and the use of reflective clothing (Peden *et al*., 1996b). Lack of adult supervision is an important contributing factor for child pedestrian injuries in the Cape Metropolitan area, highlighting the need to include adults in road safety educational and awareness campaigns (Bass *et al*., 1995).

5 CONCLUSION

The main limitation of this study is that it highlights the heavy injury burden in the Cape Metropole in 1990, more than a decade ago. Although the overall interpersonal violence mortality rate does not appear to have decreased since 1990 but is actually slightly higher in 2001, more than half of all homicides are currently firearm related while only 10% were firearm related in the Cape Metropole in 1990. Nevertheless, the Cape Metropole study was identified as the only local injury data source meeting the data requirements to calculate the years of life lived with disability, the non-fatal component of disability-adjusted life years. Using this data source, it was possible, for the first time, to estimate incidence, duration and severity of the injury disability disaggregated by age and sex in order to measure the equivalent healthy years of life lost due to the disabling sequelae of injuries. The CMS ratios

of disability to premature mortality provided in this study should be considered the best estimates available for South Africa at the present time.

The estimates were checked for coherence and consistency against various data sources. It is important to note that there seems to be an anomaly in CMS YLDs from fire-related injury in females. Although the YLD rate in males was similar to that reported for the African region in 1990 and 2000, the female rate was unexpectedly low. The reason for this inconsistency is not clear as the YLD rates for fire-related injuries are usually similar in males and females. It is therefore recommended that the ratio of YLDs/YLLs for fire-related injuries in males should be used for both sexes in any subsequent calculations.

Age-sex specific disability to premature mortality (YLD/YLL) ratios calculated for the CMS sample will be applied to national premature mortality estimates for each cause of injury category to estimate national injury disability in the first National Burden of Disease Study (Bradshaw *et al*., work in progress). This work will make it possible to describe, for the first time, the magnitude and impact of injury related burden in South Africa in 2000. Following standardized methodology has also enabled comparisons with world regions making it possible to contrast local patterns with those for the WHO regions of the world. The study also provides an important benchmark against which to compare future estimates.

Although data from the South African Police Service Crime Information Analysis Centre indicates that the number of homicides has declined in recent years, there is still an urgent need for research to understand the determinants of violence. Injuries are preventable and there is a need to evaluate interventions to reduce this high burden in the Cape Metropole. There is also a need to improve health statistics because timely, accurate and reliable statistics are extremely important for effective law enforcement and violence prevention.

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7 APPENDIX A

7.1 The CMS questionnaire

NAME _____ FOLDER NUMBER _____

SEX | M | F | RACE | W | C | As | Bl | DATE OF BIRTH

HOSPITAL _____

TRAUMA OFFICER: CODE: _____

NAME

Occupation										
	Pre-School child	1	Scholar/Student	2	National Service	3	Unskilled Labourer	4	Semi skilled Labourer	5
	Skilled Labourer	6	Professional	7	Unemployed	8	Disabled	9	Unknown	10

INCOME _____ PER MONTH MEDICAL AID | Yes | 1 | No | 2 | WORKMEN'S COMPENSATION | Yes | 1 | No | 2 |

YEARS OF EDUCATION _____

Name of Suburb/Town/City/Area where injury occurred: _____

Mark more than one block if necessary

Scene of injury: | HOME | 1 | WORK | 2 | SPORTFIELD | 3 | ROAD | 4 | FARM | 5 | SCHOOL | 6 | STATION | 7 | SHOP | 8 | OTHER | 9 |

Transport to Hospital: | AMBULANCE | 1 | PRIVATE | 2 | HELICOPTER | 3 | OTHER AIR | 4 | PUBLIC | 5 | BY FOOT | 6 | UNKNOWN | 7 |

Cause of injury: Transport related: mark one item under A and one under B
Other injuries: mark one item under C and one under D

Transport accident A

Motor vehicle	10
Minibus	11
Bus	12
Motorcycle	13
Bicycle	14
Train	15
Aircraft	16
Watercraft	17

B

Driver	100
Passenger	110
Pedestrian	120

Category C

Rape	20
Assault	21
Civil Unrest	30
Terrorism	31
Intentional Self inflicted	40
Drowning	50
Sport	60
Accident	70
Other	80

Mechanism D

Sharp Instrument	200	Hot Liquid	300
Blunt Instrument	210	Fire	310
Fists / Feet	220	Chemicals	320
Sjambok	230	Electricity	330
Firearm	240	Machinery	340
Explosives	250	Unknown	400
Human Bite	260	Other	500
Dog Bite	270	If other, specify	
Other Bite	280		
Fall/Stumble	290		

DATE AND TIME OF INJURY D D / M M / Y Y H H : M M

DATE AND TIME OF TREATMENT

Alcohol Related | Yes | 1 | No | 2 | Unknown | 3 |

DIAGNOSIS:

LEVEL OF CARE REQUIRED

SISTER	1
GENERAL PRACTITIONER	2
SPECIALIST	3

INSTITUTION REQUIRED

CLINIC/CONSULTINGROOMS	4
SMALL HOSPITAL	5
REGIONAL HOSPITAL	6
TEACHING HOSPITAL	7

The injuries fall in the field(s) of:

GENERAL SURGERY	1
ORTHOPAEDICS	2
UROLOGY	3
NEUROSURGERY	4
PLASTIC SURGERY	5
THORACIC SURGERY	6
EAR NOSE AND THROAT	7
OPHTHALMOLOGY	8
OTHER	9

ESTIMATED DISABILITY

GRADE

NONE	1
MILD	2
MODERATE	3
SEVERE	4
TOTAL	5
DEAD	6

TIME AWAY FROM WORK

NOT APPLICABLE	1
LESS THAN 1 WEEK	2
1 - 3 WEEKS	3
4 - 6 WEEKS	4
7 - 12 WEEKS	5
MORE THAN 12 WEEKS	6
PERMANENT	7

PLACEMENT AFTER PRIMARY TREATMENT

THEATRE | Yes | 1 | No | 2 |

DISCHARGED	3		
ADMISSION	4	WARD	7
		I.C.U.	8
TRANSFER	5		
DEAD	6		