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PART 0: PREAMBLE

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ASSESSING QUALITY OF EXISTING DATA SOURCES ON ROAD TRAFFIC INJURIES (RTIs) AND THEIR UTILITY IN INFORMING INJURY PREVENTION IN THE WESTERN CAPE PROVINCE, SOUTH AFRICA

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Thesis Submitted in Fulfilment of a Masters' Degree in Public Health at the School of Public Health, University of Cape Town, July 2011.

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DECLARATION

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

I empower the university to reproduce for the purpose of research either the whole or any portion of the contents in any manner whatsoever.

Signature:

Signed by candidate

Date: 1/08/2011

DEDICATION

This thesis is dedicated to Dr Tilinde Chokotho and Mrs B. Mbekeani

THESIS ABSTRACT

The burden of Road Traffic Injuries (RTIs) disproportionately affects low and middle – income countries (LMICs). For instance, 85% of the global deaths and 90% of the annual Disability Adjusted Life Years (DALYs) attributed to RTIs occur in LMICs (Peden et al. 2004), which account for less than 40% of the world’s vehicles (Scuffham. 2008). In South Africa injuries are among the principal contributors to the quadruple burden of disease, with the other contributors being maternal, women and child health problems; HIV and tuberculosis; and emerging chronic diseases of lifestyle (Bradshaw et al. 2002). In 2000, RTIs were the second leading cause of injuries after interpersonal violence (Bradshaw et al. 2002) and were responsible for 6.9% premature mortality in the Western Cape Province, 40% higher than the national figure of 5% (Matzopoulos et al. 2008). Good quality, reliable data are necessary to determine the magnitude of the problem and to identify the areas requiring prioritization for intervention as well as evaluating effectiveness of interventions. The aim of this study was to assess whether the quality of the RTI data collected by the South African Police Service (SAPS) and mortuaries was sufficient for determining the burden of RTIs in the Western Cape province, and for implementing and monitoring road safety interventions. Under-reporting was assessed by comparing data reported by the police in 2008, with data from 18 provincial mortuaries. Completeness (i.e. the proportion of the total estimated fatalities captured by each dataset) was assessed using two sample capture–recapture method and the local applicability of this method was also assessed. Lastly, the study identified practical measures to enhance the quality and improve the utility of provincial road traffic injury information.

The provincial road traffic mortality rates calculated from mortuary and police datasets were: 32.2 deaths/ 100,000 population per year (95% Confidence Interval (CI): 30.7- 33.8); and 16.3 deaths/100,000 population per year (95% CI: 15.3 – 17.5) respectively. There was

substantial duplication of crash events, varying proportions of missing data for demographic and other identifying variables with age missing in nearly half of the cases in the police dataset. The estimated completeness of the mortuary and police datasets was 57.6% and 46.4% separately, and 77.3% combined. Not all the assumptions underlying the use of capture-recapture method were met in this study hence the completeness estimates need to be interpreted with caution.

This study found extensive data quality problems which need to be addressed in order to improve data utility for informing road safety policies.

University of Cape Town

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PART A: PROTOCOL

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ABBREVIATIONS

CTTR	Cape Town Trauma Registry
DHS	Demographic Health Survey
DALYS	Disability Adjusted Life Years
eNATIS	Electronic National Traffic Information System
HIS	Health Information Systems
HMN	Health Metrics Network
ICD	International Classification of Diseases
LMIC	Low and Middle Income Countries
PAB	Provincial Accidents Bureau
PIMSS	Provincial Injury Mortality Surveillance System
RTIs	Road Traffic Injuries
RTMC	Road Traffic Management Corporation
SAPS	South African Police Service
WHO	World Health Organisation
YLL	Years of Life Lost

REVIEW OF EXISTING DATA SOURCES ON ROAD TRAFFIC INJURIES (RTIS) IN THE WESTERN CAPE PROVINCE, SOUTH AFRICA.

1. INTRODUCTION

1.1. Background

Road traffic injuries as a public health priority

Road Traffic Injuries (RTIs) are a public health concern because of the resulting loss of enormous human potential and their negative social and economic consequences (Peden et al. 2004). RTIs are a major public health challenge but are neglected (Lagarde. 2007). The recognition of the problem and prevention efforts are well below levels directed at other health problems particularly in developing countries, where relatively little funding is invested in preventing road crashes and injuries (Lagarde. 2007, Norman et al. 2007). Globally approximately USD 919- 985 million is spent on research and other programs related to HIV/AIDS while only USD 24- 33 million is spent on programs for RTIs (Lagarde. 2007), despite the fact that RTIs are predictable and preventable. The problem of injury can only be efficiently addressed if there is data to determine the magnitude of the problem and to identify the areas requiring prioritization for intervention as well as evaluating effectiveness of interventions.

1.2. Problem Statement

Several studies and reports provide estimates of the traffic injury burden for the Province, but the true extent of the problem remains unknown because a review of the Western Cape Provincial and City of Cape Town traffic data has identified a number of inaccuracies in the available data sources (Matzopoulos et al. 2008). These included: sub-optimal reporting with regards to risk factors such as blood alcohol concentration (BAC), estimated vehicle speed,

vehicle condition, loading condition; unclear linkage between the data systems; variation in the crash reporting formats among the Provinces, Municipalities and the Road Traffic Management Corporation (RTMC). In addition, recent Provincial data were not readily available and those data that could be accessed were not available at a Municipal level. It is therefore not clear whether the available data reflect the true extent of traffic injuries and whether they are suitable for informing injury prevention efforts. To date, no formal study has been done to determine the extent or magnitude of these problems in traffic related injury information systems for the Province as a whole.

1.3. Justification for the Research

Road Traffic Injuries account for 25% of injury deaths and a third of the Western Cape Injury burden (Bradshaw et al. 2003). In addition the road traffic injury burden accounts for 6.9% of total premature mortality in the province, which is almost 40% higher than the national contribution of 5% (Matzopoulos et al. 2008). Good quality, accurate and reliable data are crucial to inform understanding of the risk factors associated with RTIs as well as helping in coming up with effective intervention strategies. Decision makers in the responsible departments need accurate data upon which to base injury prevention policies, as these data are used to evaluate effectiveness of the interventions.

This study will assess the quality of road traffic injury data in the Western Cape with a view to determining their accuracy and potential use in the implementation of preventive interventions and their evaluation.

2. LITERATURE REVIEW

2.1. Global Burden

It is estimated that 1.2 million people are killed in road traffic crashes each year globally (Peden et al. 2004, Spiegel et al. 2008). An additional 20 – 50 million are injured or disabled as a result of road traffic crashes (Spiegel et al. 2008). It is not possible to assign a value to the social cost of RTIs (Peden et al. 2004). RTIs place a heavy burden on global and national economies as well as on household finances. Loss of bread winners from RTIs and the added burden of caring for members disabled by the injuries may result in poverty.

The burden of road traffic injuries (RTIs) disproportionately affects low-and - middle income countries (LMIC) (Spiegel et al. 2008) with 85% of the global deaths and 90% of the annual Disability Adjusted Life Years attributed to RTIs occurring in LMIC (Peden et al. 2004) which account for less than 40% of the world's vehicles (Scuffham. 2008). Similarly, sub-Saharan Africa with only 4% of vehicles registered globally accounted for 10% of total road fatalities in 2000 (Odero. 2004).

2.2. Road Traffic Injuries in South Africa and the Western Cape

South Africa is the most developed African country with 17 licensed vehicles per 100 inhabitants as of 2005 (Lagarde. 2007). Injuries are among the quadruple burden of disease in South Africa (Bradshaw et al. 2002). RTIs were the second leading cause of injuries in South Africa after interpersonal violence (Norman et al. 2007). Nationally, RTIs were ranked ninth among top causes of death, the fifth leading cause of premature mortality and 4th leading cause of DALYs in 2000 (Bradshaw et al. 2003). The age standardized RTI mortality rate for South Africa estimated at 39.7/100,000 was higher than for any WHO region and almost double the global average (Norman et al. 2007). The problem was even more pronounced in certain provinces, such as the Western Cape and Gauteng where RTIs were ranked as the

sixth and fifth leading causes of death and the fourth and third leading causes of premature mortality respectively (Bradshaw et al. 2003)

These statistics indicate why RTIs are of particular importance in South Africa, and highlights the need to focus on RTIs, among other problems, in order to reduce premature mortality.

In the Western Cape Province, injuries at 22% were the second biggest contributor to the provincial burden of disease in 2000 with violence and road traffic crashes being the dominant causes (Bradshaw et al. 2003). The road traffic injury burden in the Western Cape Province, as measured by YLL is 6.9%, which is 40% higher than the national figure of 5% (Matzopoulos et al. 2008). Thus, RTIs are of particular importance to the Western Cape Province and its prevention needs to be prioritised. It was estimated that in 2005, on average 305 crashes occurred per day in the Western Cape (Provincial Government Western Cape. 2005). There has been an increasing trend in the number of crashes occurring in the Western Cape from 95,434 in 2000 to 111,630 in 2005. In 2005, about seven percent of the crashes were fatal. 47.7% of the fatalities were pedestrians but this figure was as high as 63% in the Cape Metropolitan area. More than half (57.1%) of the pedestrians who died had a Blood Alcohol Concentration of greater than 0.05mg/ml (Provincial Government Western Cape. 2005).

2.3. The Utility of Road Traffic Injury Information for Prevention

The Western Cape government has planned safety strategies in the Road safety. However details of the extent and impact of current practices is not known (Matzopolous et al.), and their analysis will help in recommending appropriate interventions. Hence there is need for accurate data on mortality, morbidity and costs of crashes.

Good quality, reliable data are necessary to assess the magnitude of the problem, identify at risk groups, allocate resources appropriately and prioritize interventions for injury prevention and control. Accurate and reliable data are also needed for assessment of the effectiveness of interventional programs and to raise awareness among the public and policy makers.

Most of the research related to RTIs has been done in developed countries (Lagarde. 2007). For instance, only 290 out of the 25,320 references in PubMed from 1956 to 2006 reported data from Africa (Lagarde. 2007). In addition to limited research on this topic in Africa, most countries in the region lack complete documentation on RTIs, and have poor or non-existent surveillance systems (Odero. 2004). Thus despite facing a disproportionately high burden, the necessary information to assist in prevention programs is less available or lacking.

South Africa does not yet have complete vital registration and injury statistics (Norman et al. 2007). Data on RTIs need to be comprehensively and consistently collected capturing incidence, causes, geographical location and sequelae of RTIs. These data should then be periodically reviewed to formulate national and regional reports, determine trends in RTIs and assess effectiveness of intervention programs. Such information will help create awareness of the magnitude of the problem and facilitate prevention measures.

2.4. Available Sources of Traffic Related Injuries Data

In South Africa, there are several sources of information for road crashes and injuries. These include systems that collect data on an on-going as well as periodic basis. In the Western

Cape Province there are several surveillance systems such as:

- ♦Provincial Injury Mortality Surveillance System (PIMSS), which is a sentinel system, managed by the Medical Research Council of South Africa. It collects data on all non-

natural deaths including road traffic deaths from participating mortuaries and forensic chemistry laboratories.

- ♦ Traffic crash statistics from the Province, local authorities and the respective coordinating agencies including the Road Traffic Management Corporation and the Department of Community Safety. These agencies capture data collected by the police.
- ♦ Emergency Medical Services data from the Department of Health; data from hospital's trauma unit registers; and
- ♦ The Demographic and Health Survey (DHS) which collects information periodically.

Unreliable data misrepresent the causes and magnitude of Road Traffic Injuries. Poor information is a major obstacle to successful development and implementation of interventions, and their monitoring and evaluation. In addition, road accident costs which are based on official figures will be wrongly estimated (Spiegel et al. 2008).

2.4.1. Limitations of Available Data Sources

Hospital registers give information on deaths that occur within the hospital and non-fatal cases detailing the nature and severity of the injury. However, these registers miss cases that do not present to hospital. In addition, information in hospital registers can be inaccurate, especially if the initial diagnosis recorded was wrong or additional injuries are discovered later and the registers are not updated.

Accuracy of death register data depends on the level of training of the individual who fills in the forms. In addition use of death registers alone misses non-fatal cases.

While only the police may record deaths that occur outside the hospital, not all injuries are reported to the police. Unfortunately under-reporting of deaths and injuries due to road crashes by the police is a widespread problem affecting not only LMIC but also high-income countries (Bhalla et al. 2009, Shepherd et al. 2000, Peden et al. 2005).

A study in Karachi, Pakistan revealed that police data may miss between 61% and 86% of motor vehicle crashes that result in injuries, whereas in Brazil 53% of the accidents are not reported to the police (Peden et al. 2005). A recent study in China found that between 2002 and 2007, the road traffic mortality rate based on death registration data was almost twice as high as the rate reported by the police (Hu et al. 2010).

Given these limitations, integrating all information sources is indispensable to building an accurate surveillance system (Lyons et al. 2008) that can track the circumstances of a traffic accident, the risk factors and the medical consequences, as well as establishing and evaluating prevention interventions. However when the quality and reliability of the data vary significantly between sources, it reduces the accuracy and usefulness of the overall surveillance system (Lyons et al. 2008). In addition variation in the definitions used in different data sources makes linking the data sources very difficult.

3. AIM OF THE STUDY

The main aim of the study is to determine the quality of road traffic injuries information systems by assessing underreporting and completeness of the available data, and thus assessing whether the available data sources are suitable for determining the burden of RTIs in the Western Cape Province, and whether the quality of the data is sufficient for implementing and monitoring interventions which will improve safety of road users.

4. RESEARCH QUESTIONS

Primary: How accurate are the available data sources for Road Traffic Injuries in the Western Cape in terms of reflecting the true extent of injuries?

Subsidiary question: Are they suitable for informing injury prevention efforts and how can they be improved?

These will be translated into the objectives below:

5. OBJECTIVES

To measure the extent of underreporting in provincial traffic death estimates using mortuary data as the gold standard.

To assess the quality of the collected data in the various data sources, in terms of variable completeness, accuracy, ability to link cases across datasets and usefulness of the explanatory variables.

To assess completeness of datasets using capture-recapture technique, and assess applicability of the method in the local setting.

To identify practical measures to enhance the quality and improve the utility of provincial road traffic injury information.

6. METHODOLOGY

6.1. Study Design

The study design will be cross-sectional with both descriptive and analytical components, which will assess quality, completeness and utility of police, hospital and mortuary data for the Western Cape Province for the year 2008.

6.2. Data Sources

1. Hospital data will be obtained from Cape Town Trauma Registry (CTTR) dataset from Groote Schuur hospital (GSH). The data from this dataset were collected during a pilot study on injury surveillance in Cape Town. It captured 80-90% of all trauma cases that were seen in the month of October 2008. The missed cases will be obtained from the trauma register book to obtain 100% coverage for the month. Groote Schuur hospital is the larger of the two

tertiary care facilities in the Western Cape Province, which manages severe trauma cases from the whole Province and less severe cases from areas located near to the hospital.

2. Provincial road traffic injury data will be obtained from the Provincial Accident Bureau (PAB). These data are collected by the police and include both fatal and non-fatal cases of traffic related injuries.

3. Mortuary data will be obtained from the Department of Health's Forensic Pathology services, which has data on all deaths due to RTIs in the province. South Africa's strict medico-legal code requires that all non-natural deaths should be examined by a district surgeon, forensic pathologist or medical practitioner (Republic of South Africa. 1959), hence it will be assumed that mortuaries provide full coverage of all non-natural deaths in the Province and its dataset will act as a gold standard.

A summary of variables collected by the three datasets under study is shown in Table 1, and accident report and fatal crash report forms used by the Police to capture traffic injury data are shown in Appendix 1 and 2.

Table 1: List of variables in the Mortuary, PAB and CTTR datasets.

Variables	Mortuary	PAB	CTTR
Name and Personal ID numbers	√	√	X
Other demographic characteristics	√	√	√
Date and time of incident	√	√	√
Town/suburb of injury	√	√	√
Police station	√	√	X
Post-mortem details	√	X	X
Alcohol test	√	√	X
ICD codes for external causes	√	X	X
Police/ Accident registration number	√	√	X
Crash environment details	X	√	X
Vehicle details	X	√	X
Injury details	X	√*	√ [#]
Clinical details on condition and management of trauma patient	X	X	√

*Classified as no injury, minor, serious and killed

Detailed description of the nature and severity of injury.

6.3. Sample Size and Sampling Technique

The main data analysis in this study will not involve statistical significance testing, therefore sample size calculation and thus power of the study are not necessary. However in an event that significance testing will be needed, for instance analysis by categories of road users, power calculation will be done on an *ad hoc* basis.

Data from the year 2008 will be used in the study. The year 2008 has been chosen because of the ready availability of data from the different data sources mentioned above.

6.4. Data Management

All data will be converted to STATA format using the STATA data editor. The variables will be formatted where necessary to make them suitable for analysis using STATA.

The data will be stored in the investigator's laptop which is password protected and only the investigator has access to the password. The data will also be stored in an external drive as a backup system and during analysis, data in the backup system will be updated daily. This external drive will also be password protected and only the investigator will have access.

6.5. Data Analysis

All data will be verified to make sure that all cases are related to road traffic injury. Standard definitions of each variable as well as criteria for inclusion into the database will be obtained from the different data sources where necessary, as these may differ widely across databases.

Data from the three sources under study will first be explored separately before comparing completeness between datasets. Univariate and Bivariate categorical data exploration from each dataset will be done using frequency distribution tables, pie charts and bar graphs. If any differences are detected during exploration and there is a need to determine whether the differences are statistically significant, Chi-square test of independence or Fishers exact test will be used. Power calculation will also be done at this point to determine whether the study has adequate power to detect significance differences between the two databases.

Univariate and Bivariate continuous data exploration will be done using frequency tables, appropriate descriptive statistics, histograms and scatter plots where necessary. If there will be need of testing statistical significance, Pearson or Spearman correlation, t-test or non-parametric tests will be used as necessary.

Data exploration and significance testing if needed will be done using STATA 10 (StataCorp. 2007).

Under-reporting of traffic deaths will be assessed by comparing the rates calculated from the PAB dataset with the rates from mortuary dataset since the latter will be assumed to have full coverage of all injury deaths. Mortality rates will be calculated using 2008 mid-year population for Western Cape as the denominator, estimated at 5,262,000 people (Statistics South Africa. 2008).

A two sample Capture-recapture method will be used to assess completeness of the datasets. Capture-recapture technique is a statistical method used to evaluate completeness of data sources and to identify biases within datasets (Morrison et al. 2000). In epidemiological applications, the method is useful for assessing the accuracy of surveillance systems, and providing more accurate rates than those derived from stand alone or aggregated data sources (Meuleners et al. 2006). The capture-recapture method has been used extensively in biological sciences and medicine for estimating difficult to count populations (Razzak et al. 1998). However estimates derived from this method should be interpreted with caution as validity may be compromised if all the assumptions underlying the use of the capture-recapture method are not met.

One of the assumptions is that the data sources used should be independent (Meuleners et al. 2006, Morrison et al. 2000, Razzak et al. 1998). Lack of independence will result in an increased number of matches and consequently underestimation of the total number of deaths. In addition, each individual in the population should have the same probability of being captured by each source (Meuleners et al. 2006, Morrison et al. 2000, Razzak et al. 1998). Another assumption is that the details for each case should be accurate (Morrison et al. 2000) and that sufficient information must be available in each source to match the cases in a unique way (Meuleners et al. 2006). Poor data quality with low variable completion rates will

result in reduced number of matches which will consequently result in overestimation of the ascertainment corrected number. Use of capture-recapture method also requires that the populations under study should be closed (Meuleners et al. 2006, Morrison et al. 2000, Razzak et al. 1998). However this may not be achievable in studies involving human populations.

Completeness of datasets for fatal cases will be assessed between mortuary and PAB, whereas for non-fatal cases it will be between the PAB and CTTR datasets. Selected variables will be chosen to match both fatal and non-fatal cases between datasets. The standard used to define a match will be based on a concept used by Razzak et. al.(1998). in their study in which they estimated deaths and injuries due to Road Traffic accidents in Karachi. Depending on how strictly the variables for each case will match between two datasets, four standards (A to D) will be generated. Standard A will be the strictest one where all the selected variables for a case have to be exactly the same in both datasets. The matching criteria will then be less strict in the other standards so that each subsequent standard requires one less criteria for a match (Morrison et al. 2000, Razzak et al. 1998). This will be done to take into consideration data collection circumstances. For instance a person may have different values of age recorded in the two datasets because the police may only manage to estimate the age of the victim on the scene, while at the hospital exact age may be recorded. However the amount of acceptable variation will be defined *a priori*.

The ascertainment corrected number will then be calculated using the formula below:

$$N = \frac{(x+1)(y+1)}{(z+1)} - 1 \text{ (Morrison et al. 2000)}$$

Where x is the number of cases in database 1, y is the number of cases in database 2, and z is the number of cases common to both databases.

The variance and 95% confidence interval (CI) for the estimate of N will be calculated using the formula below:

$$\text{Var}(N) = \frac{(x+1)(y+1)(x-z)(y-z)}{(z-1)^2(z+2)}$$

$$95\% \text{ CI} = N \pm 1.96 \sqrt{\text{Var}(N)}$$

The estimated completeness of each database will then be calculated by dividing the number of injury events in each database by the ascertainment corrected number (Morrison et al. 2000). The estimated completeness of both datasets combined will be calculated by dividing the total number of non-matched cases (non-overlapping aggregate) with the ascertainment corrected number (see Appendix 1).

6.6. Pilot Study

A pilot study will be done using data which will assist in identifying variables that will be used to match the cases during data analysis with Capture-recapture method. The study protocol will be amended accordingly depending on the results of the pilot study.

7. ETHICS

7.1. Approval to Conduct the Study

Ethics approval to conduct the study will be obtained from University of Cape Town's Ethics Committee.

Permission to use the various data bases and records will be obtained from the respective government and research agencies that administer the data.

The researcher and the institutions from which the data will be obtained, will sign a contract which will allow the researcher to publish or present to scientific forums the findings of the study subject to affording the institutions an opportunity to comment on the draft results.

7.2. Confidentiality and Privacy

The databases from the different sources may contain some personal identifying information, therefore there is need to maintain confidentiality and privacy. Firstly, the various organisations' confidentiality policies with regards to use of their databases, if available will be adhered to. In addition, only variables that will not identify an individual directly will be used to match the cases.

Only the investigator will have access to the password for the computer and the external drive containing the data and will not disclose the password or share any part of the data with anyone.

7.3. Potential Benefits

Accurate reporting and completeness of databases indicate the quality of data. Therefore the findings of this study will determine how reliable, representative and useful the traffic injuries data in the Western Cape is.

Another benefit of this study is that the findings will help in the development of an Integrated Transport Reporting and Management System in the Western Cape Province in future. The findings of the study will also assist in development of intervention policies and optimal allocation of resources in priority areas. This in turn will result in a safer urban transport and reduction of road traffic crashes.

7.4. Potential Risks

Retrieval of personal identifying characteristics may be required during analysis if it will be found that it is impossible to match the cases in the datasets using the available information.

In addition, there is a potential for triangulation of data due to combining variables from various databases that will allow identification of specific individuals, even though identifying information from the original database was removed. Such details will only be used for linking data. All identifying information or information that could allow for identification of specific individuals will be redacted prior to analysis and substituted by codes where necessary.

The results of the study may be sensitive especially if underreporting or any negative findings are revealed. This might result in the responsible people/ organisations feeling compromised and so all interested parties will be afforded an opportunity to comment on the findings and these comments will be taken seriously in the further editing of the report.

7.5. Dissemination

The findings of the study will be communicated to the Departments of Health and Transport in a written report. Oral presentation of the findings to these departments will also be arranged.

A written report will also be sent to the Trauma Unit at Groote Schuur hospital for dissemination to researchers involved in the trauma surveillance system and if necessary an oral presentation of the results will be made during one of their clinical meetings.

The study findings will be compiled into an article which will be submitted for publication in a peer review journal.

A written report of the study findings will be sent to the Burden of Disease Project of the Medical Research Council. The project has planned several road safety strategies to reduce the burden of traffic related injuries in the province and acknowledges the importance of accurate traffic data capture in implementing these strategies (Matzopolous et al.).

The findings of the study will also be communicated to organisations/projects that are working towards making the Western Cape province safe by reducing traffic related injuries, as the results may be of interest to them.

8. LOGISTICS AND BUDGET

8.1. Timetable

The study will be conducted over a 9 month period. Time allocation for the different study activities is illustrated in the Gantt Chart below.

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Figure 1: Gantt Chart Showing Study's Time Allocation

Month	June 2010	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan. 2011	Feb.	Mar
ACTIVITY	Departmental and Ethics Review									
	Obtaining permission to access datasets									
				Data Cleaning						
				Literature Review						
					Data Analysis					
						Draft results reported to data institutions				
							Write up of the report			
								Submission of the Report		

8.2. Budget

It is estimated that the study will cost R12800. The table below shows the breakdown of the costs.

Table 2: Breakdown of Costs.

Item	Estimated Cost
Stationery	R1500.00
Telephone costs	R1500.00
Transport	R800.00
External hard drive	R1000.00
Field worker/ researcher costs	R8000.00
Total	R12800

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9. REFERENCES

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PART B: STRUCTURED LITERATURE REVIEW

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Background

Global burden of road traffic injuries

It is estimated that 1.2 million people are killed in road traffic crashes each year globally (Peden et al. 2004). An additional 20 – 50 million are injured or disabled as a result of road traffic crashes (Spiegel et al. 2008). The burden of Road Traffic Injuries (RTIs) disproportionately affects low-and middle –income countries (LMICs). For instance, 85% of the global deaths and 90% of the annual Disability Adjusted Life Years (DALYs) attributed to RTIs occur in LMICs (Peden et al. 2004), which account for less than 40% of the world's vehicles (Scuffham. 2008). Similarly, sub-Saharan Africa with only 4% of vehicles registered globally accounted for 10% of total road fatalities in 2000 (Odero. 2004).

For every one person injured, killed or disabled by a road crash, there are many others including family and friends who are emotionally and economically affected. It is not possible to assign a monetary value to the social cost of RTIs, but they impose a substantial burden on global and national economies as well as on household finances. Thus RTIs are a public health concern because of the resulting loss of enormous human potential and their negative social and economic consequences (Peden et al. 2004).

Although RTIs are a major public health challenge, they are neglected. The recognition of the problem and prevention efforts are well below levels directed at other health problems particularly in LMIC, where relatively little funding is invested in preventing road crashes and injuries. Globally, USD 919- 985 million is spent on research and programs related to HIV/AIDS, which is approximately 40 times the amount spent on programs for RTIs (USD 24- 33 million)(Lagarde. 2007). However, World Health Organization predicts that RTIs will rise from being the 9th leading cause of death in 2004 to 5th position by 2030 whereas HIV/AIDS will drop from being the 6th leading cause of death to the 10th position during the same period (World Health Organization. 2008). Furthermore, in the age group of 5-29 years

RTIs kill more people than HIV/AIDS (Global Burden of Disease, 2004). There is therefore need for more funding to invest in road safety initiatives and scale up current road safety measures in order to counteract the escalation.

The problem of RTIs can only be efficiently addressed if there are high quality data to determine the magnitude of the problem and to identify the areas requiring prioritization for intervention as well as evaluating effectiveness of interventions.

Objectives

This literature review will:

Review the magnitude of RTIs in South Africa, with particular reference to the Western Cape Province;

Describe health information systems and surveillance, and their importance with particular reference to injury and road traffic surveillance;

Review the assessment criteria used by studies to evaluate the quality of routine health information systems in general and road traffic injury surveillance systems in particular; and

Provide an overview of the available sources of road traffic injury data in the Western Cape Province and their limitations.

Search Strategy

A search was conducted on PubMed, Google scholar and Google search engine using the following search terms: road traffic injuries, health information systems, injury surveillance, data quality evaluation, capture-recapture. Annual national traffic reports were obtained from the *Arrive Alive* website (Road Traffic Management Corporation.), and Demographic and Health surveys were obtained from the South African Government website (Department of Health.). Additional articles were identified from the reference lists and bibliographies of

selected articles and from personal communication with researchers and practitioners with traffic safety and injury prevention expertise.

Road Traffic Injuries in South Africa and the Western Cape

South Africa had 17 licensed vehicles per 100 inhabitants as of 2005.(Lagarde. 2007) The quadruple burden of disease in South Africa include: maternal, women and child health; HIV and tuberculosis; emerging chronic diseases of lifestyle; and injuries, of which RTIs are part (Bradshaw et al. 2002). Nationally, RTIs were ranked ninth among top causes of death, the fifth leading cause of premature mortality and 4th leading cause of DALYs in 2000 (Bradshaw et al. 2003). The age standardized RTI mortality rate for South Africa estimated at 39.7/100,000 was higher than for any WHO region and almost double the global average (Norman et al. 2007). The problem was even more pronounced in certain provinces, such as the Western Cape and Gauteng where RTIs were ranked as the sixth and fifth leading causes of death and the fourth and third leading causes of premature mortality respectively (Bradshaw et al. 2003).

The road traffic injury burden in the Western Cape Province in 2000, as measured by years of life lost (YLL) was 6.9%, which was 40% higher than the national figure of 5% (Matzopoulos et al. 2008). Thus, RTIs are of particular importance to the Western Cape Province and its prevention needs to be prioritised.

It was estimated that in 2005, on average 305 crashes occurred per day in the Western Cape and there is also evidence of an increasing trend in the number of crashes recorded year-on-year from 95,434 in 2000 to 111,630 in 2005. The decreasing trend in fatalities over the same period of time might have been apparent due to improved recording of minor injuries. In 2005, about seven percent of the crashes were fatal (Provincial Government Western Cape. 2005), 47.7% of the fatalities were pedestrians but this figure was as high as 63% in the Cape

Metropolitan area. More than half (57.1%) of the pedestrians who died had a Blood Alcohol Concentration of greater than 0.05mg/ml.

These statistics highlight the need to prioritise injury prevention. One of the basic requirements that will ensure successful injury prevention is good quality data from effective health information system of which injury surveillance is part. Good quality data will ensure implementation of appropriate interventions and assist in evaluation of the success of the interventions.

Health Information Systems

A Health Information System (HIS) is defined as “an integrated effort to collect, process, report and use health information and knowledge to influence policy-making, programme action and research” (AbouZahr et al. 2005). Health Information Systems’ main role therefore is to produce data which after analysis and dissemination will aid in public health decision-making and research.

The state-of-the-art health information systems consist of two complementary parts, first a universal and effective routine civil registration system, and second, a variable range of information sources from specific disease surveillance systems, censuses and sample surveys (Hill et al. 2007).

“Civil registration is the continuous, permanent, compulsory, and universal recording of the occurrence and characteristics of vital events (e.g. live births, deaths, fetal deaths, marriages, and divorces) and other civil status events pertaining to the population as provided by decree, law, or regulation, in accordance with the legal requirements in each country” (Setel et al. 2007). Civil registration systems provide important information on population health, thus they are a foundation of health information systems.

Use of vital statistics from civil registration system or HIS to guide in setting priorities for health development and policy making goes back in history. William Farr, the Superintendent of the Statistical department of the general registry in London and a pioneer in the field of medical statistics, published reports in 1850 on causes of death using mortality data, from the civil registration system (Joubert et al. 2007, Mahapatra et al. 2007). John Snow was able to identify the contaminated water pump as the source of the cholera epidemic in London in the 1880s using registers of births and deaths of each victim maintained by local parishes (AbouZahr et al. 2005, Joubert et al. 2007). In recent times, evidence generated from vital statistics led to legislation on use of seatbelts and drink driving to reduce deaths from road traffic accidents (Mahapatra et al. 2007). These examples show how vital statistics from registration systems have been instrumental in guiding decision making and policy development.

In contrast specific disease surveillance is on-going systematic collection, analysis, interpretation and dissemination of health information for a specific disease which should lead to prevention and control of the disease (Holder et al. 2001, Joubert et al. 2007). Surveillance can either be passive where the data are collected for other purposes or active where there is active case finding. For instance, the primary function of civil registration systems is not to identify injury deaths, however it is possible to obtain such information from the systems. On the other hand, the main objective of an injury surveillance system is to collect information about the incidence, causes and consequences of injuries by active case finding.

Lack of fully developed civil registration and surveillance systems has resulted in development of other methods of data collection, which include: sample registration sites where there is continuous registration of only a sample of deaths and births; demographic surveillance sites limited to a defined geographic region; populations census; and

demographic and health surveys (Hill et al. 2007). Population censuses are done both in countries with well and poorly developed civil registration systems. Countries with well-developed civil registration systems mainly conduct censuses to obtain denominator data for mortality and fertility rates (Hill et al. 2007) but censuses can provide information on size, distribution and composition of populations (United Nations Statistics Division. 2004). Demographic and Health Surveys (DHS) are population based household surveys which provide information on a wide range of monitoring and impact evaluation indicators in the areas of population, health, and nutrition (Boerma et al. 1993, Measure DHS.). The health indicators in DHS have changed over time and some surveys now include information on injuries.

HIS play several roles, all of which will ultimately result in improved health of communities or populations. This includes assessing health service appropriateness and adequacy, formulating and evaluating health programs, monitoring progress of health programs and formulating research hypotheses.

Firstly, HIS can assist in improving effective clinical management and assessing the degree to which services are meeting the needs and demands of communities (AbouZahr et al. 2005). Such information will result in effective and efficient use of resources.

Secondly, HIS can also assist in formulating and evaluating health programs. Estimates on number of deaths that will be averted or proportion of disease that will be addressed by a particular health program are a basic requirement for any health program (AbouZahr et al. 2005). In addition vital statistics from HIS will help to monitor progress of such programs.

Thirdly, HIS can also be used to formulate research hypotheses, thus also supporting epidemiological research. For instance routine data from civil registration in England which showed a substantial increase in deaths from lung cancer in men, led Doll and Hill to identify the causal association between smoking and lung cancer (Mahapatra et al. 2007).

The general roles of HIS discussed above, can also apply to specific disease surveillance systems such as injury surveillance. Injury surveillance systems with good quality data are fundamental prerequisites which will help identify problem areas and needs, facilitate appropriate resource allocation, monitor progress of any interventional program/goals, evaluate impact of existing interventions and make evidence based decisions on policies that will improve road safety. However RTI surveillance is traditionally the scope of transport and police ministries and only peripheral to health, as the former are usually the ones responsible for implementing and enforcing road safety measures. Ministry of Health on the other hand, uses injury surveillance data to improve care of trauma patients. Thus coordination between Ministry of Health and other stakeholders is vital to effective HIS and injury surveillance. In countries where such coordination is poor or non-existent, a fragmented and ineffective HIS and injury surveillance with poor data quality has resulted.

Considering the important role that health information systems play in guiding public health action including injury prevention, the importance of effective surveillance systems with good quality data cannot be overemphasized. There is therefore need for countries to periodically evaluate surveillance systems, with an aim of improving the quality, efficiency and usefulness of the data (German et al. 2001). Such assessments will identify structural weaknesses in the system, correct observed biases and plan improvements (Mahapatra et al. 2007).

Quality assessment of health information systems

The usefulness of HIS in most developing countries is limited because of systematic problems. The availability of appropriately trained human resources with analytical, numerical and statistical skills is crucial (AbouZahr et al. 2005) and lack of such personnel in developing countries is one of the reasons which have resulted in poor quality data. In order

to meet the requirements of their intended use, surveillance data need to be accurate, complete, relevant and timely.

Several criteria have been used to assess the quality of surveillance data. These include: the assessment criteria that were proposed to evaluate the quality of cause-of-death statistics reported to World Health Organisation (WHO) (Mahapatra et al. 2007); the quality assessment framework for vital statistics from civil registration systems (AbouZahr et al. 2005, Mahapatra et al. 2007); and the Health Metrics Network (HMN) method for assessment of country's health information systems (Health Metrics Network. 2006).

The present study assessed completeness of road traffic injury surveillance data from two sources, a criterion common to both quality assessment framework for vital statistics from civil registration systems and the HMN method.

Various methods have been used to assess completeness of civil registration systems and injury surveillance data. In the 1950s several countries in Latin America assessed completeness of births and deaths registers by comparing them with census data (Gaete-Darbó et al. 1964). Bhalla et.al. (2010) estimated completeness of injury mortality data by comparing the number of deaths recorded by death registration data for each country with estimates of projected mortality from the United Nations Population Division.

The cut-off point at which completeness is considered high or adequate varies. Most published cut-off points are on completeness of death registration data. Some have suggested that completeness of 60% and above for recorded deaths can plausibly be representative of all deaths in the population and the data can be adjusted to give unbiased estimates of mortality (Hill et al. 2007). Reports from Health Metrics Network regard the standard of completeness of all registered deaths and births to be high at 90% and above (Health Metrics Network. 2006, Mahapatra et al. 2007). Bhalla et.al (2010) regarded completeness to be high when it

was greater than 80% of the expected value, medium when between 60% and 80%, and low otherwise.

Several studies have used two sample capture-recapture technique to assess completeness of national traffic injury surveillance data (Meuleners et al. 2006, Morrison et al. 2000, Razzak et al. 1998). Capture-recapture technique is a statistical method used to evaluate completeness of data sources and to identify biases within datasets (Morrison et al. 2000). The current study used Capture-recapture method to assess completeness of road traffic injury surveillance data in the Western Cape Province of South Africa.

The Utility of Road Traffic Injury Information for Prevention

As the present study assessed the quality of road traffic injury surveillance data, this section discusses the specific role of good quality Road Traffic injury surveillance data in injury prevention, the available sources of road traffic injury data in South Africa and the Western Cape Province and their limitations.

Good quality, reliable data are necessary to assess the magnitude of the problem of RTIs in the Western Cape Province, determine trends in RTIs, identify at risk groups, allocate resources appropriately and prioritize interventions for injury prevention and control. Accurate and reliable data are also needed for assessment of the effectiveness of interventional programs and to raise awareness among the public and policy makers.

Data on RTIs need to be comprehensively and consistently collected to capture incidence, causes, geographical location and sequelae of RTIs. These data should then be periodically reviewed to formulate national and regional reports.

South Africa does not yet have complete vital registration nor injury statistics (Norman et al. 2007) with the result that current data misrepresent the causes and magnitude of RTIs. Poor information is a major obstacle to successful development and implementation of

interventions, and their monitoring and evaluation. In addition, road accident costs which are based on official figures will be wrongly estimated (Spiegel et al. 2008).

In South Africa, there are several sources of information for road crashes and injuries. These include systems that collect data on an on-going basis as well as periodically. In the Western Cape Province there are several surveillance systems, such as:

- ♦ Provincial Injury Mortality Surveillance System (PIMSS), which is a sentinel system, managed by the Medical Research Council of South Africa. It collects data on all non-natural deaths including road traffic deaths from participating mortuaries and forensic chemistry laboratories.
- ♦ Traffic crash statistics from the Province, local authorities and the respective coordinating agencies including the Road Traffic Management Corporation and the Department of Community Safety. These agencies capture data collected by the police.
- ♦ Emergency Medical Services data from the Department of Health; data from hospital's trauma unit registers; and
- ♦ The Demographic and Health Survey (DHS) which collects information periodically.

Each of these sources has limitations. The PIMSS database has a wide range of information including demographic, geographic, and special investigations' details. The external causes of injuries are coded according to a structure that is consistent with ICD codes, thereby facilitating international comparisons. The PIMSS is assumed to provide complete coverage of all non-natural deaths hence can be used as a gold standard to validate other databases. However, use of PIMSS data alone misses non-fatal cases.

The Police collect detailed information on circumstances surrounding the crash and vehicle details. However, not all injuries are reported to the police. Unfortunately under-reporting of deaths and injuries due to road crashes by the police is a widespread problem affecting not only LMIC but also high-income countries (Shepherd et al. 2000, Peden et al. 2005.).

A study in Karachi, Pakistan revealed that police data may miss between 61% and 86% of motor vehicle crashes that result in injuries, whereas in Brazil 53% of the accidents are not reported to the police (Peden et al. 2005). A recent study in China found that between 2002 and 2007, the road traffic mortality rate based on death registration data was almost twice as high as the rate reported by the police (Hu et al. 2010).

Hospital registers capture deaths that occur within the hospital as well as non-fatal cases who seek hospital care. Hospital based trauma registers provide details on the nature and severity of injuries and clinical care given to trauma patients. This information can be used to improve quality of care and outcomes for trauma patients, ensure proper resource allocation (Schultz et al. 2007) and assist in evaluating the economic impact of trauma (Pollock. 1995). However, hospital based trauma registers do not capture all trauma cases in the catchment area and the information is not always aimed specifically at primary prevention of injuries.

DHS collects information on type and causes of injuries experienced in the month prior to the survey in both children and adults (Department of Health., Department of Health.). It is the only source that provides information on non-fatal injuries occurring in the communities at a national level. However the information is general, mainly classifying the injuries into intentional and non-intentional injuries. The cause of injury information does not go into specific details. For instance, RTIs are reported as one of the causes of injuries but no further break down in terms of road user, age and sex distribution is given.

Given these limitations, integrating all information sources is indispensable to building an accurate surveillance system (Lyons et al. 2008) that can track the circumstances of a traffic accident, the risk factors and the medical consequences, as well as establishing and evaluating prevention interventions. However when the quality and reliability of the data vary significantly between sources, it reduces the accuracy and usefulness of the overall

surveillance system (Peden et al. 2005). In addition variation in the definitions used in different data sources makes linking the data sources very difficult.

Research Needs

Most of the research related to RTIs has been done in developed countries (Lagarde. 2007). For instance, only 290 out of the 25,320 references in PubMed from 1956 to 2006 reported data from Africa (Lagarde. 2007). There is insufficient knowledge about the quality of injury surveillance data and countries are not always aware of the extent of the data problems with their systems or how they might be corrected to improve their utility (Mahapatra et al. 2007). More studies are needed especially in LMIC to assess the quality of the data collected by injury surveillance systems, and the plausibility of the information about the burden of RTIs that can be derived from them.

Summary

RTIs are a public health challenge which disproportionately affect LMIC. Most of these countries lack complete documentation on RTIs, and have poor or non-existent surveillance systems (Odero. 2004). Thus despite facing a disproportionately high burden, the necessary information to assist in prevention programs is less available or lacking. The role of effective surveillance systems in guiding public health action including traffic injury prevention is clear. There is therefore need for countries to strengthen these systems and periodically assess their performance and make recommendations to improve their content. This will ensure good quality data which will be representative, reliable and useful in making plausible decisions.

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PART C: JOURNAL “READY” MANUSCRIPT
Traffic Injury Prevention Journal

University of Cape Town

**ASSESSING QUALITY OF EXISTING DATA SOURCES ON ROAD TRAFFIC
INJURIES (RTIs) AND THEIR UTILITY IN INFORMING INJURY PREVENTION
IN THE WESTERN CAPE PROVINCE, SOUTH AFRICA**

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ABSTRACT:

Objectives: This study assessed whether the quality of the available road traffic injuries (RTIs) data was sufficient for determining the burden of RTIs in the Western Cape Province and for implementing and monitoring road safety interventions.

Methodology: Under-reporting was assessed by comparing data reported by the South African Police Services (SAPS) in 2008 with data from 18 provincial mortuaries. Completeness of the driver-death subset of all RTIs was assessed using the capture-recapture method.

Results: The mortuary and police datasets comprised 1696 and 860 fatalities respectively for the year 2008. The corresponding provincial road traffic mortality rates were: 32.2 deaths/100,000 population per year (95% Confidence Interval (CI): 30.7 - 33.8); and 16.3 deaths/100,000 population per year (95% CI: 15.3 – 17.5). The police dataset contained 820,960 crashes, involving 196,889 persons, indicating substantial duplication of crash events. There were varying proportions of missing data for demographic and other identifying variables with age missing in nearly half of the cases in the police dataset. The estimated total number of driver-deaths/year was 588.6 (95% CI: 544.4 to 632.8), yielding estimated completeness of the mortuary and police datasets of 57.6% and 46.4% separately, and 77.3% combined.

Conclusion: This study found extensive data quality problems including missing data, duplication and significant under-reporting of traffic injury deaths in the police data. There is a need to address the problems highlighted by this study in order to improve data utility for informing road safety policies.

Key Words: Road Traffic Injuries (RTI), data quality, capture-recapture, under-reporting, completeness.

1. INTRODUCTION

The burden of road traffic injuries (RTIs) disproportionately affects low-and middle-income countries (LMIC) (Spiegel et al. 2008) with 85% of the global deaths and 90% of the annual Disability Adjusted Life Years attributed to RTIs occurring in LMIC (Peden et al. 2004) which account for less than 40% of the world's vehicles (Scuffham. 2008). In South Africa injuries are among the principal contributors to the quadruple burden of disease (Bradshaw et al. 2002) and RTIs were the second leading cause of injuries after interpersonal violence. The age standardized RTI mortality rate for South Africa estimated at 39.7/100,000 in the year 2000, was higher than for any WHO region and almost double the global average (Norman et al. 2007). In South Africa's Western Cape Province, RTIs are of particular importance. In 2000, 6.9% of premature mortality was due to RTIs, which was 40% higher than the national figure of 5% (Matzopoulos et al. 2008).

As RTI prevention is a provincial priority, good quality, reliable data are necessary to assess the magnitude of the problem, identify at risk groups, allocate resources appropriately and prioritize interventions for injury prevention and control. Accurate and reliable data are also needed for assessment of the effectiveness of interventional programs and to raise awareness among the public and policy makers. However, few studies have assessed the quality of RTI data from LMIC and the utility of these data for prevention are not known. While there is substantial investment in intervention programs for traffic injuries in South Africa, very little funding is directed at improving the availability and quality of data with which they can be evaluated. For example, vital statistics registration is incomplete and injury surveillance is limited (Norman et al. 2007).

RTI data need to be comprehensively and consistently collected, capturing incidence, causes, geographical location and sequelae of RTIs. These data should then be periodically reviewed

to assess their quality and any problems identified should be corrected to improve their utility in informing injury prevention and evaluating interventions.

Various methods have been used to assess completeness of civil registration systems and injury surveillance data. Bhalla et.al. (2010) estimated completeness of injury mortality data by comparing the number of deaths recorded by death registration data for each country with estimates of projected mortality from the United Nations Population Division. Several studies assessing completeness of national injury surveillance data have used a two sample capture-recapture technique, a statistical method used to evaluate completeness of data sources and to identify biases within datasets (Meuleners et al. 2006, Morrison et al. 2000, Razzak et al. 1998).

In the Western Cape, RTI data are collected by several authorities including the police, hospitals and forensic pathology services, whereas Road Traffic Management Corporation collates data collected by the police and produce annual traffic reports. However the quality of these data is unknown. The aim of the present study was to assess whether the quality of the available RTI data was sufficient for determining the burden of RTIs in the province, and for implementing and monitoring road safety interventions. The main objective of the study was to assess data quality by examining under-reporting and completeness of datasets. Under-reporting of police data was assessed using mortuary dataset as the gold standard, since mortuaries are assumed to provide full coverage of all non-natural deaths in the province (Republic of South Africa. 1959). Completeness (i.e. the proportion of the total estimated fatalities captured by each dataset) was assessed using the capture–recapture method and the local applicability of this method was also assessed. Lastly, the study identified practical measures to enhance the quality and improve the utility of provincial road traffic injury information.

2. METHODOLOGY

2.1. Data Sources

Two sources of traffic related injuries data in the Western Cape for 2008 were evaluated. RTI deaths were extracted from the database of the Department of Health's Forensic Pathology Service, which provided data from the 18 provincial mortuaries that collect information on all injury deaths including those that are road traffic related. South Africa's strict medico-legal code requires that all non-natural deaths should be examined by a district surgeon, forensic pathologist or medical practitioner (Republic of South Africa. 1959)), hence it was assumed that mortuaries provide full coverage of all non-natural deaths in the Province.

The Provincial Accidents Bureau (PAB) provided both fatal and non-fatal RTI data for all crashes attended by the police. Non-fatal and fatal crashes were registered by the police using two standardised data collection forms: the Accident Report and the Fatal Crash Report. Depending on the location of the crash, the forms were sent either to the PAB directly or via the City of Cape Town Accidents Bureau. All data were captured electronically and compiled in a single database managed by the PAB.

The denominator data used to calculate Provincial age specific driver mortality rates i.e. total number of licensed drivers in the Western Cape Province, in each age group was obtained from electronic National Traffic Information System (eNATIS. 2010).

2.2. Variables

Variables available in the mortuary and PAB datasets are shown in Table 1. PAB data had detailed information on the crash and circumstances surrounding crash occurrence and also vehicle details.

Table 1: An inclusive list of variables in the PAB and Mortuary datasets.

Variables	Mortuary	PAB
Name and Personal ID numbers	√	√
Other demographic characteristics	√	√
Date and time of incident	√	√
Town/suburb of injury	√	√
Police station	√	√
Post-mortem details	√	X
Alcohol test	√	√
ICD codes for external causes	√	X
Police/ Accident registration number	√	√
Crash environment details	X	√
Vehicle details	X	√
Injury details	X	√*

*Classified as no injury, minor, serious and killed

2.3. Pilot Study

Exploratory analysis revealed several anomalies with the data. First, it was noted that police tended to record details for unknown victims by substituting details that were known at the time. These were usually the details of the vehicle driver that were often replicated and applied to other injured parties, such as unknown passengers or pedestrians. This contributed

to a large number of duplicate names that thwarted attempts to match cases across datasets as the victim name was the main identifying variable. As matching is a prerequisite for assessing completeness using the capture-recapture method, this anomaly prompted a revision of the methodology that had originally been proposed in that passengers, pedestrians, cyclists and motorcyclists were necessarily excluded from the capture-recapture analysis including those cyclists and motorcyclists who were recorded as drivers in the PAB dataset (Figure 1). Consequently, completeness analysis was limited to a subset of driver-deaths in the two databases.

Second, some of the variables used to match cases had significant proportions of missing data. As such it was not possible to generate different standards for matching (depending on how strictly the variables for each case match between the two datasets) as initially proposed. Consequently, only one standard with a loose criterion was used to match cases for the capture-recapture method, where the name and either day of accident or police station had to match exactly, plus any of the other matching variables namely: identity number, age, sex, and race.

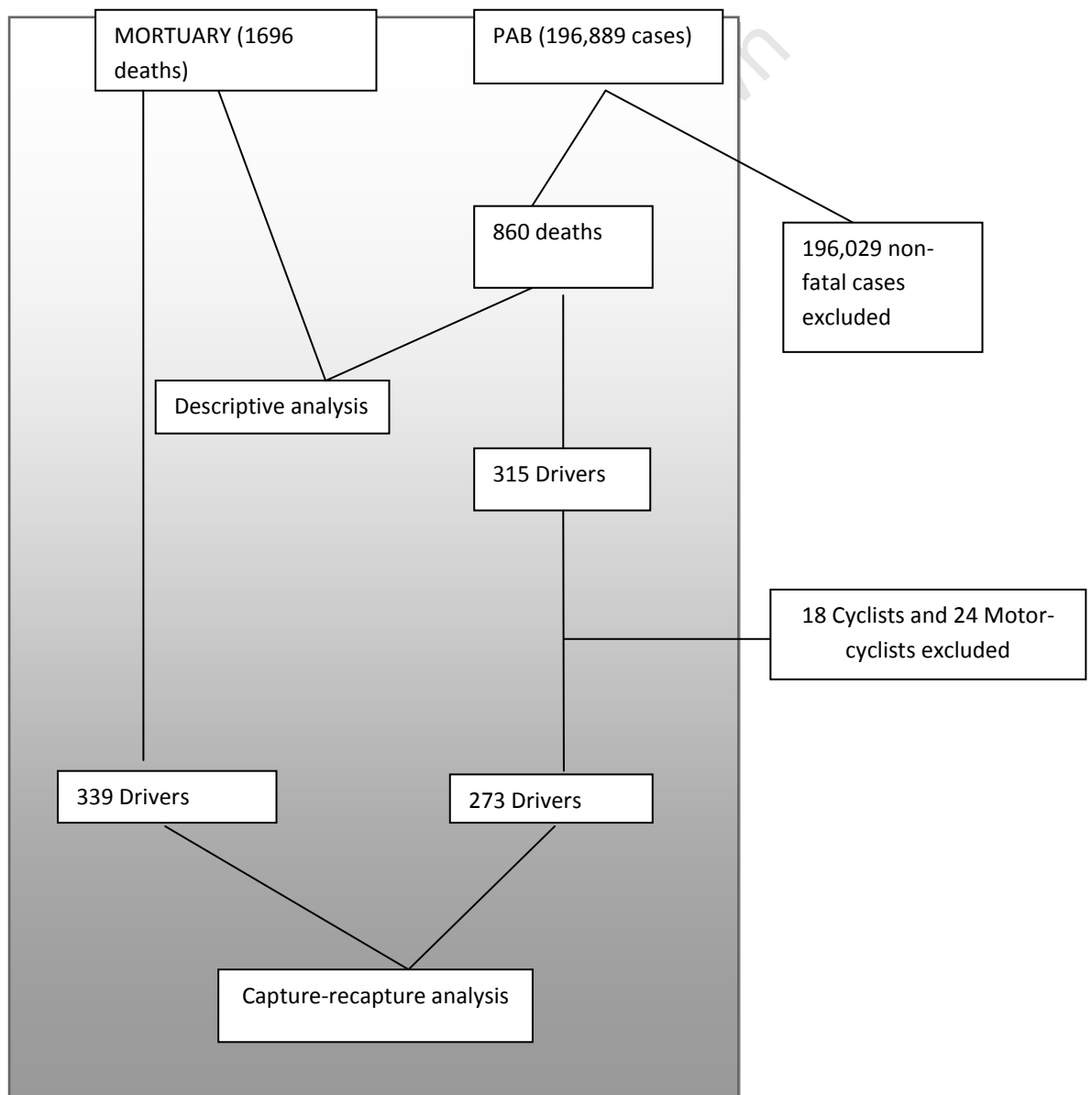
The study protocol proposed that 3 datasets should be evaluated but the Cape Town Trauma Registry (CTTR) from the city's Groote Schuur Hospital, was excluded after encountering serious limitations during pilot study¹.

¹The CTTR dataset had no unique identifiers such as names, ID numbers, Police Accident Registration with which to match the cases to the mortuary or PAB data sets, and the trauma register in which some of this information is recorded, could not be located in the hospital archives. Hence the dataset was not suitable for analysis by the capture-recapture method. Findings from the CTTR dataset are provided in Schuurman et al. (2010).

2.4. Analysis

Both descriptive and capture-recapture analysis was performed on fatalities only (Figure 1). This facilitated comparison with mortuary data which consisted of fatalities only and ensured a manageable sample with clean and accurate data.

Figure 1: Selection of cases for descriptive analysis and capture-recapture analysis



Descriptive analysis of demographic characteristics was applied to the PAB and mortuary datasets individually and to a combined dataset in which cases were matched on name with duplicate cases removed. Anonymous cases that could not be matched were excluded from the combined dataset.

Under-reporting of traffic deaths was assessed by comparing the rates calculated from the PAB dataset with the rates from mortuary dataset since the latter was assumed to have full coverage of all injury deaths. Mortality rates were calculated using mid-year population for 2008 (Statistics South Africa. 2008) as the denominator. Provincial age-specific driver mortality rates were calculated using total number of licensed drivers in the Western Cape Province, in each age group (eNATIS. 2010), as the denominator. 95% Confidence Intervals for all estimates were calculated.

The percentage of missing data for key demographic and identifying variables was assessed to identify potential problem areas for matching cases. In addition, a sample of 100 cases captured in both mortuary and PAB datasets matched by name was used to validate the accuracy of matched cases using EpiData Entry version 3.1 (Lauritsen et al. 2003-2008) . These cases were assessed to determine what proportion of cases could not match on each of the other matching variables because of missing values or inconsistency between the two datasets.

2.4.1 Assessing completeness of mortality data using capture-recapture method

Completeness of the datasets was assessed using the capture-recapture method. The capture-recapture method evaluates the degree of overlap between two sources to derive an ascertainment corrected number (Meuleners et al. 2006) which is then used to estimate completeness of datasets. In this study, the ascertainment corrected number is an estimate of

the total number of driver deaths in the year 2008 corrected for those not recorded by either the PAB or Mortuaries. The number was calculated using the following formula:

$$N = \frac{(x+1)(y+1)}{(z+1)} - 1 \text{ (Morrison et al. 2000)}$$

Where x is the number of driver deaths in mortuary dataset, y is the number of driver deaths in PAB dataset, and z is the number of cases common to both datasets.

The variance and 95% confidence interval (CI) for the estimate of N (Meuleners et al. 2006, Razzak et al. 1998) were obtained by:

$$\text{Var}(N) = \frac{(x+1)(y+1)(x-z)(y-z)}{(z-1)^2(z+2)}$$

$$95\% \text{ CI} = N \pm 1.96 \sqrt{\text{Var}(N)}$$

Each driver death was matched using the following variables: name, identity number, age, sex, race, day of accident, and the police station. The name and either day of accident or police station, had to match exactly, plus any of the other variables mentioned above. Where the name of the driver was not available, day of accident and police station were used as exact matches.

The estimated completeness of each dataset was calculated by dividing the number of driver deaths in each dataset by the ascertainment corrected number (Meuleners et al. 2006, Morrison et al. 2000, Razzak et al. 1998). The estimated completeness of both datasets combined was calculated by dividing the total number of non-matched cases (non-overlapping aggregate) with the ascertainment corrected number. An example on how to derive an ascertainment corrected number and calculate completeness of datasets is shown in appendix 3.

All analysis except validation of duplicate files, was done using STATA version 10.0 (StataCorp. 2007).

3. RESULTS

3.1. Provincial RTI Mortality Rates

The mortuary and the PAB datasets had a total of 1696 and 860 fatalities respectively. The corresponding provincial road traffic mortality rates were: 32.2 deaths/100,000 population per year (95% Confidence Interval (CI): 30.7- 33.8); and 16.3 deaths/100,000 population per year (95% CI: 15.3 – 17.5).

3.2. Demographic Data

Mortuary and PAB collectively captured 1904 fatalities in the year 2008. The mean age was 34.2±16.8 years, and more than half of the fatalities were recorded in the 15-44 year age group. (Table 2). In the aggregated dataset, the majority were males, nearly half belonged to the coloured population group and more than two fifths of the deaths were pedestrians. More than half of the deaths occurred within Cape Town (Table 2).

Table 2: Demographic characteristics of fatalities in the mortuary and PAB datasets individually and combined

Characteristic	Mortuary, N=1696 n1 (%)	PAB, N=860 n2 (%)	% reported by PAB $\frac{n2}{n1} \times 100$	Combined, N=1904* n (%)
Age (years)				
0 – 4	62 (3.7)	22 (2.6)	35.5	67 (3.5)
5 – 14	111 (6.5)	46 (5.4)	41.4	123 (6.5)
15 - 29	498 (29.4)	126 (14.7)	25.3	535 (28.1)
30 – 44	467 (27.5)	140 (16.3)	30.0	503 (26.4)
45 – 59	290 (17.1)	85 (9.9)	29.3	321 (16.9)
≥60	126 (7.4)	36 (4.2)	28.6	139 (7.3)
Missing	142 (8.4)	405 (47.1)		216 (11.34)
Sex				
Male	1288 (75.9)	566 (65.8)	43.9	1417 (74.4)
Female	396 (23.4)	212 (24.7)	53.5	463 (24.3)
Unknown	12 (0.7)	82 (9.5)		24 (1.3)
Race				
Asian	9 (0.5)	7 (0.8)	77.8	10 (0.5)
Black	657 (38.7)	243 (28.3)	37.0	710 (37.3)
Coloured	792 (46.7)	401 (46.6)	50.6	896 (47.1)
White	217 (12.8)	135 (15.7)	62.2	255 (13.4)
Other	-	2 (0.2)		1 (0.05)
Unknown	21 (1.2)	72 (8.4)		32 (1.7)
Type of Road User				
Pedestrian	806 (47.5)	281 (32.7)	34.9	833 (43.8)
Passenger	415 (24.5)	260 (30.2)	62.7	496 (26.1)
Driver	339 (20.0)	273 (31.7)	80.5	395 (20.7)
Cyclists	50 (3.0)	18 (2.1)	36.0	68 (3.6)
Motor-cyclists	63 (3.7)	28 (3.3)	44.4	91 (4.8)
	23 (1.7)	-		21 (1.1)

Other					
Location					
Within Cape Town	946 (55.8)	408 (47.4)	43.1		1034 (54.3)
Outside Cape Town	750 (44.2)	452 (52.6)	60.3		870 (45.7)
Alcohol test	553 (32.61)	12 (1.4)	2.2		542 (28.5)
Alcohol Suspected		53 (6.2)			

*Excludes anonymous cases which could not be matched across datasets.

3.3. Quality of Data

3.3.1. Under-reporting

The PAB dataset under-reported cases by 50%. All demographic categories were affected with the worst category being the age group 15-29 years in which only a quarter of the cases were captured. Only 35% of the pedestrian deaths were captured in the PAB dataset (Table 2).

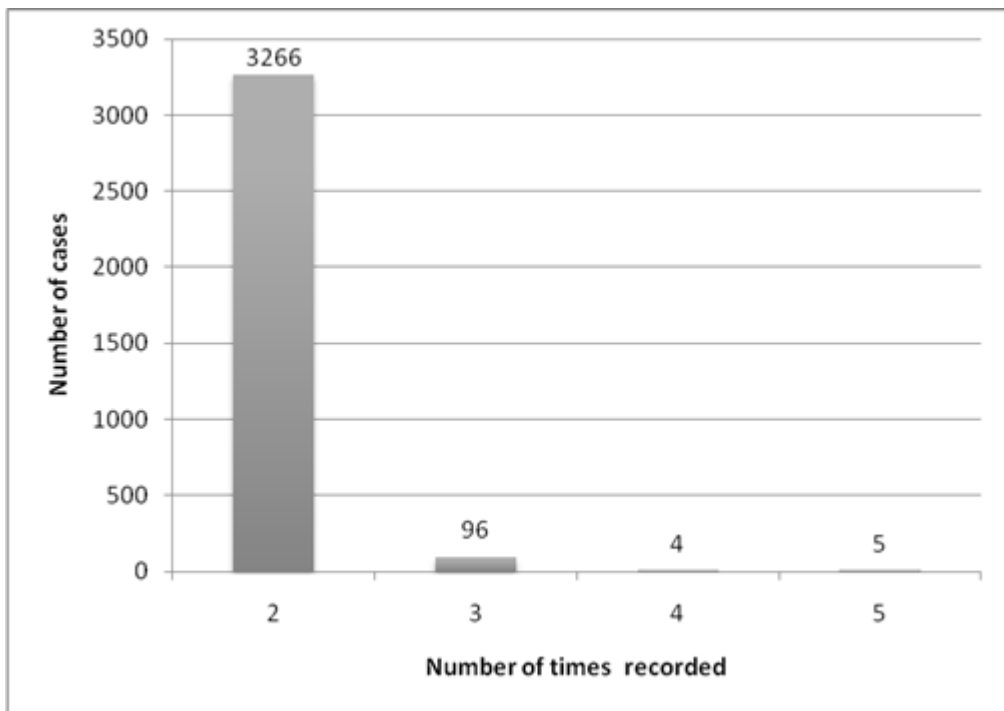
In the PAB dataset, only 12 cases (22.6%) had an alcohol test out of 53 cases suspected of alcohol intoxication.

3.3.2. Duplication

The PAB dataset had 820,960 crashes that occurred in the Western Cape Province in the year 2008, involving 196,889 persons, indicating substantial duplication of crash events. 90.7% of all the persons had either no injury or slight injury, 2.2% had serious injuries and the severity of injuries for 6.7% was not known. Only 0.4% were fatalities.

Furthermore, analysis of persons showed further duplication with at least 3000 cases recorded more than once (Figure 2).

Figure 2: Number of cases that were recorded more than once in the PAB dataset



Out of a sample of 100 cases captured in both mortuary and PAB datasets (matched on name), more than half did not match on the variable age as it was missing mostly in the PAB dataset, or the ages were not consistent in the two datasets; almost all had mismatch on ID numbers because it was mostly missing in the PAB dataset; and close to half of the records did not match on the variable police station as it was either missing, mostly in the mortuary dataset, or the names were different in the two datasets (Table 3).

Table 3: Sources of variation for each matching variable in the mortuary and PAB datasets

Variable	Proportion (%) not matched	Reason
ID number	96	Missing
Age	56	Missing, inconsistent
Sex	13	Unknown in one dataset
Race	12	Unknown, different types
Person type	24	Different types
Date of accident	14	Missing
Police station	47	Missing, different names

3.3. Missing Data

Nearly half of the cases in the PAB dataset had missing age; about two thirds had missing ID numbers. There were no missing values for date and time of incident (Table 4).

In the mortuary dataset the name of the police station where the incident was reported was missing in more than one third of the cases (Table 3). Time and date of death were missing in approximately a quarter and 15% of the cases respectively, whereas date of incident was missing in 9% of the cases.

Table 4: Missing demographic and identifying data

	Mortuary n= 1696		PAB n= 860	
Variable	n (%)	95% CI	n(%)	95% CI
Name				
Missing	6 (0.4)	0.1 – 0.8	38 (4.4)	3.1 – 6.0
Unknown	30 (1.8)	1.2 – 2.5	82 (9.5)	7.7 – 11.7
ID number	112 (6.6)	5.5 – 7.9	577 (67.1)	63.8 – 70.2
Age	142 (8.4)	7.1 – 9.8	405 (47.1)	43.7 – 50.5
Sex	12 (0.7)	0.4 – 1.2	82 (9.5)	7.7 – 11.7
Population group	21 (1.2)	0.8 – 1.9	72 (8.4)	6.6 – 10.4
Date of accident	153 (9.0)	7.7 – 10.5	0	
Time of injury	154 (9.1)	7.8 – 10.5	0	
Time of death	415 (24.5)	22.4 – 26.6	-	
Date of birth	123 (7.3)	6.1 – 8.6	-	
Date of death	253 (14.9)	13.3 – 16.7	-	
Police station	647 (38.2)	35.8 – 40.8	11 (1.3)	0.6 – 2.3

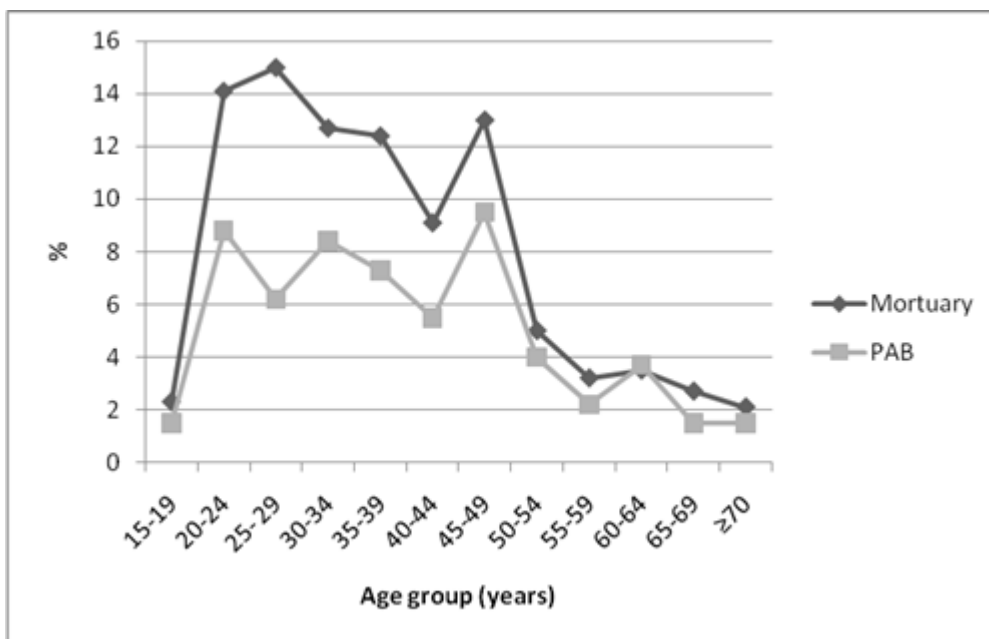
3.4. Analysis of Driver Deaths

The capture-recapture method was used to assess completeness of the mortuary and PAB driver-deaths subsets.

PAB had 273 driver-deaths and mortuaries had 339. Mean age was 38.0 ± 13.6 years and 39.4 ± 13.8 years respectively and males accounted for most deaths in both datasets (90% and 80% respectively).

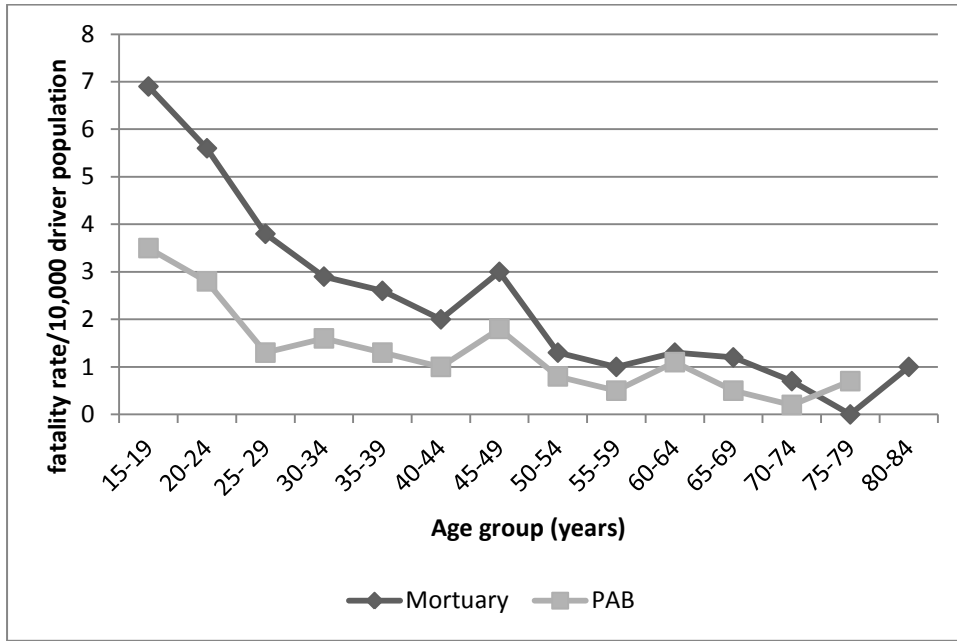
There were consistently fewer deaths in the PAB than mortuary dataset across all age groups (Figure 3). The distribution was bimodal in both datasets peaking in the 20-29 years and 45-49 year age groups.

Figure 3: Driver fatalities by age



Calculation of age-specific mortality rates among motor-vehicle drivers emphasised the considerably higher risk among younger drivers (Figure 4).

Figure 4: Age-specific driver fatality rate



3.4.1. Estimation of completeness using capture-recapture method

The findings observed in the full datasets were also reflected in the driver datasets, with the PAB dataset having higher proportions with missing age and ID numbers whereas mortuary dataset had higher proportions with missing date of injury and police station (Table 5). However the proportions of missing values were lower than in the main datasets.

Table 5: Proportion of missing data for each matching variable in the mortuary and PAB drivers'² datasets

	Mortuary n= 339		PAB n= 273	
Variable	n (%)	95% CI	n(%)	95% CI
Name				
Missing	0	-	9 (3.3)	1.5 – 6.2
Unknown	1 (0.3)	0.01 – 1.6	8 (2.9)	1.3 – 5.7
ID number	8 (2.4)	1.0 – 4.6	115 (42.1)	36.2 – 48.2
Age	16 (4.7)	2.7 – 7.6	109 (39.9)	34.1 – 46.0
Sex	2 (0.6)	0.07 – 2.1	18 (6.6)	4.0 – 10.2
Population group	2 (0.6)	0.07 – 2.1	18 (6.6)	4.0 – 10.2
Date of Accident	17 (5.0)	2.9 – 7.9	0	
Police Station	124 (36.6)	31.4 – 42.0	2 (0.7)	0.1 – 2.6

The police captured only 46.3% of the cases that were captured by the mortuary. Unexpectedly, 42.5% of the cases captured by the police were not captured in the mortuaries either.

Comparison of the two datasets identified 157 matches, which yielded an ascertainment corrected number (estimated total number of driver deaths/year) of 588.6 (95% CI: 544.4 to 632.8).

The estimated completeness of the mortuary and PAB datasets were 57.6% and 46.4% respectively. Thus based on the ascertainment corrected number, the mortuary ascertained

approximately 58% of all driver deaths in the Western Cape province whereas the police ascertained only 46%. The completeness of both datasets combined, was 77.3% i.e. together the PAB and the mortuary ascertained 77% of the total driver deaths in the Western Cape Province in the year 2008.

4. DISCUSSION

4.1. Under-reporting

The death rate for the year 2008 calculated from the mortuary data was approximately twice as high as that calculated from PAB data. This finding agrees with what other studies have found, that the police under-report both injuries and traffic deaths (Table 6). Hu et al. (2010) found that in China over a five year period, the death rate based on death registration data was about twice as high as that reported by the police. Razzak et.al.(1998) also found that the estimated death rate from capture –recapture method was 1.8 times as high as the rate reported by the police.

Table 6: Comparison of published results on underreporting and completeness of road traffic mortality data

Author	Death rate/100000 reported by police	Estimated death rate/100000	% under-reporting
Chokotho et.al. [#]	16.3	32.2	50.6
Razzak et.al.	5.5	9.7	56.7
Hu et. al.*			On average 50

[#] Current study

*Estimates were over a five year period

Pedestrian deaths were under-represented whereas passengers were over-represented in the PAB data compared to mortuary. It is interesting to see how the PAB estimates compare with

other estimates from authorities such as Road Traffic Management Corporation (RTMC), that also use police data to release annual national road traffic reports. Comparison of the proportions of passenger and pedestrian deaths in the PAB dataset with the proportions released by the Road Traffic Management Corporation.(2008) in their 2008 Road Traffic report, showed that RTMC proportions are closer to the mortuary estimates. This indicates that RTMC is aware of the under-reporting of police data and they use modelling to come up with reasonable estimates (Richard Matzopoulos, personal communication March 2011). However, their modelling seems to significantly under-represent the extent of pedestrian deaths compared to driver deaths, which are significantly over-represented.

The mortuaries were assumed to provide full coverage of non-natural deaths in the Province, but the completeness of the mortuary dataset using the capture-recapture method was 57.6%, much lower than the value of 80% regarded as high level completeness by Bhalla et al. (2010). Several reasons could account for this low level of completeness. Firstly, the fact that more than half of the deaths in the mortuary datasets were not captured by the police resulted in a small number of matches and consequently a bigger ascertainment corrected number resulting in a low completeness. Similarly, more than a third of cases captured by the police were not captured by the mortuaries of which 15% had no names, hence it is possible that some were captured in the mortuary dataset but could not be identified, spuriously lowering the completeness level. Further research is needed to establish reasons why some cases were not captured by mortuaries, as it is unlikely that they bypassed mortuaries considering the legal requirement that every non-natural death should undergo post-mortem.

Other possible factors that could contribute to reduced level of completeness in the mortuary dataset are misclassification of RTI deaths, and RTI deaths which occur sometime after injuries sustained during the crash, and are consequently not recorded as road traffic deaths.

4.2. Data Quality Problems

This study found several problems with the various datasets that capture traffic injury related data in the Western Cape Province.

Nine percent of the deaths in the mortuary data had no information on the date of injury, and more than a third of cases had no details of the police station which handled the incident. This made it difficult to link anonymous cases (3%). The mortuary dataset was particularly poor in recording time variables such as date and time of death. Mortuaries need to improve recording time and police station variables which would facilitate identification of cases common to more than one dataset.

The proportion of cases with missing age (8%) in the mortuary dataset was about six times fewer than that in the PAB dataset. However this proportion is too high for mortuaries, considering that age can be estimated during post-mortem examinations.

Since a traffic crash involves at least one person, the number of crash victims should at least be equal to the number of crashes. However the number of crashes recorded by PAB dataset was four times greater than the number of crash victims, suggesting either extensive duplication of crash entries or under-reporting of crash victims. Use of computer programs that do not allow duplicate entries, as well as training data capturers to capture high quality data should be considered by the Provincial Accidents Bureau. Periodic reconciliation of data during the course of the year should also be advocated to ensure improved utility of the data in informing injury prevention.

Nearly half of the cases in the PAB dataset had missing ages. This is a worrying finding especially considering that these data are used to produce official reports for policy making which will be unable to target the appropriate age groups for preventive interventions. In some cases the circumstances of the crash may make it difficult for the police to record the ages of victims, but this is very unlikely to apply to half of all traffic injury fatalities. The

police should be trained and they should endeavour to estimate age or use other documents to ascertain the age of the victim. All available sources of information should be used by police, particularly linkage to other relevant databases.

In the PAB dataset, both cyclists and motor cyclists were recorded as drivers, and the only way to differentiate them was by looking at information on type of vehicle. Motorcyclists and cyclists are a distinct group of road users with unique road safety needs. Separate recording of these road users will ensure formulation of suitable policies that will improve their road safety as well as ensure that drivers are not over-represented.

Complete data for the PAB dataset only became available to the investigators of this study more than two years after it was collected, as data were still being captured. This raises questions about the practical utility of such data. Timeliness is an important attribute of data quality (Mahapatra et al. 2007) for intervention effectiveness.

Linking the datasets in their current form is an inefficient and daunting task which requires much time. Apart from names, there is no single unique identifying variable to link cases common to datasets. Reliance on multiple data sources providing detailed information about the circumstances of, and risk factors for, a crash as well as medical consequences is currently necessary. The responsible authorities need to agree on a unique identifier to be recorded in all datasets. Anonymous cases had to be excluded because there was no other way to ensure that they were not duplicated in the combined dataset. It was not possible to match CTTR cases with PAB cases because the former were anonymous. These limitations would have been mitigated if there was a unique identifier other than name. Automated linking of cases across datasets would be highly desirable.

Notwithstanding these problems, some interesting findings emerged. Only 1.4% of the fatalities were tested for alcohol, and only 2% of the alcohol deaths were recorded in the PAB dataset. These figures reflect severe under-reporting of deaths due to alcohol intoxication

compared to 2005 estimates by Provincial Government Western Cape.(2005) where more than half (57.1%) of the pedestrians who died had a blood alcohol concentration of greater than 0.05mg/ml.

4.3. Assumptions Underlying Use of Capture Recapture Method

The capture–recapture method has proved useful for evaluating completeness of data sources and the quality of datasets. However estimates in this study should be interpreted with caution as validity may be compromised if all the assumptions underlying the use of the capture-recapture method are not met.

One of the assumptions is that the data sources used should be independent (Meuleners et al. 2006, Morrison et al. 2000, Razzak et al. 1998). The data sources in this study were independent as the police do not follow up cases at hospitals or mortuaries, although if they did, it would considerably improve data quality. Lack of independence will result in an increased number of matches and consequently underestimation of the total number of deaths. Independence of the data sources in the current study is supported by the higher ascertainment corrected number.

Another assumption is that each individual in the population has the same probability of being captured by each source (Meuleners et al. 2006, Morrison et al. 2000, Razzak et al. 1998). All the people in the Western Cape Province have access to police services either in their area of residence or in the area where the accident happens and differential access is unlikely for fatal cases. All non-natural deaths including RTIs are required by law to be examined by a qualified medical practitioner in mortuaries, hence each death has an equal chance of being captured.

The last assumption is that the details for each case should be accurate (Morrison et al. 2000). Data quality is important when using the capture–recapture method. This is a major limitation

in this study as several variables had significant rates of missing data. In addition, as seen from table 3, there was considerable variation in the consistency of matching variables among cases matched by name, highlighting the fact that any strict matching criteria would have yielded a far lower number of matches. However, the use of driver-only data for the capture-recapture method improved data quality by reducing the proportions of missing values for matching variables when compared to using the entire datasets.

This study therefore demonstrated the potential and actual use of capture-recapture method to assess completeness of datasets and limits to its application given current data quality .

5. CONCLUSION

One of the goals of the 2015 road safety management plan in South Africa, is to reduce by half the rate of crash fatalities arising from road and other transport by 2015, with 2007 statistics as the baseline (Road Traffic Management Corporation). A critical pre-requisite to assess progress is high quality reliable data, in the absence of which any observed changes are uninterpretable. It is clear from the findings of this study that road traffic data are in great need of improvement if they are to be used for evaluating progress toward achieving this goal.

This study has found extensive data quality problems in the PAB data including significant under-reporting of traffic injury deaths. Recording of time variables in the mortuary dataset was substandard. Not all assumptions underlying the use of capture-recapture method were met in this study, hence the estimates should be interpreted with caution. There is a need to address the problems highlighted by this study in order to improve utility of these data in informing road safety policies.

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PART D: APPENDICES

University of Cape Town

APPENDIX 1

FATAL CRASH REPORT FORM

If there 5 vehicles involved in the accident, and/or more that 9 people killed, please complete an additional page.

DIVISION G: DRIVER AND VEHICLE INFORMATION									
Surname and Initials	Identity Number	Driving License 01 = No 02 = Yes	Population Group 01 = Asian 02 = Black 03 = Coloured 04 = White 00 = Unknown	Gender/Sex 01 = Male 02 = Female 00 = Unknown	Killed 01 = Yes 02 = No	Seat Belts 01 = No 02 = Yes 00 = Unknown	Vehicle Registration Number Plate of Vehicle	Vehicle Type and Colour	
								Type	Colour

DIVISION H: PARTICULARS OF FATALITIES (deaths / persons killed)							
Surname and initial(s)	Population group 01 = Asian 02 = Black 03 = Coloured 04 = White 00 = Unknown	Gender / Sex 01 = Male 02 = Female 00 = Unknown	Age If age of adult is really not available, estimate.	Road user status 01 = Driver 02 = Passenger 03 = Pedestrian 04 = Cyclist 00 = Unknown	Buckled up (Seat belt worn) 01 = No 02 = Yes 03 = Pedestrian 00 = Unknown	In which vehicle was the driver or passenger? A, B, C, D or E (As Division G below)	
						Pedestrians = P	

ARRIVE ALIVE THANKS YOU FOR YOUR TIME AND CO-OPERATION. IT IS GREATLY APPRECIATED

APPENDIX 2

OFFICER'S ACCIDENT REPORT (OAR)FORM

WITNESSES

A police/traffic officer/other authorized person must make an attempt to obtain witnesses to an accident. This is especially so in respect of independent eye-witnesses.

Standards at a scene of an accident must not be chased away before a good attempt is made by an officer to find out whether anyone witnessed (saw) the accident, and/or anyone can give valuable information about circumstances relating to the accident, and/or anyone can assist with the identification of deceased or seriously injured persons involved in the accident. In the event of a reliable witness (passenger or independent eye-witness) residing or working in another city/town, an affidavit must, as soon as possible, be taken from him/her either at the scene or at the police station/traffic police department (this is in the event of a CR/CAS police case docket being registered).

This form provides for the details of 2 witnesses. Each witness must be identified as an independent eye-witness (IEW) or as a passenger of one of the involved vehicles (PW) by placing a cross (X) on the appropriate block. If he/she is a passenger, indicate the appropriate vehicle reference number.

WITNESS 01:

IEW (Independent Eye-witness):

PW (Passenger of Involved Vehicle):

86. Surname & initials: _____

87. Residential/home/contact address: _____

Postal Code: _____

88. Telephone code & number: (_____) _____

89. Business / contact address: _____

Postal Code: _____

90. Telephone code & number: (_____) _____

91. Brief description of accident as alleged by witness: _____

WITNESS 02:

IEW (Independent Eye-witness):

PW (Passenger of Involved Vehicle):

86. Surname & initials: _____

87. Residential/home/contact address: _____

Postal Code: _____

88. Telephone code & number: (_____) _____

89. Business / contact address: _____

Postal Code: _____

90. Telephone code & number: (_____) _____

91. Brief description of accident as alleged by witness: _____

16

1999

1. Traffic Accident Register no. (TARN or NATIS)

OAR

Form no. () of () Total number of forms used.

2. Accident Register no. (of local/provincial accident management system)

(1998/8/31)

Officer's Accident Report (OAR) Form

Instructions :

When completing this form please -

- use **BLOCK/CAPITAL LETTERS** only;
- place your **CROSS (X)** on BLOCKS provided and not on the description or illustration/picture.

1. This Officer's Accident Report (OAR) form replaces the SAP 352 Road Traffic Collision Report form.
2. It is essential that the information recorded on this OAR form is an accurate reflection of the circumstances of the accident.
3. An OAR form must be completed for each driver/pedestrian reporting an accident at a police station.
4. If there are more than two parties (that is more than two vehicles, or more than a vehicle and a pedestrian) involved in the accident, additional OAR forms must be completed.
5. If there is not enough space on the OAR form for particulars of additional witnesses, passenger casualties, or the description of the accident, etc. additional applicable sections of the forms must be completed and attached to the original form (stapled or pinned).
6. Each form must be numbered and start from 01, 02 etc. which must be entered in the top right-hand corner of page 1 (first two blocks). The second set of blocks is for the total number of OAR forms completed for a particular accident, for example, if two (2) OAR forms are completed, 02 must be entered in the second set of blocks on each OAR form (01 of 02 and 02 of 02, total number of forms used).
7. In the event of a dangerous goods spillage, a traffic officer must complete the required incident report as stipulated per SABS 0232 Part 3.

8. When a person in the employ of the SAPS completes this OAR form for an accident, it must be processed through the SAPS 176 register at a police station. If a traffic officer/other authorized person completes the OAR form, it must only be processed through the SAPS 176 register at a police station if the accident warrants the registering of a police case docket. (In this instance, it must be presumed that such officer attended the accident and conducted the initial on-site investigation. He/She will therefore be expected to register a case docket. A docket must be registered immediately after the accident is attended.)

ENVIRONMENT, THE ROAD, AND ACCIDENT TYPE

62. Weather conditions and visibility:

- | | | |
|--------------------------------------|--|--|
| 1. Clear <input type="checkbox"/> | 4. Mist / fog <input type="checkbox"/> | 7. Fire / smoke <input type="checkbox"/> |
| 2. Overcast <input type="checkbox"/> | 5. Hail <input type="checkbox"/> | 8. Snow <input type="checkbox"/> |
| 3. Rain <input type="checkbox"/> | 6. Dust <input type="checkbox"/> | 0. Unknown <input type="checkbox"/> |

63. Light condition:

- | | | |
|---|--|-----------------------------------|
| 1. Daylight <input type="checkbox"/> | 3. Night: unlit <input type="checkbox"/> | 8. Other <input type="checkbox"/> |
| 2. Night: lit by street lights <input type="checkbox"/> | 4. Dawn/dusk <input type="checkbox"/> | <small>Specify</small> |

64. Road surface:

- | | | |
|--|--|--------------------------------------|
| 1. Dry <input type="checkbox"/> | 4. Ice <input type="checkbox"/> | 7. Slippery <input type="checkbox"/> |
| 2. Wet <input type="checkbox"/> | 5. Snow <input type="checkbox"/> | 8. Other <input type="checkbox"/> |
| 3. Wet in areas <input type="checkbox"/> | 6. Loose gravel or sand <input type="checkbox"/> | <small>Specify</small> |

65. Road surface type:

- | | | |
|--------------------------------------|------------------------------------|-----------------------------------|
| 1. Concrete <input type="checkbox"/> | 3. Gravel <input type="checkbox"/> | 8. Other <input type="checkbox"/> |
| 2. Tarmac <input type="checkbox"/> | 4. Dirt <input type="checkbox"/> | <small>Specify</small> |

66. Quality of road surface:

- | | | |
|-------------------------------------|--|-----------------------------------|
| 1. Good <input type="checkbox"/> | 4. Cracks <input type="checkbox"/> | 8. Other <input type="checkbox"/> |
| 2. Bumpy <input type="checkbox"/> | 5. Corrugated <input type="checkbox"/> | <small>Specify</small> |
| 3. Pothole <input type="checkbox"/> | | |

67. Road separation:

1. With median/island 2. No median/island

74. Conditions of road signs:

1. Good 2. Not good 3. Damaged or missing

Specify _____

75. Road marking conditions:

1. Good 2. Not good

Specify _____

76. Speed limit on road:

- km/h

77. Road type:

- | | |
|--|--|
| 1. Freeway <input type="checkbox"/> | 4. Single carriageway <input type="checkbox"/> |
| 2. On/off ramp <input type="checkbox"/> | 5. One way <input type="checkbox"/> |
| 3. Dual carriageway <input type="checkbox"/> | 8. Other <input type="checkbox"/> |
| | <small>Specify</small> |

78. Junction type:

- | | |
|--|---|
| 1. Cross roads <input type="checkbox"/> | 5. Circle <input type="checkbox"/> |
| 2. T-junction <input type="checkbox"/> | 6. Level crossing <input type="checkbox"/> |
| 3. Staggered junction <input type="checkbox"/> | 7. Not at junction <input type="checkbox"/> |
| 4. Y-junction <input type="checkbox"/> | 8. Other <input type="checkbox"/> |
| | <small>Specify</small> |

(12)

21. Seatbelt/helmet:

- 21.1 Seatbelt fitted/helmet present:
1. Yes 2. No 0. Unknown
- 21.2 Seatbelt/helmet **definitely** used:
1. Yes 2. No 0. Unknown
- 21.3 Seatbelt/helmet used (according to hearsay):
1. Yes 2. No 0. Unknown

22. Trapped/fallen out?

1. Trapped 2. Fallen out 7. N/A

23. Liquor/drug use:

- 23.1 Liquor/drug use suspected: 1. Yes 2. No
- 23.2 Liquor/drug use: tested: 1. Yes 2. No

24. Use of cell-phone or other handheld instrument suspected:

1. Yes 2. No

25. Other relevant information/comments (e.g. disabled person, breathalyser reading, etc): _____

26. Ambulance service, driver, case reference number & hospital: _____

21. Seatbelt/helmet:

- 21.1 Seatbelt fitted/helmet present:
1. Yes 2. No 0. Unknown
- 21.2 Seatbelt/helmet **definitely** used:
1. Yes 2. No 0. Unknown
- 21.3 Seatbelt/helmet used (according to hearsay):
1. Yes 2. No 0. Unknown

22. Trapped/fallen out?

1. Trapped 2. Fallen out 7. N/A

23. Liquor/drug use:

- 23.1 Liquor/drug use suspected: 1. Yes 2. No
- 23.2 Liquor/drug use: tested: 1. Yes 2. No

24. Use of cell-phone or other handheld instrument suspected:

1. Yes 2. No

25. Other relevant information/comments (e.g. disabled person, breathalyser reading, etc): _____

26. Ambulance service, driver, case reference number & hospital: _____

27. COMPLETE FOR PEDESTRIAN ONLY

- 27.1 **Pedestrian position:** 1. Roadway 2. Sidewalk/Verge
3. Shoulder of road
- 27.2 **Pedestrian location:** 1. At crossing 2. Within 50m of crossing
3. Not at crossing
- 27.3 **Pedestrian manoeuvre:** 1. Facing traffic 2. Back to traffic
3. Crossing road

- 27.4 **Pedestrian action:** 1. Walking 3. Standing 8. Other
2. Running 4. Playing Specify
- 27.5 **Colour of clothing:** 1. Light 3. Light & dark 8. Other
2. Dark 4. Reflective Specify

(5)

VEHICLE DETAILS A or






28. Registration number:
 (- Check that registration/licence plate number on Vehicle Licence Disc/Clearance Certificate (VLD/CC) corresponds with that on front and back of vehicle. Expiry date of VLD/CC should also be checked; - Please complete items 29, 30 and 31 from details on VLD/CC)

29. Clearance Cert. No.:
 30. Register number:
 31. Vehicle identification number / Chassis number:




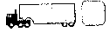

32. Colour: _____ Make: _____ Model: _____

33. Vehicle type:

Passenger vehicles:

- 01. Motor car or station wagon: 
- 02. Combi/minibus: 
- 03. Midibus: 
- 04. Bus: 
- 05. Bus-train: 

Goods vehicles:

- 06. Light delivery vehicle: 
- 07. Panelvan: 
- 08. GVM > 3500kg: (greater than) 
- 09. Truck: Articulated: 
- 10. Truck: Articulated multiple: 






VEHICLE DETAILS B or

28. Registration number:
 29. Clearance Cert. No.:
 30. Register number:
 31. Vehicle identification number / Chassis number:




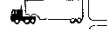

32. Colour: _____ Make: _____ Model: _____

33. Vehicle type:

Passenger vehicles:

- 01. Motor car or station wagon: 
- 02. Combi/minibus: 
- 03. Midibus: 
- 04. Bus: 
- 05. Bus-train: 

Goods vehicles:

- 06. Light delivery vehicle: 
- 07. Panelvan: 
- 08. GVM > 3500kg: (greater than) 
- 09. Truck: Articulated: 
- 10. Truck: Articulated multiple: 

6

PASSENGER Number
OF VEHICLE: Which vehicle

PARTICULARS OF PASSENGERS - KILLED or INJURED

PASSENGER Number
OF VEHICLE: Which vehicle

48. Country of origin: _____
 49. Identity number: -
 50. Surname & initials: _____
 51. Residential/home/contact address: _____
 _____ Postal Code: _____
 52. Telephone code & number: (_____) _____
 53. Business telephone code & number: (_____) _____
 54. Population group: 01. Asian 03. Coloured 98. Other
 02. Black 04. White 00. Un-
 known
 55. Age: Unknown age
If not certain please estimate.
 56. Gender: 01. Male 02. Female 00. Unknown
 57. Severity of injury: 1. Killed 2. Serious 3. Slight
 58. Passenger location: 1. Front seat 3. Back of goods vehicle
 2. Back seat 8. Other
Specify
 59. Trapped/fallen out?
 1. Trapped 2. Fallen out 7. N/A
 60. Seatbelt/helmet:
 60.1 Seatbelt fitted/helmet present:
 1. Yes 2. No 0. Unknown
 60.2 Seatbelt/helmet **definitely** used:
 1. Yes 2. No 0. Unknown
 60.3 Seatbelt/helmet used (according to hearsay):
 1. Yes 2. No 0. Unknown
 61. Ambulance service, driver, case reference number & hospital: _____

48. Country of origin: _____
 49. Identity number: -
 50. Surname & initials: _____
 51. Residential/home/contact address: _____
 _____ Postal Code: _____
 52. Telephone code & number: (_____) _____
 53. Business telephone code & number: (_____) _____
 54. Population group: 01. Asian 03. Coloured 98. Other
 02. Black 04. White 00. Un-
 known
 55. Age: Unknown age
If not certain please estimate.
 56. Gender: 01. Male 02. Female 00. Unknown
 57. Severity of injury: 1. Killed 2. Serious 3. Slight
 58. Passenger location: 1. Front seat 3. Back of goods vehicle
 2. Back seat 8. Other
Specify
 59. Trapped/fallen out?
 1. Trapped 2. Fallen out 7. N/A
 60. Seatbelt/helmet:
 60.1 Seatbelt fitted/helmet present:
 1. Yes 2. No 0. Unknown
 60.2 Seatbelt/helmet **definitely** used:
 1. Yes 2. No 0. Unknown
 60.3 Seatbelt/helmet used (according to hearsay):
 1. Yes 2. No 0. Unknown
 61. Ambulance service, driver, case reference number & hospital: _____

11

<p>PASSENGER <input type="text"/> Number OF VEHICLE: <input type="text"/> Which vehicle</p> <p>48. Country of origin: _____</p> <p>49. Identity number: <input type="text"/>-<input type="text"/></p> <p>50. Surname & initials: _____</p> <p>51. Residential/home/contact address: _____ Postal Code: _____</p> <p>52. Telephone code & number: (_____) _____</p> <p>53. Business telephone code & number: (_____) _____</p> <p>54. Population group: 01. Asian <input type="checkbox"/> 03. Coloured <input type="checkbox"/> 98. Other <input type="checkbox"/> 02. Black <input type="checkbox"/> 04. White <input type="checkbox"/> 00. Un- known <input type="checkbox"/></p> <p>55. Age: <input type="text"/> <input type="text"/> <input type="text"/> Unknown age <input type="checkbox"/> <small>if not certain please estimate</small></p> <p>56. Gender: 01. Male <input type="checkbox"/> 02. Female <input type="checkbox"/> 00. Unknown <input type="checkbox"/></p> <p>57. Severity of injury: 1. Killed <input type="checkbox"/> 2. Serious <input type="checkbox"/> 3. Slight <input type="checkbox"/></p> <p>58. Passenger location: 1. Front seat <input type="checkbox"/> 3. Back of goods vehicle <input type="checkbox"/> 2. Back seat <input type="checkbox"/> 8. Other <input type="checkbox"/> <small>Specify</small></p> <p>59. Trapped/fallen out? 1. Trapped <input type="checkbox"/> 2. Fallen out <input type="checkbox"/> 7. N/A <input type="checkbox"/></p> <p>60. Seatbelt/helmet:</p> <p>60.1 Seatbelt fitted/helmet present: 1. Yes <input type="checkbox"/> 2. No <input type="checkbox"/> 0. Unknown <input type="checkbox"/></p> <p>60.2 Seatbelt/helmet definitely used: 1. Yes <input type="checkbox"/> 2. No <input type="checkbox"/> 0. Unknown <input type="checkbox"/></p> <p>60.3 Seatbelt/helmet used (<u>according to hearsay</u>): 1. Yes <input type="checkbox"/> 2. No <input type="checkbox"/> 0. Unknown <input type="checkbox"/></p> <p>61. Ambulance service, driver, case reference number & hospital: _____</p>	<p>PASSENGER <input type="text"/> Number OF VEHICLE: <input type="text"/> Which vehicle</p> <p>48. Country of origin: _____</p> <p>49. Identity number: <input type="text"/>-<input type="text"/></p> <p>50. Surname & initials: _____</p> <p>51. Residential/home/contact address: _____ Postal Code: _____</p> <p>52. Telephone code & number: (_____) _____</p> <p>53. Business telephone code & number: (_____) _____</p> <p>54. Population group: 01. Asian <input type="checkbox"/> 03. Coloured <input type="checkbox"/> 98. Other <input type="checkbox"/> 02. Black <input type="checkbox"/> 04. White <input type="checkbox"/> 00. Un- known <input type="checkbox"/></p> <p>55. Age: <input type="text"/> <input type="text"/> <input type="text"/> Unknown age <input type="checkbox"/> <small>if not certain please estimate</small></p> <p>56. Gender: 01. Male <input type="checkbox"/> 02. Female <input type="checkbox"/> 00. Unknown <input type="checkbox"/></p> <p>57. Severity of injury: 1. Killed <input type="checkbox"/> 2. Serious <input type="checkbox"/> 3. Slight <input type="checkbox"/></p> <p>58. Passenger location: 1. Front seat <input type="checkbox"/> 3. Back of goods vehicle <input type="checkbox"/> 2. Back seat <input type="checkbox"/> 8. Other <input type="checkbox"/> <small>Specify</small></p> <p>59. Trapped/fallen out? 1. Trapped <input type="checkbox"/> 2. Fallen out <input type="checkbox"/> 7. N/A <input type="checkbox"/></p> <p>60. Seatbelt/helmet:</p> <p>60.1 Seatbelt fitted/helmet present: 1. Yes <input type="checkbox"/> 2. No <input type="checkbox"/> 0. Unknown <input type="checkbox"/></p> <p>60.2 Seatbelt/helmet definitely used: 1. Yes <input type="checkbox"/> 2. No <input type="checkbox"/> 0. Unknown <input type="checkbox"/></p> <p>60.3 Seatbelt/helmet used (<u>according to hearsay</u>): 1. Yes <input type="checkbox"/> 2. No <input type="checkbox"/> 0. Unknown <input type="checkbox"/></p> <p>61. Ambulance service, driver, case reference number & hospital: _____</p>
--	--

10

Motor cycles:

11. 125cc and under:

12. Above 125cc:

13. Tri-cycle:

14. Quadri-cycle:

Other vehicles:

15. Bicycle:

16. Mobile equipment: (driven)

17. Caravan/trailer:

18. Tractor:

19. Animal drawn vehicle

98. Other - vehicle not in 01 - 19 (describe)

Motor cycles:

11. 125cc and under:

12. Above 125cc:

13. Tri-cycle:

14. Quadri-cycle:

Other vehicles:

15. Bicycle:

16. Mobile equipment: (driven)

17. Caravan/trailer:

18. Tractor:

19. Animal drawn vehicle

98. Other - vehicle not in 01 - 19 (describe)

Usage of vehicle at time of accident (if applicable):

34. Dangerous Goods: 1. Yes 2. No

35. Passengers for reward: 1. Yes 2. No 3. Taxi

36. **Vehicle manoeuvre/what driver was doing:**

01. Turning Right: 05. Merging:

02. Turning Left: 06. Diverging:

03. U-Turn: 07. Overtaking: pass to right:

04. Enter traffic flow: 08. Overtaking: pass to left:

Additional options on next page:

Usage of vehicle at time of accident (if applicable):

34. Dangerous Goods: 1. Yes 2. No

35. Passengers for reward: 1. Yes 2. No 3. Taxi

36. **Vehicle manoeuvre/what driver was doing:**

01. Turning Right: 05. Merging:

02. Turning Left: 06. Diverging:

03. U-Turn: 07. Overtaking: pass to right:

04. Enter traffic flow: 08. Overtaking: pass to left:

Additional options on next page:

7

VEHICLE DETAILS A or

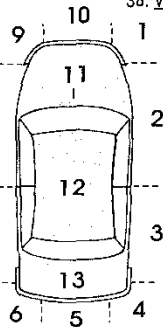
Options continued from previous page:

- 09. Travelling straight: ↑ 15. Changing lane: ↗
- 10. Reversing: ↓ 16. Swerving: ↘
- 11. Sudden start: ↑ 17. Slowing down: ↓
- 12. Sudden stop: ↓ 18. Avoiding object: ↘
- 13. Busy parking: 19. Stationary:
- off roadway: (eg. waiting in traffic)
- 14. Busy parking: 20. Parked:
- on roadway: (eg. in parking bay)
- 98. Other: Describe

37. Compass direction of travel: 1. North 3. East
2. South 4. West 0. Unknown

38. Vehicle damage:

- 01. Right front: 11. Bonnet:
- 02. Right mid-front: 12. Roof:
- 03. Right mid-back: 13. Boot:
- 04. Back right: 14. Multiple:
- 05. Back centre: 15. Caught fire:
- 06. Back left: 16. Rolled:
- 07. Left mid-back: 17. Damage undercarriage:
- 08. Left mid-front: 18. Damage no detail:
- 09. Left front: 19. No damage:
- 10. Front centre:



VEHICLE DETAILS B or

Options continued from previous page:

- 09. Travelling straight: ↑ 15. Changing lane: ↗
- 10. Reversing: ↓ 16. Swerving: ↘
- 11. Sudden start: ↑ 17. Slowing down: ↓
- 12. Sudden stop: ↓ 18. Avoiding object: ↘
- 13. Busy parking: 19. Stationary:
- off roadway: (eg. waiting in traffic)
- 14. Busy parking: 20. Parked:
- on roadway: (eg. in parking bay)
- 98. Other: Describe

37. Compass direction of travel: 1. North 3. East
2. South 4. West 0. Unknown

38. Vehicle damage:

- 01. Right front: 11. Bonnet:
- 02. Right mid-front: 12. Roof:
- 03. Right mid-back: 13. Boot:
- 04. Back right: 14. Multiple:
- 05. Back centre: 15. Caught fire:
- 06. Back left: 16. Rolled:
- 07. Left mid-back: 17. Damage undercarriage:
- 08. Left mid-front: 18. Damage no detail:
- 09. Left front: 19. No damage:
- 10. Front centre:

8

39. Details of breakdown company used:
Name of breakdown company, telephone number, driver's name:

40. Registration no. of breakdown vehicle:

41. Tyre appears to have burst before accident:
1. No 2. Yes which tyre _____ 00. Unknown

42. Length of skidmarks:
1. Tape measure _____ metres or
2. Heel-to-toe method _____

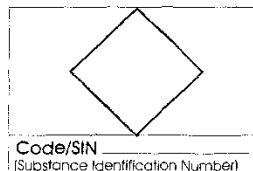
43. Lights: Working condition:
1. Good 2. Faulty/not visible _____ 00. Unknown

44. Reflector quality:
1. Good 2. Faulty/not visible _____ 00. Unknown

45. Chevron quality:
1. Good 2. Faulty/not visible _____ 00. Unknown

46. Dangerous goods carried in/on vehicle:
1. No: no goods 3. Yes, spillage occurred
2. Yes, but no spillage 4. Yes: vapour/gas leaking/emission occurred

47. Dangerous goods sign/placard on vehicle:
Please draw in



39. Details of breakdown company used:
Name of breakdown company, telephone number, driver's name:

40. Registration no. of breakdown vehicle:

41. Tyre appears to have burst before accident:
1. No 2. Yes which tyre _____ 00. Unknown

42. Length of skidmarks:
1. Tape measure _____ metres or
2. Heel-to-toe method _____

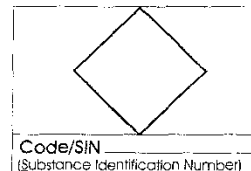
43. Lights: Working condition:
1. Good 2. Faulty/not visible _____ 00. Unknown

44. Reflector quality:
1. Good 2. Faulty/not visible _____ 00. Unknown

45. Chevron quality:
1. Good 2. Faulty/not visible _____ 00. Unknown

46. Dangerous goods carried in/on vehicle:
1. No: no goods 3. Yes, spillage occurred
2. Yes, but no spillage 4. Yes: vapour/gas leaking/emission occurred

47. Dangerous goods sign/placard on vehicle:
Please draw in



9

APPENDIX 3

CALCULATING COMPLETENESS USING CAPTURE-RECAPTURE METHOD (AN EXAMPLE)

Two source Capture recapture technique is a statistical method used to evaluate completeness of data sources and to identify biases within datasets (Morrison, Stone 2000). Thus the method evaluates the degree of overlap between two sources to derive an ascertainment corrected number (Meuleners et al. 2006). Ascertainment corrected number is the estimate of the total number of events being studied e.g. deaths or injuries, occurring over a period of time corrected for events/ cases not recorded in either dataset. For instance in the present study the ascertainment corrected number is an estimate of the total number of driver deaths in the year 2008 corrected for those not recorded by either the PAB or Mortuaries.

Completeness of each dataset is then calculated by dividing the number of events under study in each dataset by the ascertainment corrected number.

The ascertainment corrected number is calculated using the following formula:

$$N = \frac{(x+1)(y+1)}{(z+1)} - 1 \text{ (Morrison et al. 2000)}$$

And its 95% confidence interval is calculated using:

$$95\% \text{ CI} = N \pm 1.96 \sqrt{\text{Var}(N)}$$

$$\text{Where Var}(N) = \frac{(x+1)(y+1)(x-z)(y-z)}{(z-1)^2 (z+2)}$$

x = number of cases in database 1,

y = number of cases in database 2,

z = number of cases common to both databases.

As seen from the formula, one needs to identify cases common to both datasets, thus a criteria for matching cases in the 2 datasets is determined first.

Let's assume dataset 1 had captured 250 deaths, dataset 2 had 355 deaths, and out these deaths 246 deaths were captured in both datasets over a 1 year period.

$x = 250$ deaths

$y = 355$ deaths

$z = 246$ deaths

Using the above formula:

$$\begin{aligned} \text{Ascertainment corrected number} &= [(250+1)(355+1)(246+1) / (246+1)] - 1 \\ &= \mathbf{360.8 \text{ (95\% CI: 357.6 - 364)}} \end{aligned}$$

$$\text{Completeness of Dataset 1} = 250/360.8 = \mathbf{69.3\%}.$$

$$\text{Completeness of Dataset 2} = 355/ 360.8 = \mathbf{98.4\%}$$

$$\text{Completeness of Dataset 1 and 2} = (250+355-246) / 360.8 = \mathbf{99.5\%}$$

Interpretation: Dataset 1 ascertained 69% of the total deaths whereas Dataset 2 ascertained 98% of the deaths over a 1 year period.

The completeness of both datasets combined, disregarding the cases common to both, was 99.5% i.e. together Dataset 1 and 2 ascertained 99.5% of the total deaths over a 1 year period.

APPENDIX 4

**LETTER OF APPROVAL FROM UCT HUMAN RESEARCH ETHICS
COMMITTEE**



Health Sciences Faculty
Research Ethics Committee
Room E52-24 Groote Schuur Hospital Old Main Building
Observatory 7925
Telephone [021] 406 6626 • Facsimile [021] 406 6411
e-mail: shuretta.thomas@uct.ac.za

24 June 2010

HREC REF: 295/2010

Dr L Chokocho
c/o Mr R Matzopoulos & Prof J Myers
Public Health & Family Medicine

Dear Dr Chokocho

PROJECT TITLE: REVIEW OF EXISTING DATA SOURCES ON ROAD TRAFFIC INJURIES (RTIs) IN THE WESTERN CAPE PROVINCE, SOUTH AFRICA.

Thank you for submitting your study to the Faculty of Health Sciences Human Research Ethics Committee.

It is a pleasure to inform you that the Ethics Committee has **formally approved** the above-mentioned study.

Approval is granted for one year till the 30th June 2011.

Please submit an annual progress report if the research continues beyond the expiry date. Please submit a brief summary of findings if you complete the study within the approval period so that we can close our file.

To my knowledge, Professor Sebastian Van As also maintains a trauma registry at Red Cross Children's Hospital which may include information that is relevant to this study.

Please note that the ongoing ethical conduct of the study remains the responsibility of the principal investigator.

Please quote the REC. REF in all your correspondence.

Yours sincerely

Signed by candidate

PROFESSOR M BLOCKMAN
CHAIRPERSON, HSE HUMAN ETHICS
Federal Wide Assurance Number: FWA00001637.

S Thomas

APPENDIX 5

AUTHOR INSTRUCTIONS FOR INJURY PREVENTION JOURNAL

Journal Details



Traffic Injury Prevention

Published By: Taylor & Francis

Instructions for Authors

SCHOLARONE MANUSCRIPTS™

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Traffic Injury Prevention is an archival and indexed journal covering traffic safety, crash prevention and injury control. Papers include research on alcohol and drug impairment, behavior of traffic participants, injury mechanisms, impact biomechanics, injury prevention and epidemiology. Published articles have been subjected to anonymous and independent peer review. They can include all phases of experimental, computational, statistical, emergency, clinical and epidemiological research.

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validity of the results. The guidelines can be found at: <http://www.consort-statement.org>.

Language: English only.

Abstract: 200 to 400 words using the headings: objective, methods, results and conclusions.

Key Words: Include up to six key words for indexing and database word searches.

Text Headings: Set first-level headings in the text to the left, typed in all capitals and bold faced; begin text on the following line. Second level headings should be typed in bold lowercase letters, but with all main words capitalized; start text on the next line. For third-level headings, use bold type and capitalize only the first level; begin text on the same line after three spaces.

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Second-Level Text Headings

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McCartt AT, Hellinga LA, Strouse LM, Farmer CM. Long-term effects of handheld cell phone laws on driver handheld cell phone use. *Traffic Inj Prev.* 2010 Apr;11(2):133-41

Digges K, Dalmotas D. Benefits of a low severity frontal crash test. *Annu Proc Assoc Adv Automot Med.* 2007;51:299-317

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