

The Injury Mortality Survey: A national study of injury mortality levels and causes in South Africa in 2009

Report prepared for the National and Provincial Departments of Health

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EXECUTIVE SUMMARY

Introduction

The initial National Burden of Disease (NBD) study for South Africa in 2000 revealed that homicide was the second leading cause of premature mortality after HIV/AIDS, that road traffic injuries ranked fourth and that the mortality rates from these unnatural deaths were considerably higher than in other countries. These estimates have been widely used for driving prevention and policy changes, and there are indications that mortality from non-natural deaths has decreased. However, the cause of injury deaths is currently poorly recorded in vital statistics records, and it is not clear which injury types may have been most affected by this decrease or whether, in fact, the decrease in mortality is real or perceived.

Aim and objectives

This study aimed to establish the cause-specific incidence of fatal injury for the year 2009. The specific objectives were:

- to describe the incidence of fatal injury rates in South Africa for 2009 by age, sex and cause
- to describe the metro and non-metro profiles of fatal injuries
- to compare the provincial profiles of fatal injuries.

Methods

The study was designed as a retrospective descriptive study, utilising routine data collected through the post-mortem investigation process at sampled mortuaries to describe non-natural deaths across South Africa. The study population was all persons who died unnaturally during the year 2009 and had a legally required post-mortem done at a State-owned mortuary within South Africa. Foetuses and deaths from natural causes were excluded.

A multi-stage stratified cluster sample was drawn for the eight provinces, using mortuaries as the primary sampling unit (cluster). A sampling frame of 106 mortuaries (57 274 folders) was used to draw a representative sample that was stratified by metro and non-metro area by mortuary size. Forty-five mortuaries were selected for inclusion in the study and the expected sample was 22 733 records. Western Cape data from the Provincial Injury Mortality Surveillance System were added to provide a complete sample for the country.

The primary source of the data was the post-mortem reports, and ancillary documentation including police reports and hospital records that appear in case folders. Data were entered on site via the custom-designed software for mobile telephones and submitted to a central data platform, which enabled ongoing monitoring of data collection activities, quality control and data cleaning. Inter-observer reliability was tested by two fieldworkers independently collecting data from the same folder on the same day for 5 percent of the sample. Blood alcohol data were collected from the post-mortem folders where available, but are currently being solicited by the project manager from the state chemical laboratories in Pretoria, Johannesburg, and Cape Town, in order to capture any missing information. Fieldwork was completed in two phases during November and December 2011. The first phase covered the Eastern Cape, Free State, KwaZulu-Natal and Northern Cape, and the second phase covered Gauteng, Limpopo, Mpumalanga and the North West Province.

Analysis weights were calculated to take into account the selection probabilities of mortuaries in the survey strata and the realisation of the sample. National estimates for the

proportion of deaths for overall homicide, road traffic deaths and other injury categories were computed, taking into account the survey design and the sampling weights of mortuaries. Mortality rates were calculated for sex and age using 2009 population from ASSA2008 and the Community Survey 2007, and age standardised rates by the direct method using the WHO world standard population(1).

Ethical approval for the study was obtained from the Medical Research Council's Health Research Ethics Committee and permission to undertake the study was granted by Provincial Health Research Committees in each province.

Results

Information on 24 197 non-natural deaths was collected, which equated to a total of 52 493 non-natural deaths when the sampling weights were applied, equivalent to a mortality rate of 109 per 100,000 population (95%CI: 97.1 to 121). Overall, the highest proportion of non-natural deaths in 2009 were recorded for Gauteng (24.7 percent) followed by KwaZulu-Natal (20.8 percent), while the Northern Cape had the fewest non-natural deaths (2.9 percent). Limpopo, Mpumalanga, North West and Northern Cape only had a non-metro representation of non-natural deaths. The Eastern Cape was the only province that had a higher proportion in non-metro areas, while the Free State had similar proportions of non-natural deaths in both metro and non-metro areas.

The age profile for non-natural deaths indicates an increase from the age of 15 years, with a peak between the ages of 20 and 34 years, which accounted for 41 percent of deaths, after which it declined among the older ages. The age-sex profile differed: females under-15 years of age had a higher proportion of non-natural deaths, both sexes had similar levels for the 15-19 year age group, and more male non-natural deaths were found between 20 and 34 years of age. There were approximately four male non-natural deaths for every female death.

Four out of five non-natural deaths were recorded among the African population, amongst which there were 4.2 male non-natural deaths for every female death. Coloureds and whites had similar levels of non-natural deaths, with a M:F ratio of 3.3 and 3 respectively. Asians had the largest sex difference, with 4.6 male non-natural deaths for every female death.

Nearly 80 percent of non-natural deaths were male and 20 percent were female. Homicide (36.2 percent) followed by transport (33.8 percent) were the leading apparent manners of death. The M:F ratio was highest for homicide, with 5.9 male deaths for every female death. Homicide ranked highest for five of the nine provinces, except for the Free State, Limpopo, Mpumalanga and North West provinces, where road traffic injuries ranked highest. Suicide ranked third highest for all provinces, while the ranking for other specified unintentional injuries, i.e. fires, drowning, falls, etc. varied by province.

Homicide: Overall, 85.4 percent of the estimated 19 028 homicides were male. Homicide peaked in the 20-24 and 25-29 year age groups for both males and females. Approximately 50 percent of homicides occurred between the ages of 20 and 34 years. For males, homicide levels were consistently high throughout the year, with a peak in December (11 percent) and a smaller peak in May (9.0 percent). Female homicide also peaked in May (9.9 percent) and December (9.5 percent). Homicide peaked on Saturdays for both sexes and nearly 58 percent of the homicides occurred over the weekend (the three days from Friday to Sunday). One-quarter of homicides were recorded in KwaZulu-Natal, followed by Gauteng (23.3 percent) and the Eastern Cape (18.2 percent). Of the homicides in metro areas, Gauteng

had the highest proportion (35.4 percent), followed by KwaZulu-Natal (28.6 percent) and the Western Cape (18.3 percent). A provincial comparison of the homicides in non-metro areas indicated that the Eastern Cape had the highest proportion (22.7 percent), followed by KwaZulu-Natal (21.9 percent) and Gauteng (12.4 percent). Sharp force was the leading circumstance of homicide for both males (43.8 percent) and females (30.0 percent). For males, this was followed by firearms (30.1 percent) and blunt force (22.1 percent), while for females, blunt force (26.8 percent) was the second leading circumstance of homicide. Strangulation deaths were higher for females (11.5 percent) than for males (1.4 percent). KwaZulu-Natal and Gauteng had the highest proportion of firearm homicide, with more than one-third of deaths being attributed to a single circumstance.

Suicide: Of the estimated 6 471 suicides, 82 percent were male and more than half of all suicides occurred between the ages of 20 and 39 years. The majority of suicides were African (71.1 percent), followed by the white population group (16 percent). The sex distribution differed by population group with the African population having 5.2 male suicides for every female, while the ratio was lower for the Asian, white and coloured population (3.9, 3.6 and 3.2 male suicides for every female respectively). Male suicides peaked in December (10.2 percent) and October (9.7 percent), with no discernible seasonality observed among females. More than one-quarter of suicides were recorded in Gauteng, followed by KwaZulu-Natal (20.9 percent) and the Eastern Cape (13.3 percent). Of the suicides in metro areas, Gauteng had the highest proportion (43.3 percent), followed by KwaZulu-Natal (25.4 percent). A provincial comparison of the suicides in non-metro areas indicated that KwaZulu-Natal had the highest proportion (18 percent), followed by the Eastern Cape (14.9 percent) and North West (14.8 percent). Hanging was the leading circumstance of suicide for both males (68.8 percent) and females (42.3 percent). For females, this was followed closely by poison ingestion (40.2 percent), while for males it was firearms (12.9 percent) and poison ingestion (12 percent).

Transport: Pedestrians (32.8 percent) were the leading category of road traffic deaths. However for females, passenger deaths were the leading category, accounting for 42.6 percent. For road traffic injuries, more than one-third of deaths were recorded among those aged between 20 and 34 years. The majority of deaths were African, followed by whites. The male to female ratio was highest among Asians at 4.2:1 for road traffic deaths, compared to 3.1, 3.2 and 2.9 among Africans, coloureds and whites respectively. Deaths peaked in December for males and females. There were distinct weekend peaks for both road traffic and other transport deaths. Most deaths in metropolitan areas occurred in Gauteng (43.3 percent) followed by KwaZulu-Natal (25.3 percent) and the Western Cape (14 percent). Deaths in non-metro areas were more evenly distributed across the provinces, and only in Gauteng were there substantially more transport and road traffic deaths in metro versus non-metro areas. Railway deaths were concentrated in the metro areas of Gauteng, KwaZulu-Natal and the Western Cape.

Other unintentional injuries: Of the 7 153 other unintentional deaths, 72 percent were male and the overall peak was among the 1-4 year age group (11.3 percent), which also coincided with a peak in female mortality in this age group (16.9 percent). The majority of other unintentional deaths were Africans, followed by coloureds. The Asian population had 3.8 male deaths for every female. This ratio was lower for the African, coloured and white population (2.8, 2.2 and 1.8 male deaths for every female). The provincial breakdown indicates that 22.5 percent of deaths were from Gauteng, followed by KwaZulu-Natal (19.1 percent) and the Western Cape (16.6 percent) The Eastern Cape (17.8 percent) and KwaZulu-Natal (16.5 percent) had the highest proportion of other unintentional deaths in

non-metro areas. Fires and drowning were the leading circumstances of other unintentional deaths. A higher proportion of males than females drowned (26.7 percent), and females had a higher proportion of fire-related deaths (36.8 percent). There were slightly more male deaths than female deaths due to falls (10.4 percent) and more female deaths due to surgical or medical complications (11 percent).

Injury mortality rates

The national age-standardised mortality rate for all injuries was 109.8 per 100 000 population and the rate for males was 4.3 times higher than for females. The age-specific all injury mortality rate peaked in the 30-44 year age group at 162.5 per 100 000 and the rate for children under 5 years of age (45.6 per 100 000) was double the rate in the 5-14 year age group (22.7 per 100 000). The injury mortality rate was higher in the metro areas, largely due to the higher all injury mortality rates among males aged between 15 and 29 years, and the higher rates in older ages.

Compared to the first National Burden of Disease Study for 2000, the homicide rates for both males and females appear to have decreased substantially since 2000. For both road traffic injuries and suicide, the mortality rates amongst females appear to have decreased, whereas amongst males they have remained remarkably similar. Compared to the 2008 global rates, the homicide rate for South African males was approximately five times higher, while the female homicide rate was four times higher than the global rate. Road traffic injury rates were double the global average. In terms of suicide, the male rate was 1.6 times higher and the female rate was 0.6 times lower than the global average. For both road traffic injuries and suicide, the age patterns differed from the global pattern, which peaked in the elderly. In South Africa, male rates peaked in the 30-44 year age group, while female road traffic injuries peaked in the 60-69 year age group, and suicide peaked in the 15–29 year age group.

Conclusion

The study has provided a reliable, nationally representative estimate of injury mortality rates by specific cause (as well as provincial level estimates). The results indicate that homicide and road traffic injuries continue to contribute substantially to the burden of disease in South Africa, although there are clear indications that homicide has declined since 2000. Next steps will involve integrating the estimates arising from this study with the overall cause of death profile from other sources to produce revised injury mortality estimates as part of the second National Burden of Disease Study for 2009. This will be instructive in identifying key areas where policy changes have had an effect in terms of reducing injury related causes, as well as identifying emerging priorities for prevention at both national and provincial levels.

Key words: injury mortality, non-natural death, homicide, suicide, road traffic injury, mortuary

1 BACKGROUND

Updated knowledge and ongoing understanding of the country's injury burden are fundamental to identifying relevant prevention interventions, monitoring the progress of current interventions and making decisions for resource allocation. The initial National Burden of Disease (NBD) study for South Africa revealed that homicide was the second leading cause of premature mortality after HIV/AIDS in 2000, and that road traffic injuries ranked fourth (2). The mortality rates from unnatural deaths in South Africa were found to be considerably higher than those in other countries, and in 2000, were estimated at approximately double the global average. This was mainly due to the high rates of homicide and road traffic injuries, which were estimated at approximately eight times and twice the global average, respectively (3).

Subsequent to the release of the first NBD study, the use of burden of disease estimates to drive prevention and policy changes has been widely demonstrated, most notably in the Western Cape, which instituted a provincial Burden of Disease Reduction Project (4). In response to the province's unusually high injury burden, the provincial government also consolidated its approach to injury prevention, culminating most recently in a dedicated injury prevention working group under its provincial strategic objective for health and wellness, and changed provincial legislation regulating access to alcohol. Improved data collection was an integral part of the overarching project, which institutionalised, across the province, an all-cause mortality surveillance system (5) and an ongoing injury mortality surveillance system including all the medico-legal mortuaries (6). This has been complemented by pilot studies for non-fatal injury surveillance (7,8). Injury mortality surveillance efforts are also underway in Gauteng and Mpumalanga (9).

There are indications that mortality from non-natural deaths in South Africa has decreased since the end of apartheid (Stats SA, 2005; Stats SA, 2009). Altbeker's 2008 analysis of police murder statistics suggests that this may have been due to the steady decrease in homicide rates from 67 per 100 000 to just less than 43 per 100 000 over the 15-year period from 1994/5 to 2003/4 (13). Certainly, the decrease in overall non-natural mortality reported in vital registration (Stats SA, 2005; Stats SA 2009; Bah, 2004) and the estimated increase in road traffic mortality rates over a similar time period (14) support the hypothesis that the decrease in the homicide rate has caused the overall decrease in injury mortality. Stricter firearm control legislation introduced in 2002 is one possible explanation for the decrease in homicide, as firearm deaths have decreased markedly compared to homicides from other causes (15). There has also been a suggestion that the decline in homicide reflected in police data is an artefact of the differential recording of crime data over time (13), but there are scant details about the underlying cause or circumstance of death in official statistics.

Regarding road traffic injuries, the most recent mortality trend reported in the *Global Status Report on Road Safety* indicates a sharp rise from 2000 to 2007. However, this trend line is based on modelled estimates that make adjustments for under-reporting in officially

recorded data (Gerrie Botha, Road Traffic Management Corporation, personal communication Dec 2010). Recently, official data have recorded 50 percent of non-natural deaths as ill-defined (Stats SA, 2009).

In the face of imperfect injury mortality data, there is a need to ascertain the extent or nature of change in the fatal injury profile since 2000 to inform the second National Burden of Disease (NBD) study that is underway. The first NBD study used the injury mortality profile provided by the National Injury Mortality Surveillance System (NIMSS), which is a sentinel mortuary-based study that captures information on the causes of fatal injuries mainly in urban areas (16). The NIMSS study's urban bias, lack of representivity in certain provinces and fluctuating coverage suggest that a more representative random sample of injury deaths would reflect the fatal injury profile more accurately. Furthermore, the NIMSS data for 2008 and 2009 were not available to the NBD study due to unresolved issues that were still being negotiated between the Provincial Departments of Health and the UNISA-MRC Safety and Peace Promotion Research Unit regarding use of the data (Ashley van Niekerk and Kopana Ratele, UNISA-MRC Safety and Peace Promotion Research Unit, personal communication, 15 February 2011).

The current national study was therefore undertaken to obtain information from a representative sample of injury-relatedⁱ deaths in order to describe the incidence of fatal injury for the year 2009, and to provide the cause of death profile for the second NBD study.

2 AIMS AND OBJECTIVES

The aim of this study was to establish the cause-specific incidence of fatal injury for the year 2009.

The specific objectives were to:

- describe the incidence of fatal injury rates in South Africa for 2009 by age, sex and cause
- describe the metro and non-metro profiles of fatal injuries
- compare the provincial profiles of fatal injuries.

ⁱ Injury-related and Non-natural deaths are used interchangeably.

3 METHODS

3.1 Study design

This was a retrospective, descriptive study conducted in a nationally representative sample of mortuaries in eight provinces, which was combined with prospective data from the Western Cape's Provincial Injury Mortality Surveillance System (PIMSS), which maintains full coverage of medico-legal mortuaries in the province utilising a coding system that was compatible with the current survey. All folders and registers for patients who died an unnatural death during 2009 were reviewed.

3.2 Study population

The study population was all persons who died unnaturally during the year 2009 and had a legally required post-mortem at a medico-legal mortuary. These mortuaries are maintained by the Forensic Pathology Services within each provincial health department. Foetuses and deaths from natural causes were excluded once basic demographic information was captured. The sampling frame was the list of all medico-legal mortuaries operating in South Africa for the year 2009.

3.3 Sampling

The multistage stratified cluster sample was drawn for the eight provinces using mortuaries as the primary sampling unit (cluster). A sampling frame of 106 mortuaries (57 274 folders) across eight provinces that were operating in South Africa in 2009 was used to draw a representative sample of mortuaries. These were stratified by metro and non-metro area and mortuary size. The metro stratification was based on mortuaries being located within one of seven metropolitan areas, namely, Cape Town, Ethekwini (Durban), Ekurhuleni (East Rand), Johannesburg, Tshwane (Pretoria), Nelson Mandela (Port Elizabeth) and Bloemfontein (Free State). Limpopo, Mpumalanga, North West and Northern Cape provinces did not have any designated metropolitan areas. Mortuary size categorisation was established by the Gender and Health Research Unit for the sampling frame of the mortuary study on *Female and Child Homicide*(17,18), namely, small (up to 500 bodies), medium (501–1 500 bodies) and large (>1 500 bodies). The sample size justification is presented in Appendix I. Table 1 reports the total number of mortuaries and post mortem folders for South Africa for 2009 and those selected for the survey in parenthesis.

Table 1: Description of sampling frame, and selected mortuaries and post mortem folders by strata, province and mortuary size

Sampling frame											
Stratum	Province	Mortuaries					Post mortem folders				
		Total	Metro		Non metro		Total	Metro		Non metro	
			Large	Medium	Medium	Small		*Large	Medium	*Medium	Small
Strata 1	Eastern Cape	14 (6)		5 (2)	6 (2)	3 (2)	9470 (4028)		3817 (1307)	4986 (2299)	667 (422)
Strata 2	Free State	6 (5)		1 (1)	2 (2)	3 (2)	4095 (3616)		1433 (1433)	1459 (1459)	1203 (724)
Strata 3	Gauteng	10 (8)	4 (2)	2 (2)	2 (2)	2 (2)	15802 (10958)	10056 (5212)	2635 (2635)	2508 (2508)	603 (603)
	KwaZulu Natal	39 (11)	2 (2)	1 (1)	5 (2)	31 (6)	13682 (8307)	4017 (4017)	1109 (1109)	3696 (1843)	4860 (1338)
Strata 4	Limpopo	11 (4)			3 (2)	8 (2)	4395 (2172)			2195 (1623)	2200 (549)
	Mpumalanga	12 (4)			2 (2)	10 (2)	4122 (1845)			1281 (1281)	2841 (564)
	North West	8 (4)			3 (2)	5 (2)	3978 (2117)			2256 (1606)	1722 (511)
	Northern Cape	6 (3)			1 (1)	5 (2)	1730 (943)			658 (658)	1072 (285)
Total		106 (45)	6 (4)	9 (6)	24 (15)	67 (20)	57274 (33986)	14073 (9229)	8994 (6484)	19039 (13277)	15168 (4996)

*Second level of sampling with every second folder selected.

A second level of sampling was applied within mortuaries sampled. For small mortuaries and medium metro mortuaries all records for 2009 were included, but in the large and medium rural mortuaries we selected every second folder. This resulted in forty-five mortuaries being selected for inclusion for an expected sample of 22 733 records. Data for the Western Cape Province were sourced from the Provincial Injury Mortality Surveillance System(19) to provide a complete national sample.

3.4 Data collection

At each sampled mortuary, all cases were identified from the mortuary register or from the computer administration system where available. Data were collected for all cases that presented at the mortuary from 00:00 on 1 January 2009 to 23:59 on 31 December 2009 using a mobile phone data capture system.

A paper-based questionnaire was designed to capture the required data that were collected as part of the routine post-mortem investigation procedure (Appendix II). The questionnaire included demographic information, date of death, mannerⁱⁱ and circumstances of the injury death to match NBD injury categories, whether death was related to a legal intervention, whether death occurred in custody and whether there was any evidence of sexual assault. The mortuary death register number and the death notification number (BI-1663) were collected as identifiers for case follow-up and checking in the event of data capture errors. The primary source of the data was the post-mortem reports, and ancillary documentation

ⁱⁱ For manner of death, ICD-10 was used with an additional category of Transport, separated from the Other unintentional deaths.

including police reports and hospital records that appear in case folders. In KwaZulu-Natal, data were collected from the register only and detailed information was obtained from forensic pathologists in the province.

The Mobenzi team converted the questionnaire into a mobile phone application incorporating the screening logic, skips and control flow capabilities offered by Mobenzi Researcher for entry-level handsets ("Mobenzi Researcher", 2011). These were procured, set up and delivered to the MRC, along with SIM cards that had been registered for RICA on behalf of the MRC. Mobenzi provided airtime monitoring and recharge services, which included both scheduled recharges as well as ad hoc recharge requests. The data were entered on site via the custom-designed software and were submitted to the central data platform. This enabled ongoing monitoring of data-collection activities, quality control and data cleaning by the national coordinator and project manager.

Inter-observer reliability was tested by two fieldworkers independently collecting data from the same folder, on the same day, for 5 percent of the sample. This was done by reserving every 20th folder for independent capture by another fieldworker.

Blood alcohol data were collected from the post-mortem folders where available, but are currently being solicited by the project manager from the State chemical laboratories in Pretoria, Johannesburg and Cape Town, in order to capture any missing information.

3.5 Recruitment of fieldworkers

Fieldworkers with the required competencies were recruited from each of the eight provinces to collect the required information on non-natural deaths.

A competency test was developed to ensure that the fieldworkers had the necessary skills to logically extract data from the mortuary records. The recruitment process and training logistics were coordinated by the national coordinator and the administration officer, both of whom were appointed for the duration of this study, with assistance and guidance from the project team.

3.6 Piloting

The electronic data collection tool (mobile phone), data management and quality control software were piloted following the recruitment of the national coordinator. This piloting formed part of an intensive orientation and training programme for the coordinator, which also included the review and finessing of training materials prior to their use for fieldworker training. Piloting was conducted at the Salt River, Tygerberg and Hermanus mortuaries in the Western Cape.

3.7 Fieldwork training

Training was conducted in two phases, the first phase occurred in Durban from 17-19 October 2011, and the second phase occurred in Pretoria from 9-11 November 2011. Fieldworkers were either bussed or reimbursed for their own transport from their various

areas of residence and accommodation, and meals were provided. Fieldworkers were trained on the purpose and importance of the study, sampling strategy, research ethics, post-mortem investigation procedures, structure of post-mortem folders, the data capture instrument, data capture using mobile telephones, their roles and responsibilities in the field, the project organisational structure, the logistics of the project, the reporting structure within the project team, the MRC's values, the MRC's procedures for grievance/injury on duty/accidents, and reasons for disciplinary action or termination of their contracts. A practical exercise was incorporated into the training whereby the field worker was required to capture data from post-mortem report scenario's created by injury mortality experts/forensic pathologists. Each fieldworker had to successfully complete a competency assessment before they were contracted as a fieldworker for the survey. The fieldworkers' training also included orientation by a social worker who prepared them for the possibility of vicarious trauma from reviewing traumatic information in the post-mortem folders, and who alerted them to various counselling opportunities, which are described in more detail in section 3 (Ethical considerations). An operational manual was provided to each fieldworker during the training. The manual provided information on all topics discussed during the training, and included contact details for the project team and counselling support services.

3.8 Fieldwork

The fieldwork was completed in two phases. In the first phase, a fieldwork team convened for training in Durban in October 2011 in preparation for data collection at mortuaries in the Eastern Cape, Free State, KwaZulu-Natal and Northern Cape. Then, a second team convened for training in Pretoria a month later in preparation for data collection at mortuaries in Gauteng, Limpopo, Mpumalanga and the North West Province. Fieldwork was completed by mid-December 2011, a total duration of approximately two months.

3.9 Data management and quality control

Data checks were incorporated in the data-capture application, for example, consistency between manner of death and cause of death, and accuracy of capturing the death registration number. Data captured by individual fieldworkers were uploaded to a central web-based data set. The project manager and biostatistician conducted field quality tabulations while the data were collected, and liaised with the national level coordinator to resolve any data quality problems that occurred during fieldwork. The data capture application also registered the time that the record was captured and the number of folders captured in that day per fieldworker. This type of information assisted with monitoring fieldwork by the national level coordinator.

3.10 Analysis weights

Analysis weights were applied to account for the selection probabilities of mortuaries within survey strata and the sample realisation. Weight calculations were based on the number of mortuaries in each metro/non-metro area categorised by strata size. The 12 strata used to determine the selected sample were also used to calculate the sample weights (Table 1). Weight calculations were performed in Microsoft Excel 2007 using the formula:

Weight = realisation weight (RW) × sampling fraction (SF) × 1/adj. primary sampling unit weight(PSUW)

where:

RW = expected sample/realised sample for each mortuary

SF= 2 for mortuaries that had half their post-mortem folders surveyed

SF= 1 for mortuaries that had all their post-mortem folders surveyed

PSUW = Total no. of folders in mortuaries selected for stratum
Total no. of folders in stratum

3.11 Data analysis

After cleaning the data on the Mobenzi Researcher platform, it was exported as an excel spreadsheet and then analysed using SAS version 9 and Stata 10. The proportion of potential agreement beyond chance between two data collectors, extracting data from the same folder on the same day, was determined using the Kappa score (21).

By using standard methods for analysing survey data, national estimates for the proportion of deaths for overall homicide, road traffic deaths and other injury categories were computed. The analysed data took into account the survey design and the sampling weights of mortuaries.

Mortality rates were calculated for sex and age using 2009 mid-year population estimates for South Africa from ASSA2008(22). In order to obtain the metro/non-metro populations, use was made of the 2007 Community Survey(23) breakdown. Mid-year population estimates were generated for 2007 and 2009 using ASSA2008, and the growth rate was estimated to determine the expected population size for mid-February 2007. Municipalities in the 2007 Community Survey were categorised as metro or non-metro areas for each province. A scaling factor, to adjust for the differences in the ASSA2008 estimates and the Community Survey estimates, was calculated using the ASSA2008 estimates for mid-February 2007 and the Community Survey estimates for mid-February 2007. The scaling factor was used to adjust the Community Survey 2007 metro and non-metro populations. The growth rate calculated earlier was applied to the adjusted Community Survey 2007 metro and non-metro populations to produce mid-year population estimates for 2009. These mid-year population estimates were used to calculate rates. Age-standardised rates were calculated from age-specific mortality rates using the WHO world standard (1).

4 ETHICAL CONSIDERATIONS AND PERMISSIONS

Ethical approval for the study was obtained from the Medical Research Council's Health Research Ethics Committee. As study subjects are deceased and records were reviewed posthumously at mortuaries, informed consent was not necessary. However, the confidentiality of the deceased was ensured at all times and the name of the deceased was not captured. The importance of confidentiality was explained to the fieldworkers during training and a signed undertaking was made by each fieldworker. In addition, fieldworkers were alerted that sanctions would be taken if confidentiality was breached. Other measures were undertaken to ensure confidentiality. These measures were the nature of the mobile phone data capture process, which did not allow the fieldworker to access the information captured after it was entered on the phone; the data were encrypted during transmission; and the data were stored behind the MRC firewall on a password-protected database.

Permission to undertake the study was sought from each Provincial Department of Health. Access to the mortuaries in each province was granted by the respective Provincial Health Research Committees, and forensic pathologists representing the different provinces were also notified of the study. The person in charge of each mortuary was approached to arrange the logistics of accessing the death registers and post-mortem reports at the sampled mortuaries.

The fieldworkers were alerted to the possibilities of vicarious trauma. A qualified social worker prepared fieldworkers during training for how to deal with the gruesome nature of some of the information they would be exposed to. The national coordinator arranged for a weekly debriefing session for each fieldwork team. A helpline was available to fieldworkers during the course of the fieldwork if they required immediate debriefing and group debriefing was conducted at the end of fieldwork.

5 RESULTS

5.1 Overview of sample realisation

5.1.1 Realised sample

During the fieldwork, slight discrepancies in the numbers of folders expected in each mortuary were found for 2009 in the 45 facilities that were visited. Overall, there were five more cases than had been expected ($N = 22\,733$). A total of 22 583 cases were drawn. This was 0.7 percent less than the 22 733 cases that might have been realised. Reasons for the discrepancies included:

- 75 death registration (DR) numbers could not be found
- 55 deaths occurred in 2008 but were given a 2009 DR number
- one death occurred in 2005
- 16 cases were torn from the registers at two mortuaries
- one DR number was blank and two were animal remains.

The number of cases drawn, compared to the anticipated sample from each mortuary, is shown in Table 2.

Of the 22 583 cases sampled, there were 20 missing folders and 11 cases where the body was only stored at the mortuary. For these cases, which accounted for 0.1 percent of the sample, cause of death (i.e. whether due to natural or non-natural causes) was obtained from the register, although detail on the circumstance was not always available.

Table 2: Realised sample versus anticipated sample by mortuary

Province	Mortuary	Sample		
		Expected	Actual	Difference (%)
Eastern Cape	Butterworth	347	341	-1.7
Eastern Cape	Mthatha	803	802	-0.1
Eastern Cape	Port St Johns	55	55	0.0
Eastern Cape	Mount Road	606	607	0.2
Eastern Cape	Gelvandale	701	730	4.1
Eastern Cape	Aliwal North	367	362	-1.4
Free State	Bethlehem	397	366	-7.8
Free State	Kroonstad	327	325	-0.6
Free State	Welkom	470	469	-0.2
Free State	Bloemfontein	1 433	1 449	1.1

Free State	Sasolburg	260	260	0.0
Gauteng	Sebokeng	661	658	-0.5
Gauteng	Diepkloof	907	875	-3.5
Gauteng	Roodepoort	1 465	1 420	-3.1
Gauteng	Germiston	1 700	1 340	-21.2
Gauteng	Springs	1 170	1 164	-0.5
Gauteng	Heidelberg	278	298	7.2
Gauteng	Bronkhorstspuit	325	315	-3.1
Gauteng	Garankuwa	593	586	-1.2
North west	Phokeng	486	484	-0.4
North west	Koster	95	95	0.0
North west	Mafikeng	416	416	0.0
North west	Klerksdorp	318	317	-0.3
Kwazulu-Natal	Phoenix	820	811	-1.1
Kwazulu-Natal	Gale Street, Durb	1 189	1 179	-0.8
Kwazulu-Natal	Pinetown	1 109	1 202	8.4
Kwazulu-Natal	Stanger	406	657	61.8
Kwazulu-Natal	Port Shepstone	290	290	0.0
Kwazulu-Natal	Harding	210	210	0.0
Kwazulu-Natal	Pietermaritzburg	632	629	-0.5
Kwazulu-Natal	Howick	177	177	0.0
Kwazulu-Natal	Vryheid	235	234	-0.4
Kwazulu-Natal	Nongoma	157	157	0.0
Kwazulu-Natal	Ulundi	148	145	-2.0
Limpopo	Polokwane	502	500	-0.4
Limpopo	Kgapane, Tzaneen	64	64	0.0
Limpopo	Mokopane	485	485	0.0
Limpopo	St Ritas	310	307	-1.0
Mpumalanga	Witbank	262	262	0.0
Mpumalanga	Middelburg	476	476	0.0
Mpumalanga	Lydenburg	88	92	4.5
Mpumalanga	Nelspruit	379	360	-5.0
Northen Cape	Kimberley	329	329	0.0
Northen Cape	Calvinia	65	65	0.0
Northen Cape	De Aar	220	218	-0.9
8 provinces		22 733	22 583	-0.7

5.1.2 Provincial and metro/non-metro distribution of realised sample

The extent to which the findings from this survey can be extrapolated to the total deaths for 2009 for South Africa depends on how representative its sample is. Table 3 compares the structure of the survey sample by metro/non-metro and province to the deaths reported in mortuaries for 2009. The results suggest that the sample is representative of the population from which it was drawn.

Table 3: Characteristics of the weighted sample* compared with total deaths reported in mortuaries for 2009

Characteristics	Weighted sample		Total deaths for 2009	
	<i>n</i>	%	<i>n</i>	%
<i>Metro/Non-metro</i>				
Metro	23 067	40.3	23 067	40.3
Non-metro	34 207	59.7	34 207	59.7
<i>Total</i>	57 274	100.0	57 274	100.0
<i>Province</i>				
Eastern Cape	9 470	16.5	9 470	16.5
Free State	4 095	7.1	4 095	7.1
Gauteng	15 860	27.7	15 802	27.6
Kwazulu-Natal	13 624	23.8	13 682	23.9
Limpopo	4 260	7.4	4 395	7.7
Mpumalanga	3 899	6.8	4 122	7.2
North West	4 083	7.1	3 978	6.9
Northern Cape	1 983	3.5	1 730	3.0
<i>Total</i>	57 274	100.0	57 274	100.0

* Numbers and percentages may not always sum accurately due to rounding

5.2 Reliability of information

Reliability was tested by two fieldworkers independently collecting data from the same folder, on the same day, for 5 percent of the sample. Agreement between the initial and

repeat data capturers is shown for the key information in Appendix III. Agreement between the initial and repeat record was assessed on a combination of “Cause of death” and “Apparent manner of death” variables in Table 34A. Six records had missing or wrong information on one of the entries. However, there was complete agreement for 88.0 percent of the cases and the Kappa statistic was 0.860 (95 percent CI: 0.834-0.886), indicating excellent agreement.ⁱⁱⁱ

Almost 90 percent of the cases had a date of birth and date of death from which the age of the deceased could be calculated, and many of the cases with unknown age were fetuses. There was excellent agreement (97.5 percent) in terms of finding age details in the records (Table 35A). Out of the 1 037 repeats, there were two cases that the initial capturer considered to have an estimated age, while the repeat capturer considered them to have a date of birth, and another two that the repeat capturer considered to be unknown. The Kappa statistic was 0.954 (95 percent CI: 0.933-0.975). The agreement on sex was also high (97.1 percent) as can be seen from Table 37A. The Kappa statistic was 0.920 (95 percent CI: 0.889-0.959).

5.3 Main findings

Of the 22 583 cases for which cause of death information was available, 18 241 (80.7 percent) were due to non-natural causes, 3 281 (14.5 percent) were due to natural causes, 441 (2.0 percent) were fetuses and for 620 (2.8 percent) it was unclear whether the cause of death was natural or non-natural. A further 9 418 deaths were available from the Western Cape PIMSS database, of which 5 956 (63.2 percent) were due to non-natural causes, 3 186 (33.8 percent) were due to natural causes, 63 (0.7 percent) were fetuses and for 213 (2.3 percent) it could not be determined whether the death was natural or non-natural.

Figure 1 and Figure 2 show the cause of death breakdown of the unweighted and weighted number of deaths respectively^{iv}. Of the total 32 001 unweighted deaths, 75.6 percent were non-natural. Approximately one-fifth were natural and for 2.6 percent, it was undetermined whether the death was natural or non-natural. Fetuses accounted for 1.6 percent of all the cases. When weighted, the total number of deaths was 66 693, of which 78.7 percent were non-natural.

ⁱⁱⁱ It should be noted that a Kappa score with a value of 0.6 denotes substantial agreement and a value of greater than 0.8 denotes near perfect agreement.

^{iv} The unweighted numbers indicate the number of cases observed from the survey sample, while the weighted numbers indicate the estimated total numbers representative of the country. It is the weighted data that provide results that should be interpreted for policy formulation.

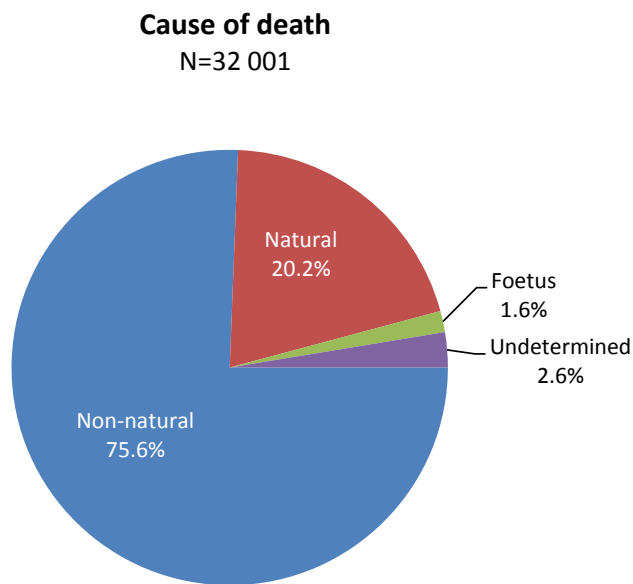


Figure 1: Cause of death (unweighted analysis), South Africa 2009 (*N* = 32 001)

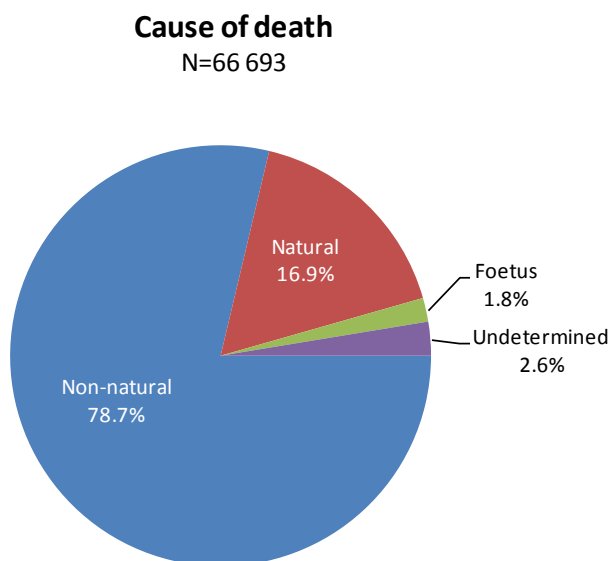


Figure 2: Cause of death (weighted analysis), South Africa 2009 (*N* = 66 693)

The rest of the analysis in this report will focus on the 24 197 non-natural deaths, comprising the 18 241 non-natural deaths that were recorded during the fieldwork and the 5 956 non-

natural deaths drawn from the Western Cape's PIMSS database.^v This reflected a total of 52 493 non-natural deaths when the sampling weights were applied.

5.3.1 Demographic characteristics

Among the key explanatory variables collected during the survey, were the province of the injury death, key demographic descriptors (age, sex and population group), and temporal data. The tables that follow describe the national sample of the non-natural deaths, both weighted and unweighted.

Table 4 and Figure 3 indicate the number of non-natural deaths by metro and non-metro area for each of the nine provinces. Overall, the highest proportion of non-natural deaths were recorded for Gauteng (24.7 percent) followed by KwaZulu-Natal (20.8 percent), while the Northern Cape had the fewest non-natural deaths (2.9 percent) in 2009. The provinces of Limpopo, Mpumalanga, North West and Northern Cape only had non-metro representation of non-natural deaths. The Eastern Cape was the only province that had a higher proportion in non-metro areas, while the Free State had similar proportions of metro and non-metro non-natural deaths.

Table 4: Non-natural deaths by metro/non-metro and province, South Africa 2009

Province	Metro/Non-metro (unweighted)					
	Metro		Non-metro		Total	
	n	%	n	%	n	%
Eastern Cape	858	(7.1)	1 377	(11.3)	2 235	(9.2)
Free State	1 188	(9.9)	1 059	(8.7)	2 247	(9.3)
Gauteng	3 981	(33.1)	1 474	(12.1)	5 455	(22.5)
KwaZulu-Natal	2 467	(20.5)	2 079	(17.1)	4 546	(18.8)
Limpopo	0	(0.0)	1 173	(9.7)	1 173	(4.9)
Mpumalanga	0	(0.0)	1 019	(8.4)	1 019	(4.2)
North West	0	(0.0)	1 093	(9.0)	1 093	(4.5)
Northern Cape	0	(0.0)	473	(3.9)	473	(2.0)
Western Cape	3 543	(29.4)	2 413	(19.8)	5 956	(24.6)
Total	12 037	(100.0)	12 160	(100.0)	24 197	(100.0)

^v The Western Cape's PIMSS database is drawn from a mortuary-based surveillance system that is fully institutionalised within the province's Forensic Pathology Service. The PIMSS provides routine injury mortality data that is compatible with the IMS coding for all mortuaries in the Western Cape.

Province	Metro/Non-Metro (weighted)					
	Metro		Non-metro		Total	
	n	%	n	%	n	%
Eastern Cape	2 449	(11.4)	5 078	(16.4)	7 527	(14.3)
Free State	1 175	(5.4)	1 980	(6.4)	3 155	(6.0)
Gauteng	8 774	(40.7)	4 190	(13.5)	12 964	(24.7)
KwaZulu-Natal	5 628	(26.1)	5 289	(17.1)	10 917	(20.8)
Limpopo	0	(0.0)	3 679	(11.9)	3 679	(7.0)
Mpumalanga	0	(0.0)	3 345	(10.8)	3 345	(6.4)
North West	0	(0.0)	3 421	(11.1)	3 421	(6.5)
Northern Cape	0	(0.0)	1 529	(4.9)	1 529	(2.9)
Western Cape	3 543	(16.4)	2 413	(7.8)	5 956	(11.3)
Total	21 568	(100.0)	30 925	(100.0)	52 493	(100.0)

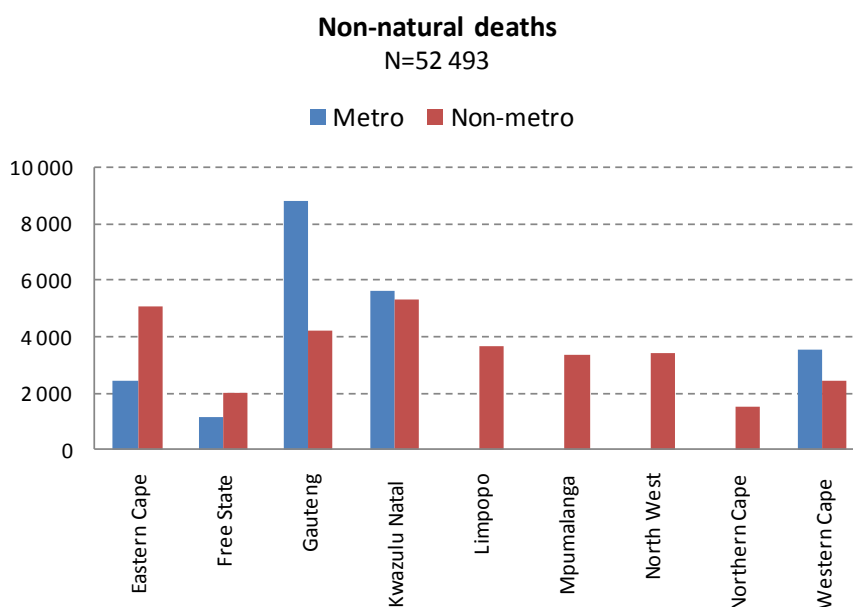


Figure 3: Distribution of non-natural deaths by metro/non-metro and province (weighted analysis), South Africa 2009 (N = 52 493)

The age profile for non-natural deaths indicates an increase from the age of 15 years, with a peak between the ages of 20 and 34 years, which accounted for 41.0 percent of deaths after which it declined among the older ages (Table 5). The age-sex profile differed: females that were under 15 years of age had a higher proportion of non-natural deaths, both sexes had similar levels for the 15–19 year age group and more male non-natural deaths were found between 20–34 years. There were approximately four male non-natural deaths for every female death.

Table 5: Age distribution of non-natural deaths by sex, South Africa 2009

Age	Sex (unweighted)								Sex (weighted)							
	Male		Female		Unknown		Total		Male		Female		Unknown		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
<1	170	(0.9)	127	(2.6)	7	(8.4)	304	(1.3)	336	(0.8)	266	(2.5)	10	(6.9)	612	(1.2)
1–4	420	(2.2)	296	(6.1)	2	(2.4)	718	(3.0)	943	(2.3)	687	(6.5)	5	(3.5)	1 635	(3.1)
5–9	315	(1.6)	181	(3.8)	4	(4.8)	500	(2.1)	778	(1.9)	407	(3.9)	8	(5.6)	1 192	(2.3)
10–14	310	(1.6)	154	(3.2)	0	(0.0)	464	(1.9)	720	(1.7)	372	(3.5)	0	(0.0)	1 092	(2.1)
15–19	1 361	(7.1)	385	(8.0)	5	(6.0)	1 751	(7.2)	3 041	(7.3)	877	(8.3)	7	(4.8)	3 924	(7.5)
20–24	2 994	(15.5)	530	(11.0)	1	(1.2)	3 525	(14.6)	6 393	(15.3)	1 189	(11.3)	3	(2.1)	7 585	(14.4)
25–29	2 993	(15.5)	519	(10.7)	1	(1.2)	3 513	(14.5)	6 432	(15.4)	1 110	(10.5)	1	(0.7)	7 543	(14.4)
30–34	2 537	(13.2)	445	(9.2)	3	(3.6)	2 985	(12.3)	5 541	(13.3)	930	(8.8)	5	(3.3)	6 476	(12.3)
35–39	1 920	(10.0)	426	(8.8)	4	(4.8)	2 350	(9.7)	4 070	(9.7)	888	(8.4)	8	(5.4)	4 966	(9.5)
40–44	1 535	(8.0)	348	(7.2)	5	(6.0)	1 888	(7.8)	3 293	(7.9)	763	(7.2)	5	(3.4)	4 061	(7.7)
45–49	1 183	(6.1)	320	(6.6)	1	(1.2)	1 504	(6.2)	2 534	(6.1)	657	(6.2)	1	(0.7)	3 192	(6.1)
50–54	947	(4.9)	239	(5.0)	1	(1.2)	1 187	(4.9)	2 015	(4.8)	531	(5.0)	1	(0.7)	2 547	(4.9)
55–59	689	(3.6)	167	(3.5)	2	(2.4)	858	(3.6)	1 477	(3.5)	367	(3.5)	5	(3.3)	1 849	(3.5)
60–64	439	(2.3)	155	(3.2)	0	(0.0)	594	(2.5)	946	(2.3)	331	(3.1)	0	(0.0)	1 277	(2.4)
65–69	332	(1.7)	125	(2.6)	0	(0.0)	457	(1.9)	706	(1.7)	289	(2.7)	0	(0.0)	995	(1.9)
70–74	185	(1.0)	107	(2.2)	0	(0.0)	292	(1.2)	394	(0.9)	239	(2.3)	0	(0.0)	633	(1.2)
75–79	97	(0.5)	92	(1.9)	0	(0.0)	189	(0.8)	194	(0.5)	206	(2.0)	0	(0.0)	400	(0.8)
80–84	67	(0.4)	50	(1.0)	0	(0.0)	117	(0.5)	139	(0.3)	81	(0.8)	0	(0.0)	220	(0.4)
85+	49	(0.3)	46	(1.0)	0	(0.0)	95	(0.4)	105	(0.3)	85	(0.8)	0	(0.0)	190	(0.4)
Unknown	740	(3.8)	119	(2.5)	47	(56.6)	906	(3.7)	1 749	(4.2)	269	(2.6)	86	(59.4)	2 104	(4.0)
Total	19 283	(100.0)	4 831	(100.0)	83	(100.0)	24 197	(100)	41 807	(100.0)	10 541	(100.0)	145	(100.0)	52 493	(100.0)

Table 6 indicates that 80.5 percent of non-natural deaths were recorded among the African population, with 4.2 male non-natural deaths for every female. Coloureds and whites had similar levels of non-natural deaths, with a M:F ratio of 3.3 and 3 respectively. Asians had the largest sex difference, with 4.6 males for every female non-natural death.

Table 6: Population group distribution of non-natural deaths by sex, South Africa 2009

Population Group	Sex (unweighted)							
	Male		Female		Unknown		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
African	14 737	(76.4)	3 379	(69.9)	22	(26.5)	18 138	(75.0)
Coloured	2 479	(12.9)	789	(16.3)	6	(7.2)	3 274	(13.5)
Asian	432	(2.2)	96	(2.0)	0	(0.0)	528	(2.2)
White	1 556	(8.1)	548	(11.3)	0	(0.0)	2 104	(8.7)
Unknown	79	(0.4)	19	(0.4)	55	(66.3)	153	(0.6)
Total	19 283	(100.0)	4 831	(100.0)	83	(100.0)	24 197	(100.0)
Population Group	Sex (weighted)							
	Male		Female		Unknown		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
African	34 018	(81.4)	8 185	(77.7)	55	(38.1)	42 259	(80.5)
Coloured	3 577	(8.6)	1 077	(10.2)	6	(4.1)	4 660	(8.9)
Asian	993	(2.4)	218	(2.1)	0	(0.0)	1 211	(2.3)
White	3 077	(7.4)	1 035	(9.8)	0	(0.0)	4 112	(7.8)
Unknown	141	(0.3)	26	(0.3)	84	(57.8)	252	(0.5)
Total	41 807	(100.0)	10 541	(100.0)	145	(100.0)	52 493	(100.0)

5.3.2 Apparent manner and circumstance of death

Homicide (36.2 percent), followed by transport (33.8 percent), were the leading apparent manners of death. The proportion of other unintentional deaths were marginally higher than suicide (Figure 4). For 4.0 percent of cases, the apparent manner of death could not be determined.

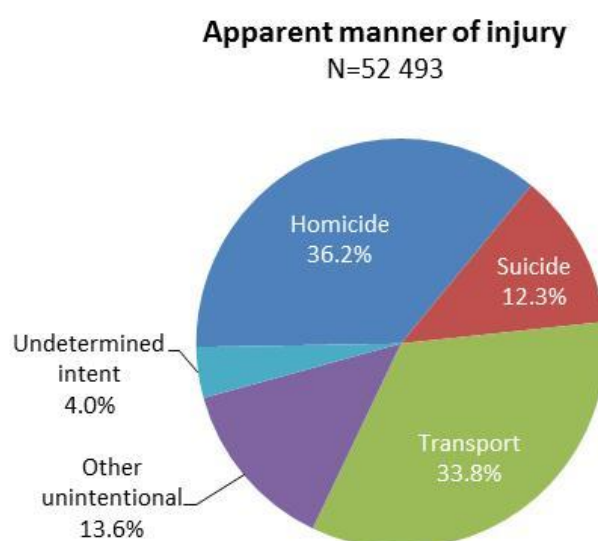


Figure 4: Apparent manner of injury (weighted analysis), South Africa 2009 (N = 52 493)

Table 7 shows that nearly 80 percent of non-natural deaths were male and 20 percent were female. The M:F ratio was highest for homicide, with 5.9 male deaths for every female death. This was followed by suicide (4.6), transport deaths (3.2) and other unintentional deaths (2.6).

Table 7: Sex distribution by apparent manner of death, South Africa 2009

	Apparent manner (weighted)											
	Homicide		Suicide		Transport		Other unintentional		Undetermined intent		Total	
Sex	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Male	16 245	(85.4)	5 307	(82.0)	13 486	(76.0)	5 151	(72.0)	1 618	(77.1)	41 807	(79.6)
Female	2 740	(14.4)	1 153	(17.8)	4 229	(23.8)	1 958	(27.4)	461	(22.0)	10 541	(20.1)
Unknown	43	(0.2)	10	(0.2)	27	(0.2)	45	(0.6)	20	(0.9)	145	(0.3)
Total	19 028	(100)	6 471	(100)	17 742	(100)	7 153	(100)	2 099	(100)	52 493	(100)

Among males, Africans had the highest proportion for all manners of death, with an average of 81.4 percent (Table 8). This was followed by coloureds (9.6 percent) for homicide, whites (15.2 percent and 9.9 percent) for suicide and transport respectively, and coloureds (10.8 percent) for other unintentional deaths. Among females, Africans contributed to 77.7 percent of all manners of death. The population group ranking by manner of death was similar to males.

Table 8: Population group distribution by apparent manner and sex, South Africa 2009

	Apparent manner by sex (weighted)											
Population group	Males											
	Homicide		Suicide		Transport		Other unintentional		Undetermined		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
African	13 883	(85.5)	3 862	(72.8)	10 756	(79.8)	4 145	(80.5)	1 373	(84.9)	34 018	(81.4)
Coloured	1 564	(9.6)	439	(8.3)	966	(7.2)	558	(10.8)	50	(3.1)	3 577	(8.6)
Asian	271	(1.7)	188	(3.5)	393	(2.9)	99	(1.9)	42	(2.6)	993	(2.4)
White	479	(3.0)	809	(15.2)	1 332	(9.9)	319	(6.2)	138	(8.5)	3 077	(7.4)
Unknown	47	(0.3)	10	(0.2)	39	(0.3)	30	(0.6)	15	(0.9)	141	(0.3)
Total	16 245	(100.0)	5 307	(100.0)	13 486	(100.0)	5 151	(100.0)	1 618	(100.0)	41 807	(100.0)
	Females											
African	2 184	(79.7)	742	(64.3)	3 375	(79.8)	1 486	(75.9)	399	(86.4)	8 185	(77.7)
Coloured	363	(13.2)	138	(12.0)	299	(7.1)	259	(13.2)	18	(3.9)	1 077	(10.2)
Asian	45	(1.7)	48	(4.2)	93	(2.2)	26	(1.3)	5	(1.0)	218	(2.1)
White	141	(5.1)	225	(19.5)	457	(10.8)	173	(8.9)	39	(8.4)	1 035	(9.8)
Unknown	8	(0.3)	0	(0.0)	4	(0.1)	13	(0.7)	1	(0.2)	26	(0.3)
Total	2 740	(100.0)	1 153	(100.0)	4 229	(100.0)	1 958	(100.0)	461	(100.0)	10 541	(100.0)
	Total (including unknown sex)											
African	16 088	(84.5)	4 605	(71.2)	14 146	(79.7)	5 641	(78.9)	1 781	(84.8)	42 258	(80.5)
Coloured	1 928	(10.1)	579	(8.9)	1 268	(7.1)	817	(11.4)	68	(3.3)	4 660	(8.9)
Asian	316	(1.7)	236	(3.6)	486	(2.7)	125	(1.8)	50	(2.4)	1 214	(2.3)
White	620	(3.3)	1 034	(16.0)	1 789	(10.1)	493	(6.9)	176	(8.4)	4 112	(7.8)
Unknown	77	(0.4)	18	(0.3)	53	(0.3)	77	(1.1)	27	(1.3)	252	(0.5)
Total	19 028	(100.0)	6 470	(100.0)	17 742	(100.0)	7 153	(100.0)	2 099	(100.0)	52 493	(100.0)

5.3.3 Work-related injuries

Death as a result of work-related injuries was only recorded for 573 (1.2 percent) of non-natural deaths. Of these, 51.6 percent were other unintentional injuries, 33.6 percent were transport-related and 14.2 percent were homicide. As a result of the small number of cases recorded, these deaths were included among the analysis of each apparent manner of death and not reported elsewhere.

5.4 Circumstance of non-natural deaths for each apparent manner of death

The following section provides a more detailed profile of the non-natural deaths according to each apparent manner of death (homicide, suicide, transport, other unintentional injuries and injury deaths due to undetermined intent). In all cases, it is the weighted numbers that have been applied to reflect the estimated total of 52 493 injury deaths occurring in 2009.

5.4.1 Homicide

Overall, 85.4 percent of the estimated 19 028 homicides were male (Table 7). Homicide peaked in the 20–24 and 25–29 year age groups for both males and females (Figure 5 and Table 9). Overall, approximately 50 percent of homicide occurred between the ages of 20 and 34 years. A lower proportion of homicides were noted from 35 years and older. Three percent of homicide was perpetrated against children younger than 15 years of age. For less than 1 percent of homicide the sex was unknown.

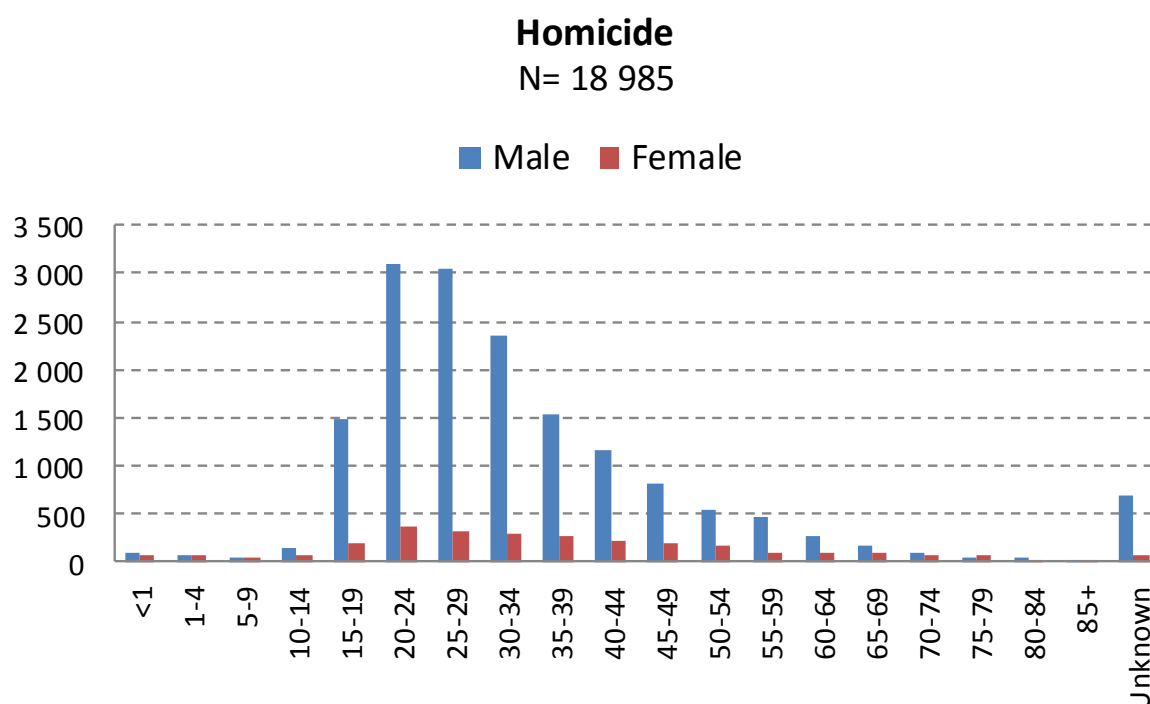


Figure 5: Distribution of homicides by age and sex, South Africa 2009 (N = 18 985)

Table 9: Age distribution of homicide by sex, South Africa 2009

Age	Homicide (Weighted)							
	Male		Female		Unknown		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
<1	97	(0.6)	59	(2.1)	4	(9.3)	160	(0.8)
1–4	70	(0.4)	56	(2.0)	0	(0.0)	126	(0.7)
5–9	47	(0.3)	36	(1.3)	0	(0.0)	83	(0.4)
10–14	148	(0.9)	55	(2.0)	0	(0.0)	203	(1.1)
15–19	1 478	(9.1)	201	(7.3)	4	(9.5)	1 683	(8.8)
20–24	3 096	(19.1)	376	(13.7)	3	(7.2)	3 475	(18.3)
25–29	3 052	(18.8)	320	(11.7)	1	(2.3)	3 373	(17.7)
30–34	2 361	(14.5)	281	(10.2)	4	(9.0)	2 646	(13.9)
35–39	1 542	(9.5)	271	(9.9)	4	(9.0)	1 817	(9.5)
40–44	1 168	(7.2)	224	(8.2)	1	(2.3)	1 393	(7.3)
45–49	819	(5.0)	201	(7.3)	0	(0.0)	1 020	(5.4)
50–54	544	(3.4)	167	(6.1)	1	(2.3)	712	(3.7)
55–59	468	(2.9)	95	(3.5)	0	(0.0)	563	(3.0)
60–64	272	(1.7)	93	(3.4)	0	(0.0)	365	(1.9)
65–69	174	(1.1)	79	(2.9)	0	(0.0)	253	(1.3)
70–74	98	(0.6)	66	(2.4)	0	(0.0)	165	(0.9)
75–79	50	(0.3)	56	(2.0)	0	(0.0)	106	(0.6)
80–84	46	(0.3)	14	(0.5)	0	(0.0)	60	(0.3)
85+	27	(0.2)	20	(0.7)	0	(0.0)	47	(0.2)
Unknown	687	(4.2)	72	(2.6)	21	(49.1)	780	(4.1)
Total	16 245	(100.0)	2 740	(100.0)	43	(100.0)	19 028	(100.0)

From Table 8, it can be seen that overall the majority (84.5 percent) of homicides were African, followed by the coloured population group (10.1 percent). However, from Table 10 it can be seen that the sex distribution differed by population group, with the African and Asian population having 6.4 and 6 male homicides for every female respectively, while the ratio was lower for the coloured population (4.3) and the white population group (3.4).

Table 10: Sex distribution of homicide by population group, South Africa 2009

Population group	Homicide (weighted)							
	Males		Females		Unknown		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
African	13 883	(86.3)	2 184	(13.6)	21	(0.1)	16 088	(100.0)
Coloured	1 564	(81.2)	363	(18.8)	1	(0.1)	1 927	(100.0)
Asian	271	(85.7)	45	(14.3)	0	(0.0)	316	(100.0)
White	479	(77.3)	141	(22.7)	0	(0.0)	620	(100.0)
Unknown	47	(61.7)	8	(10.4)	21	(27.9)	77	(100.0)
Total	16 245	(85.4)	2 740	(14.4)	43	(0.2)	19 028	(100.0)

The monthly distribution of homicides is shown in Figure 6 for males and females, excluding the cases with unknown sex. For males, homicide levels were consistently high throughout the year, with a peak in December (11.0 percent) and a smaller peak in May (9.0 percent). Female homicide also peaked in May (9.9 percent) and December (9.5 percent).

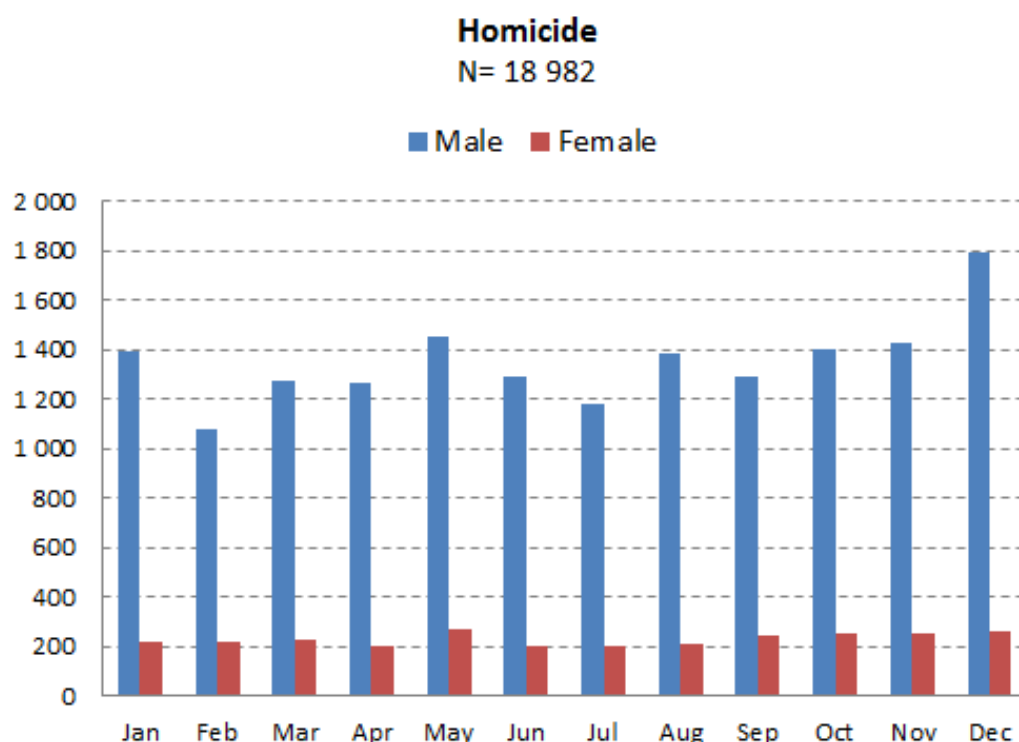


Figure 6: Distribution of homicide by month and sex, South Africa 2009 (N = 18 982)

Figure 7 indicates that homicide peaked on a Saturday for both sexes, and nearly 58 percent of the homicides occurred over the weekend (Friday to Sunday).

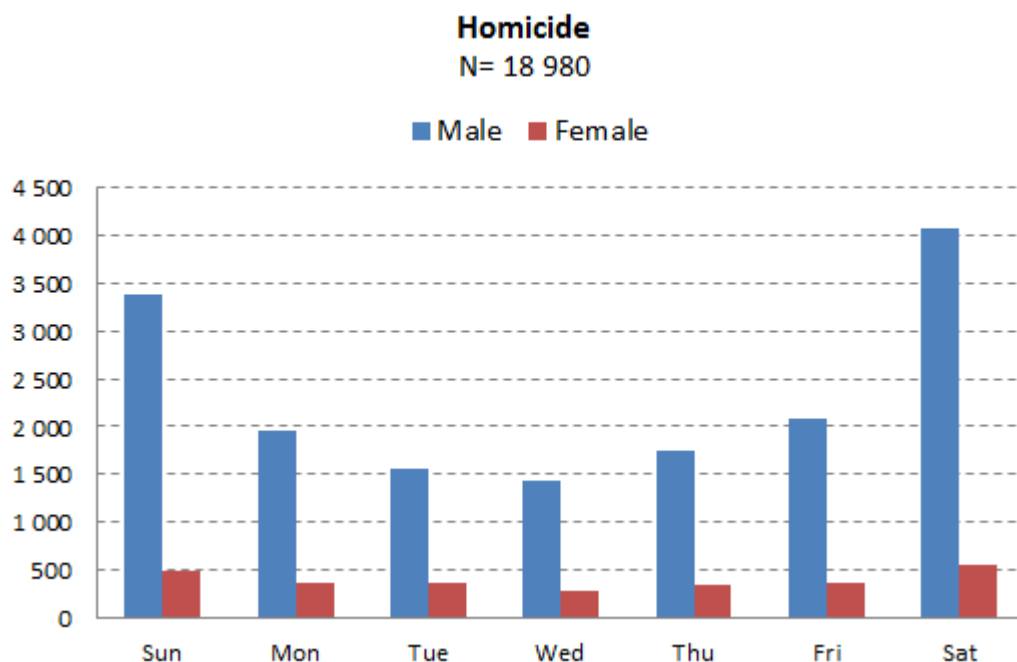


Figure 7: Distribution of homicide by week and sex, South Africa 2009 (N = 18 980)

A provincial breakdown for homicide indicates that one-quarter of deaths were from KwaZulu-Natal, followed by Gauteng (23.3 percent) and the Eastern Cape (18.2 percent) (Table 11). Of the homicides in metro areas, Gauteng had the highest proportion (35.4 percent), followed by KwaZulu-Natal (28.6 percent) and the Western Cape (18.3 percent). A provincial comparison of the homicides in non-metro areas indicated that the Eastern Cape had the highest proportion (22.7 percent), followed by KwaZulu-Natal (21.9 percent) and Gauteng (12.4 percent). From Figure 8, it can be seen that Gauteng metro areas account for the most homicides, followed by KwaZulu-Natal metro areas.

Table 11: Provincial distribution of homicide by metro/non-metro area, South Africa 2009

Province	Homicide (weighted)					
	Metro		Non-metro		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Eastern Cape	1 185	(13.2)	2 272	(22.7)	3 458	(18.2)
Free State	402	(4.5)	568	(5.7)	970	(5.1)
Gauteng	3 191	(35.4)	1 244	(12.4)	4 436	(23.3)
KwaZulu-Natal	2 579	(28.6)	2 200	(21.9)	4 779	(25.1)
Limpopo	0	(0.0)	860	(8.6)	860	(4.5)
Mpumalanga	0	(0.0)	668	(6.7)	668	(3.5)
North West	0	(0.0)	829	(8.3)	829	(4.4)
Northern Cape	0	(0.0)	607	(6.1)	607	(3.2)
Western Cape	1 646	(18.3)	776	(7.7)	2 422	(12.7)
Total	9 003	(100.0)	10 025	(100.0)	19 028	(100.0)

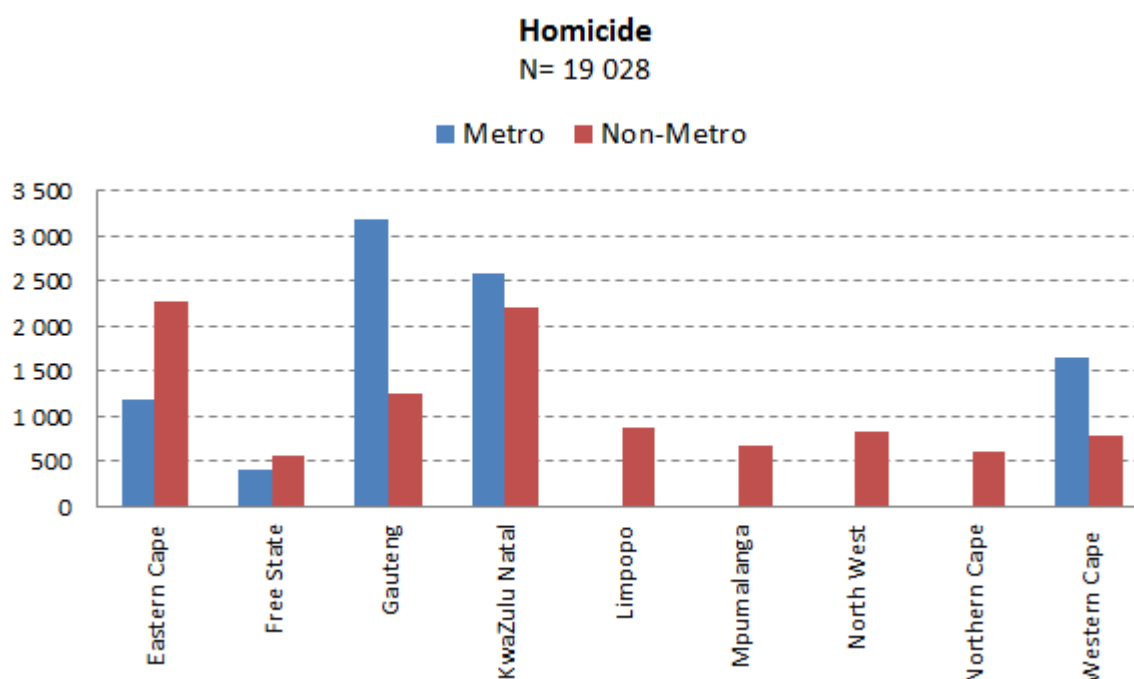


Figure 8: Distribution of homicide by metro/non-metro area and province, South Africa 2009 (N = 19 028)

Table 12 shows that sharp force was the leading circumstance of homicide for both males (43.8 percent) and females (30.0 percent). For males, this was followed by firearms (30.1 percent) and blunt force (22.1 percent), while for females, blunt force (26.8 percent) was the

second leading circumstance of homicide. Strangulation deaths were higher in females (11.5 percent) than in males (1.4 percent).

Table 12: Circumstance of homicide by sex, South Africa 2009

Circumstances	Homicide (weighted)							
	Male		Female		Unknown		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Sharp force	7 112	(43.8)	823	(30.0)	16	(36.1)	7 951	(41.8)
Firearm	4 895	(30.1)	611	(22.3)	7	(16.5)	5 513	(29.0)
Blunt force	3 595	(22.1)	735	(26.8)	5	(12.6)	4 336	(22.8)
Strangled	222	(1.4)	315	(11.5)	1	(2.3)	538	(2.8)
Fire	121	(0.7)	79	(2.9)	3	(6.7)	203	(1.1)
Ingestion	112	(0.7)	72	(2.6)	0	(0.0)	184	(1.0)
Abandoned	23	(0.1)	39	(1.4)	7	(16.2)	69	(0.4)
Pushed	18	(0.1)	9	(0.3)	0	(0.0)	27	(0.1)
Drowning	16	(0.1)	9	(0.3)	0	(0.0)	26	(0.1)
Gassing	21	(0.1)	4	(0.2)	0	(0.0)	25	(0.1)
Crushing	7	(0.0)	0	(0.0)	0	(0.0)	7	(0.0)
Electrocution	3	(0.0)	0	(0.0)	0	(0.0)	3	(0.0)
Other	54	(0.3)	25	(0.9)	4	(9.6)	84	(0.4)
Unknown	45	(0.3)	17	(0.6)	0	(0.0)	63	(0.3)
Total	16 245	(100.0)	2 740	(100.0)	43	(100.0)	19 028	(100.0)

Overall, 29.0 percent of homicides were firearm related. Table 13 and Figure 9 show a comparison of firearm and non-firearm (i.e. sharp force, blunt force, strangled, etc.) homicide by province. KwaZulu-Natal and Gauteng had the highest proportion of firearm homicide, with more than one-third of deaths being due to a single circumstance. The Eastern Cape and Western Cape also had high levels of homicide but had a similar profile of firearm and non-firearm deaths to other provinces with low levels of homicide.

Table 13: Firearm and non-firearm homicide by province, South Africa 2009

Province	Homicide (weighted)					
	Firearm		Non-firearm		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Eastern Cape	579	(16.7)	2 879	(83.3)	3 458	(100.0)
Free State	111	(11.5)	858	(88.5)	970	(100.0)
Gauteng	1 760	(39.7)	2 676	(60.3)	4 436	(100.0)
KwaZulu-Natal	2 023	(42.3)	2 756	(57.7)	4 779	(100.0)
Limpopo	162	(18.8)	699	(81.2)	860	(100.0)
Mpumalanga	222	(33.2)	446	(66.8)	668	(100.0)
North West	107	(12.9)	722	(87.1)	829	(100.0)
Northern Cape	21	(3.4)	586	(96.6)	607	(100.0)
Western Cape	529	(21.8)	1 893	(78.2)	2 422	(100.0)
Total	5 513	(29.0)	13 515	(71.0)	19 028	(100.0)

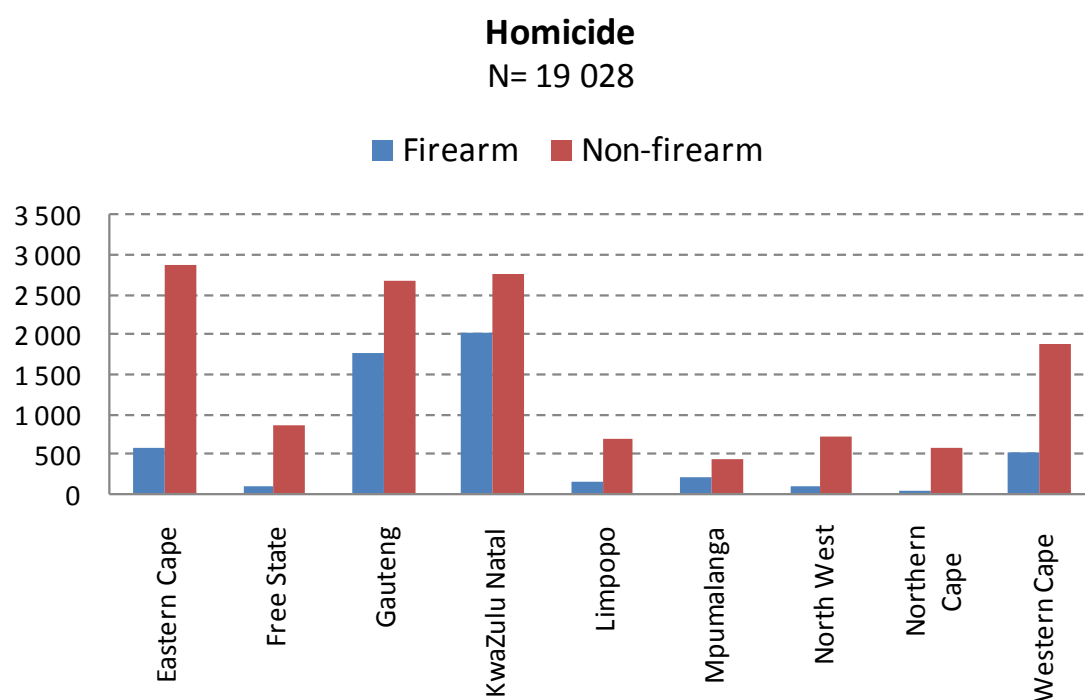


Figure 9: Firearm and non-firearm homicide by province, South Africa 2009

5.4.2 Suicide

Of the estimated 6 471 suicides, 82 percent were male (Table 7). Figure 10 and Table 14 show that suicides peaked among those between 25 and 29 years of age (17.1 percent), followed by the 20–24 year age group (16 percent). For females, suicide peaked at the younger ages of between 15 and 19 years (17.1 percent), and between 20 and 24 years (17.4 percent). Overall, more than one-half of all suicides occurred between the ages of 20 and 39 years.

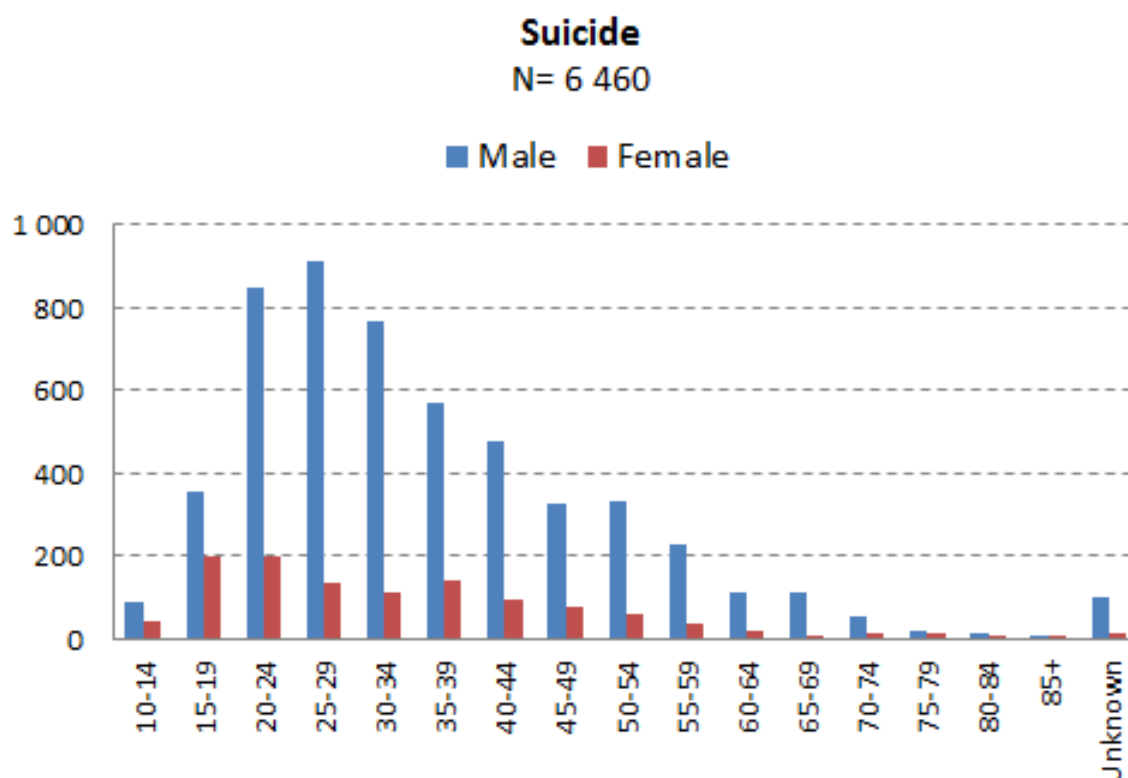


Figure 10: Distribution of suicide by age and sex, South Africa 2009 (N = 6 460)

Table 14: Age distribution of suicide by sex, 2009

Age	Suicide (weighted)							
	Male		Female		Unknown		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
10–14	87	(1.6)	40	(3.5)	0	(0.0)	127	(2.0)
15–19	355	(6.7)	198	(17.1)	1	(9.0)	554	(8.6)
20–24	851	(16.0)	200	(17.4)	0	(0.0)	1 051	(16.2)
25–29	910	(17.1)	137	(11.9)	0	(0.0)	1 047	(16.2)
30–34	768	(14.5)	109	(9.5)	0	(0.0)	877	(13.6)
35–39	569	(10.7)	140	(12.2)	0	(0.0)	709	(11.0)
40–44	476	(9.0)	97	(8.4)	0	(0.0)	573	(8.8)
45–49	325	(6.1)	75	(6.5)	0	(0.0)	401	(6.2)
50–54	334	(6.3)	58	(5.0)	0	(0.0)	391	(6.0)
55–59	225	(4.2)	34	(3.0)	5	(47.4)	264	(4.1)
60–64	110	(2.1)	16	(1.4)	0	(0.0)	126	(1.9)
65–69	110	(2.1)	4	(0.3)	0	(0.0)	114	(1.8)
70–74	51	(1.0)	13	(1.2)	0	(0.0)	65	(1.0)
75–79	19	(0.4)	14	(1.2)	0	(0.0)	32	(0.5)
80–84	12	(0.2)	1	(0.1)	0	(0.0)	13	(0.2)
85+	7	(0.1)	5	(0.4)	0	(0.0)	12	(0.2)
Unknown	99	(1.9)	12	(1.1)	4	(43.6)	115	(1.8)
Total	5 307	(100.0)	1 153	(100.0)	10	(100.0)	6 471	(100.0)

The majority of suicides were African (71.2 percent), followed by the white population group (16 percent) (Table 8). From Table 15, it can be seen that the sex distribution differed by population group, with the African population having 5.2 male suicides for every female suicide. The ratio was lower for the Asian, white and coloured population (3.9, 3.6 and 3.2 male suicides for every female suicide respectively).

Table 15: Sex distribution of suicide by population group, South Africa 2009

Population group	Suicide (Weighted)							
	Male		Female		Unknown		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>N</i>	%
African	3 862	(83.9)	739	(16.1)	1	(0.0)	4 601	(100.0)
Coloured	439	(75.9)	138	(23.9)	1	(0.2)	579	(100.0)
Asian	188	(79.7)	48	(20.3)	0	(0.0)	236	(100.0)
White	809	(78.3)	225	(21.7)	0	(0.0)	1 034	(100.0)
Unknown	10	(53.9)	0	(0.0)	8	(46.1)	18	(100.0)
Total	5 307	(82.1)	1 153	(17.8)	10	(0.2)	6 471	(100.0)

Figure 11 shows that male suicides peaked in December (10.2 percent) and October (9.7 percent). There were no strong peaks observed for females. However, the frequency was generally highest in May and September (9.5 percent each), with the lowest proportion noted in June (5.7 percent). Figure 12 shows that suicides peaked on a Monday, accounting for 17.1 percent of suicides among males and 18.6 percent among females. Overall, approximately one-third of suicides occurred on Sundays and Mondays.

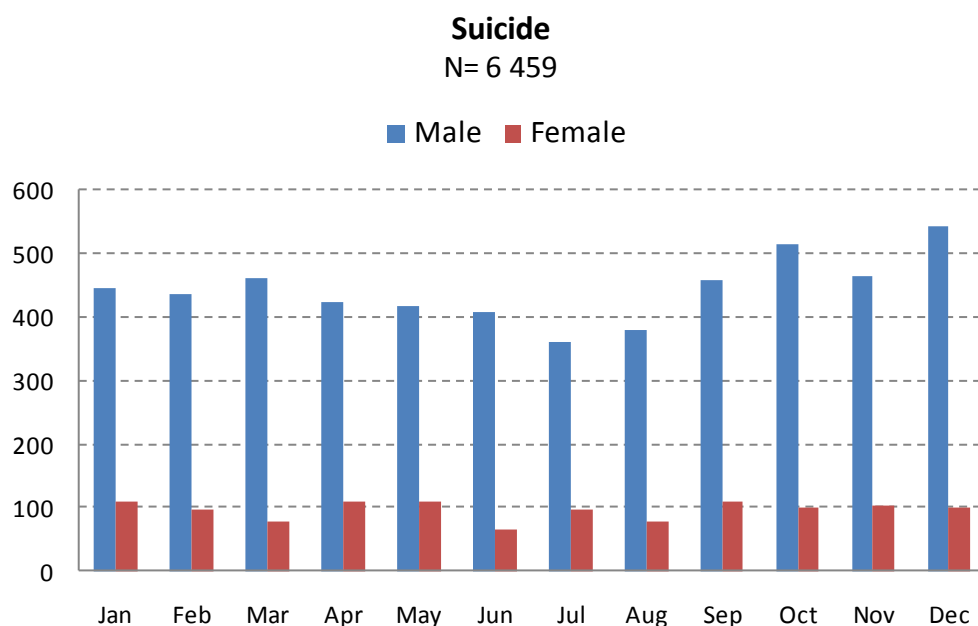


Figure 11: Distribution of suicide by month, South Africa 2009 (N = 6 459)

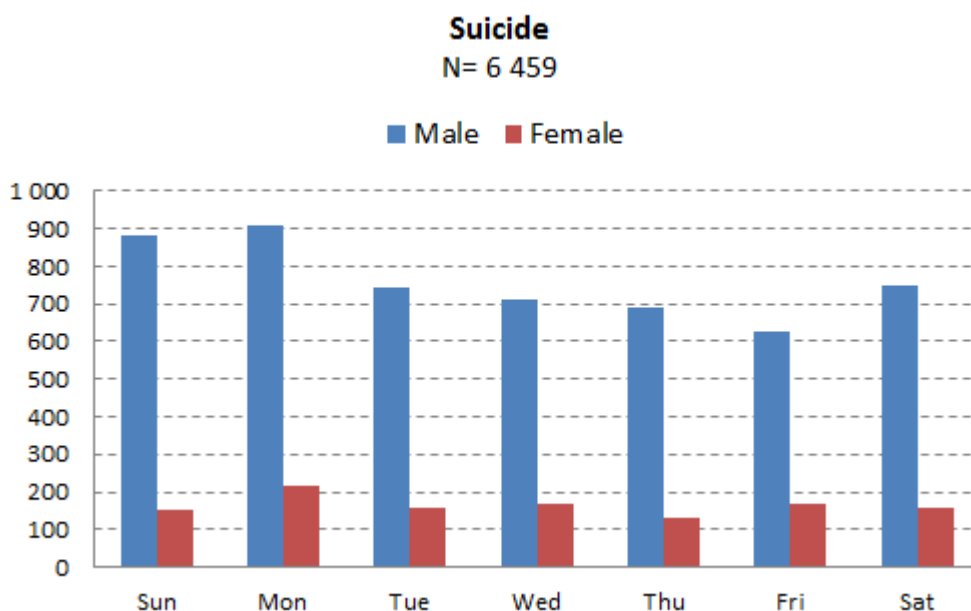


Figure 12: Distribution of suicide by week and sex, South Africa 2009 (N = 6 459)

A provincial breakdown for suicide (Table 16) indicates that more than one-quarter of deaths were from Gauteng, followed by KwaZulu-Natal (20.9 percent) and the Eastern Cape (13.3 percent). Of the suicides in metro areas, Gauteng had the highest proportion (43.3 percent), followed by KwaZulu-Natal (25.4 percent). A provincial comparison of the suicides in non-metro areas indicated that KwaZulu-Natal had the highest proportion (18 percent), followed by the Eastern Cape (14.9 percent) and North West (14.8 percent). Figure 13 and Table 16 indicate that the non-metro areas in the Eastern Cape had higher levels of suicide than the metro areas.

Table 16: Provincial distribution of suicide by metro/non-metro area, South Africa 2009

Province	Suicide (weighted)					
	Metro		Non-metro		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Eastern Cape	279	(10.8)	582	(14.9)	861	(13.3)
Free State	132	(5.1)	264	(6.8)	395	(6.1)
Gauteng	1 115	(43.3)	541	(13.9)	1 656	(25.6)
KwaZulu-Natal	653	(25.4)	700	(18.0)	1 354	(20.9)
Limpopo	0	(0.0)	410	(10.5)	410	(6.3)
Mpumalanga	0	(0.0)	339	(8.7)	339	(5.2)
North West	0	(0.0)	577	(14.8)	577	(8.9)
Northern Cape	0	(0.0)	197	(5.0)	197	(3.0)
Western Cape	394	(15.3)	289	(7.4)	683	(10.6)
Total	2 573	(100.0)	3 898	(100.0)	6 471	(100.0)

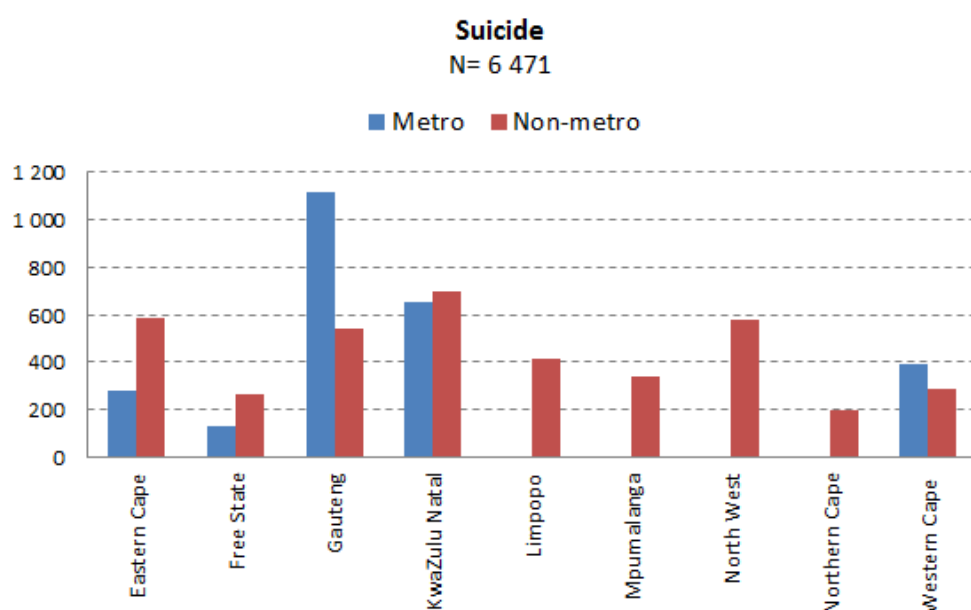


Figure 13: Distribution of suicide by metro/non-metro area and province, South Africa 2009 (N = 6 471)

Table 17 shows that hanging was the leading circumstance of suicide for both males (68.8 percent) and females (42.3 percent). For females, this was followed closely by poison ingestion (40.2 percent), while for males it was firearms (12.9 percent) and poison ingestion (12.0 percent). While females had a lower proportion of firearm suicides (8.1 percent) than males, they had a higher proportion of suicides by jumping from a height (3.2 percent).

Table 17: Circumstance of suicide by sex, South Africa 2009

Circumstances	Suicide (weighted)							
	Male		Female		Unknown		Total	
	n	%	n	%	n	%	n	%
Hanging	3 651	(68.8)	488	(42.3)	9	(90.3)	4 148	(64.1)
Ingestion	636	(12.0)	463	(40.2)	0	(0.0)	1 099	(17)
Firearm	686	(12.9)	93	(8.1)	1	(9.7)	780	(12.1)
Gassing	114	(2.2)	38	(3.3)	0	(0.0)	152	(2.3)
Jumped	47	(0.9)	37	(3.2)	0	(0.0)	83	(1.3)
Sharp force	58	(1.1)	4	(0.4)	0	(0.0)	62	(1)
Fire	37	(0.7)	15	(1.3)	0	(0.0)	52	(0.8)
Railway pedestrian	46	(0.9)	2	(0.2)	0	(0.0)	48	(0.7)
Other	27	(0.5)	9	(0.8)	0	(0.0)	36	(0.6)
Unknown	5	(0.1)	4	(0.4)	0	(0.0)	9	(0.1)
Total	5 307	(100.0)	1 153	(100.0)	10	(100.0)	6 471	(100.0)

5.4.3 Transport

Transport deaths constituted the second largest category of injury mortality after homicide, and accounted for more than one-third of injury-related deaths (33.8 percent). Road traffic injuries are an important sub-set (see Table 17) of transport injuries, accounting for 96 percent of all transport deaths. As they are often described independently of other transport injuries, this section provides separate tabulations and figures for road traffic injuries alongside those for all transport deaths including road, rail, water- and air-travel deaths.

Pedestrians (32.8 percent) were the leading category of road traffic deaths, but for females, passenger deaths were the leading category, accounting for 42.6 percent (Table 18). The category of road traffic deaths was unspecified for 18.1 percent of cases. For other transport deaths, rail pedestrian (69.4 percent) was the leading category.

Table 18: Circumstance of road traffic and other transport deaths by sex, South Africa 2009

Circumstances	Transport (Weighted)							
	Male		Female		Unknown		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Road traffic injuries:	12 942	(100.0)	4 135	(100.0)	26	(100.0)	17 103	(100.0)
MV pedestrian	4 290	(33.2)	1 299	(31.4)	15	(57.4)	5 604	(32.8)
MV passenger	2 802	(21.7)	1 760	(42.6)	9	(35)	4 572	(26.7)
MV driver	2 891	(22.3)	313	(7.6)	0	(0.0)	3 205	(18.7)
MV unspecified	2 365	(18.3)	727	(17.6)	1	(3.8)	3 093	(18.1)
MC driver	355	(2.7)	21	(0.5)	0	(0.0)	377	(2.2)
MC passenger	11	(0.1)	8	(0.2)	0	(0.0)	19	(0.1)
Bicycle	227	(1.8)	6	(0.1)	1	(3.8)	234	(1.4)
Other transport injuries:	544	(100.0)	94	(100.0)	1	(100.0)	639	(100.0)
Rail pedestrian	371	(68.1)	72	(76.3)	1	(100)	443	(69.4)
Rail passenger	57	(10.5)	13	(13.6)	0	(0.0)	70	(10.9)
Aviation casualty	34	(6.2)	6	(6.9)	0	(0.0)	40	(6.3)
Other	36	(6.6)	2	(2.1)	0	(0.0)	38	(5.9)
Unknown	47	(8.6)	1	(1.1)	0	(0.0)	48	(7.5)
Total	13 486	(100.0)	4 229	(100.0)	27	(100.0)	17 742	(100.0)

For both road traffic and other transport injuries, the overwhelming majority of deaths were male (76 percent and 85 percent respectively). For road traffic injuries, more than one-third of deaths were recorded among those between 20 and 34 years of age, after which it

declined (Table 19 and Figure 14). Other transport deaths peaked in the 20–24 and 30–34 year age groups for males, and the 25–29 and 40–44 year age groups for females (Table 19). For children younger than 5 years of age, other transport deaths peaked for females. For all transport deaths, the M:F ratio peaked in the 30–34 years age category at 4.9:1.

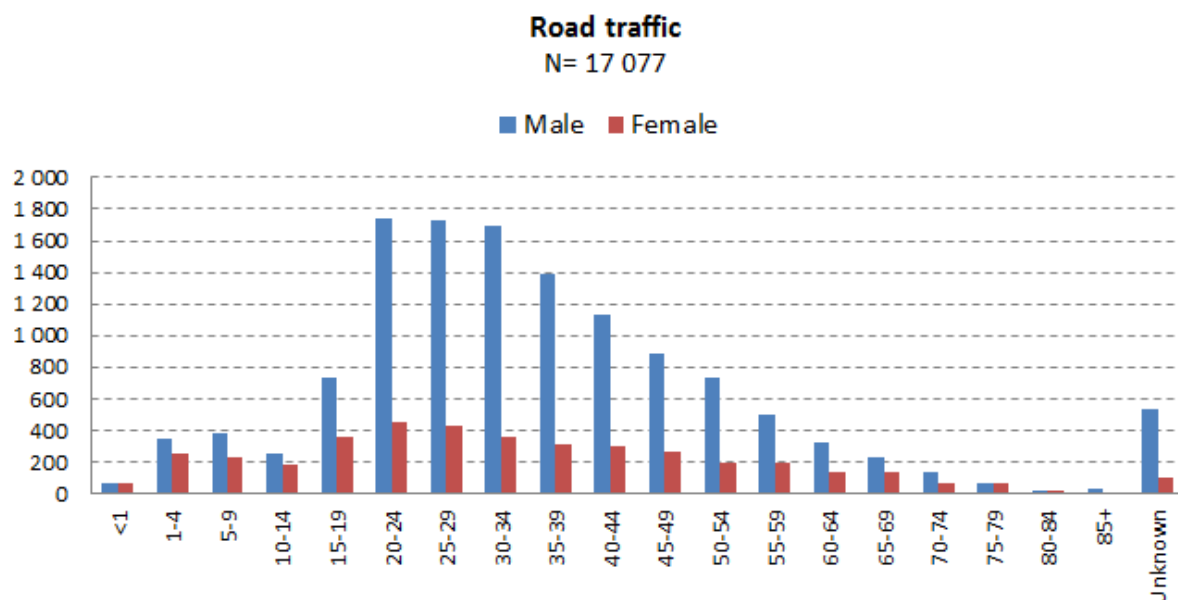


Figure 14: Distribution of road traffic deaths by age and sex, South Africa 2009 (N = 17 077)

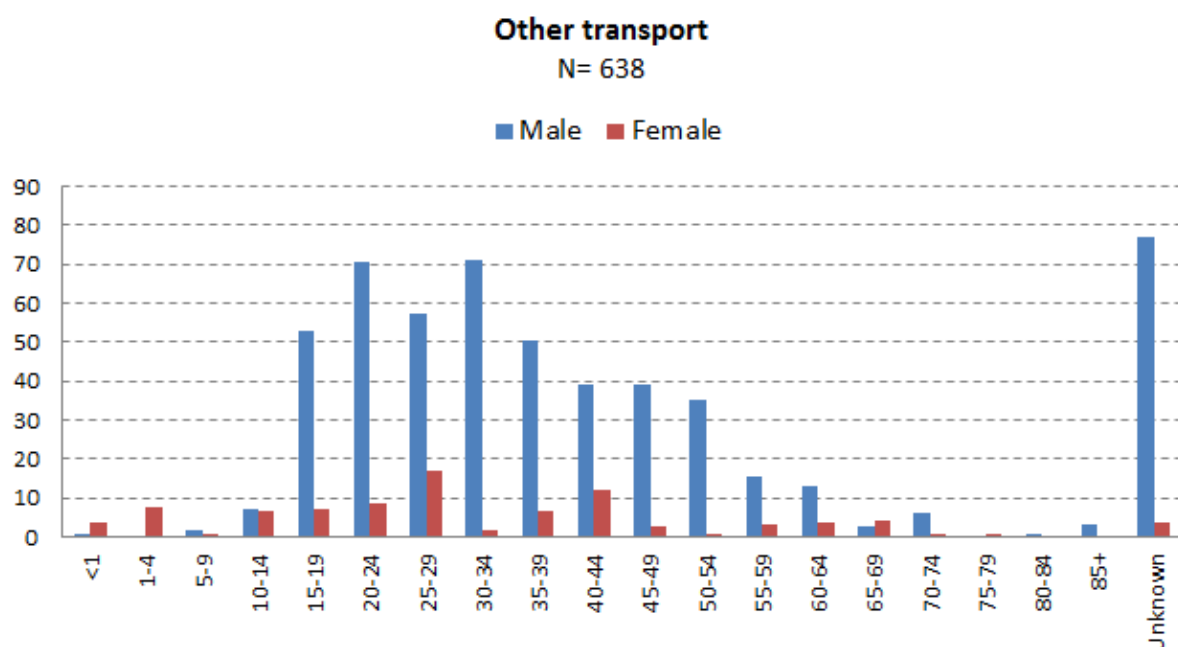


Figure 15: Distribution of other transport deaths by age and sex, South Africa 2009 (N = 638)

Table 19: Age distribution of transport and road traffic deaths by sex, South Africa 2009

Age	Transport (weighted)								Road traffic (weighted)							
	Male		Female		Unknown		Total		Male		Female		Unknown		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
<1	66	(0.5)	67	(1.6)	4	(15.0)	137	(0.1)	65	(0.5)	63	(1.5)	4	(15.6)	132	(0.8)
1–4	352	(2.6)	261	(6.2)	4	(15.0)	617	(3.5)	352	(2.7)	254	(6.1)	4	(15.6)	609	(3.6)
5–9	385	(2.9)	226	(5.4)	6	(22.5)	618	(3.5)	383	(3.0)	225	(5.5)	6	(23.4)	615	(3.6)
10–14	261	(1.9)	186	(4.4)	0	(0.0)	447	(2.5)	254	(2.0)	179	(4.3)	0	(0.0)	433	(2.5)
15–19	789	(5.9)	365	(8.6)	1	(3.7)	1 155	(6.5)	736	(5.7)	357	(8.6)	1	(3.8)	1 094	(6.4)
20–24	1 816	(13.5)	456	(10.8)	0	(0.0)	2 272	(12.8)	1 745	(13.5)	447	(10.8)	0	(0.0)	2 192	(12.8)
25–29	1 791	(13.3)	450	(10.7)	0	(0.0)	2 241	(12.6)	1 734	(13.4)	433	(10.5)	0	(0.0)	2 167	(12.7)
30–34	1 767	(13.1)	361	(8.5)	0	(0.0)	2 128	(12)	1 696	(13.1)	359	(8.7)	0	(0.0)	2 054	(12.0)
35–39	1 434	(10.6)	319	(7.5)	1	(3.7)	1 754	(9.9)	1 384	(10.7)	312	(7.5)	1	(3.8)	1 697	(9.9)
40–44	1 166	(8.6)	312	(7.4)	2	(7.3)	1 480	(8.3)	1 127	(8.7)	300	(7.2)	1	(3.8)	1 428	(8.3)
45–49	923	(6.8)	263	(6.2)	1	(3.7)	1 187	(6.7)	884	(6.8)	260	(6.3)	1	(3.8)	1 145	(6.7)
50–54	771	(5.7)	198	(4.7)	0	(0.0)	969	(5.5)	736	(5.7)	197	(4.8)	0	(0.0)	933	(5.5)
55–59	511	(3.8)	193	(4.6)	0	(0.0)	704	(4.0)	495	(3.8)	190	(4.6)	0	(0.0)	685	(4.0)
60–64	338	(2.5)	142	(3.4)	0	(0.0)	480	(2.7)	325	(2.5)	138	(3.3)	0	(0.0)	463	(2.7)
65–69	238	(1.8)	138	(3.3)	0	(0.0)	377	(2.1)	236	(1.8)	134	(3.2)	0	(0.0)	370	(2.2)
70–74	142	(1.1)	72	(1.7)	0	(0.0)	214	(1.2)	136	(1.1)	71	(1.7)	0	(0.0)	207	(1.2)
75–79	63	(0.5)	71	(1.7)	0	(0.0)	134	(0.8)	63	(0.5)	70	(1.7)	0	(0.0)	133	(0.8)
80–84	25	(0.2)	25	(0.6)	0	(0.0)	50	(0.3)	24	(0.2)	25	(0.6)	0	(0.0)	49	(0.3)
85+	37	(0.3)	14	(0.3)	0	(0.0)	51	(0.3)	34	(0.3)	14	(0.3)	0	(0.0)	48	(0.3)
Unknown	611	(4.5)	110	(2.6)	8	(29.1)	729	(4.1)	534	(4.1)	106	(2.6)	8	(30.2)	649	(3.8)
Total	13 486	(100)	4 229	(100)	27	(100)	17 742	(100)	12 942	(100)	4 135	(100)	26	(100)	17 103	(100)

Overall, the majority of both transport and road traffic deaths were African, followed by the white population group (Table 20). The M:F ratio was highest among Asians at 4.2:1 for road traffic deaths, compared to 3.1, 3.2 and 2.9 among Africans, coloureds and whites respectively.

Table 20: Sex distribution of transport and road traffic deaths by population group, South Africa 2009

Population group	Transport (weighted)							
	Male		Female		Unknown		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
African	10 756	(76.0)	3 375	(23.9)	15	(0.1)	14 145	(100.0)
Coloured	966	(76.2)	299	(23.6)	3	(0.2)	1 268	(100.0)
Asian	393	(80.8)	93	(19.2)	0	(0.0)	486	(100.0)
White	1 332	(74.5)	457	(25.5)	0	(0.0)	1 789	(100.0)
Unknown	39	(74.3)	4	(7.6)	10	(18.1)	53	(100.0)
Total	13 486	(76.0)	4 229	(23.8)	27	(0.2)	17 742	(100.0)
Population group	Road traffic (weighted)							
	Male		Female		Unknown		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
African	10 296	(75.7)	3 293	(24.2)	15	(0.1)	13 604	(100.0)
Coloured	934	(76.2)	291	(23.7)	2	(0.2)	1 227	(100.0)
Asian	390	(80.7)	93	(19.3)	0	(0.0)	483	(100.0)
White	1 282	(73.8)	453	(26.1)	0	(0.0)	1 736	(100.0)
Unknown	39	(74.3)	4	(7.6)	10	(18.1)	53	(100.0)
Total	12 942	(75.7)	4 135	(24.2)	26	(0.2)	17 103	(100.0)

Road traffic deaths peaked in December for males and females (Figure 16). For males, this was followed by another peak in July. For females, road traffic deaths were also high in April. Other transport deaths were high for males, and peaked in March and September (Figure 17).

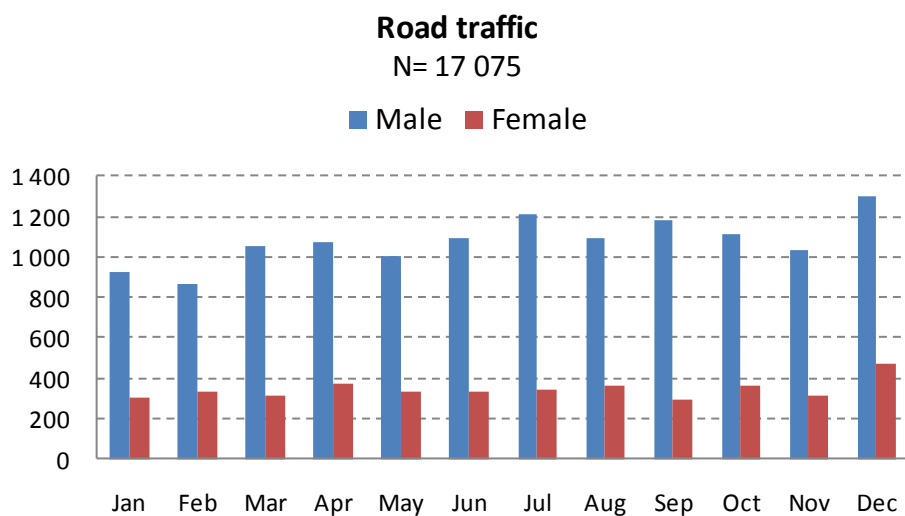


Figure 16: Distribution of road traffic injury deaths by month and sex, South Africa 2009 (N = 17 075)

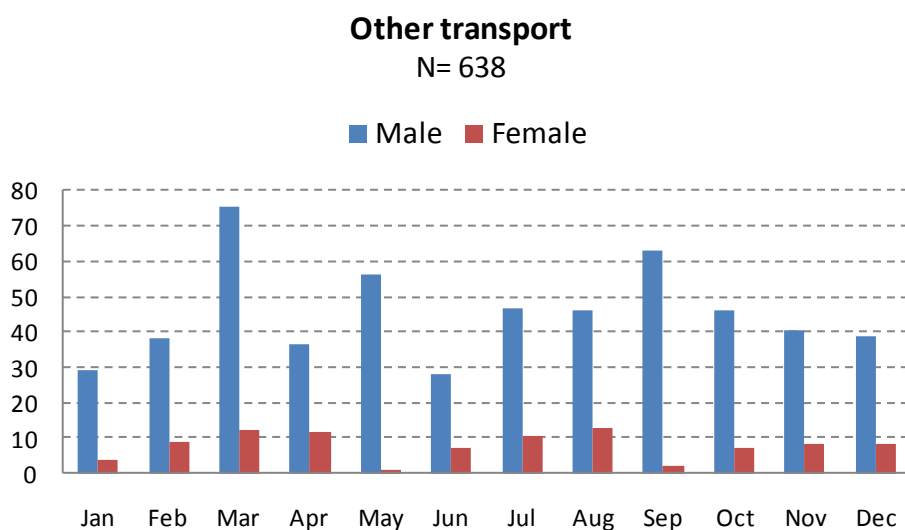


Figure 17: Distribution of other transport deaths by month and sex, South Africa 2009 (N = 638)

There were distinct weekend peaks for both road traffic and other transport deaths (Figure 18 and Figure 19). Saturday (23 percent), followed by Sunday (19 percent) and Friday (15 percent) together, accounted for more than half (57 percent) of all road traffic injury deaths. The association between alcohol intoxication and road and rail deaths is already well established, and the mortality pattern by day of week is also consistent with alcohol consumption patterns.

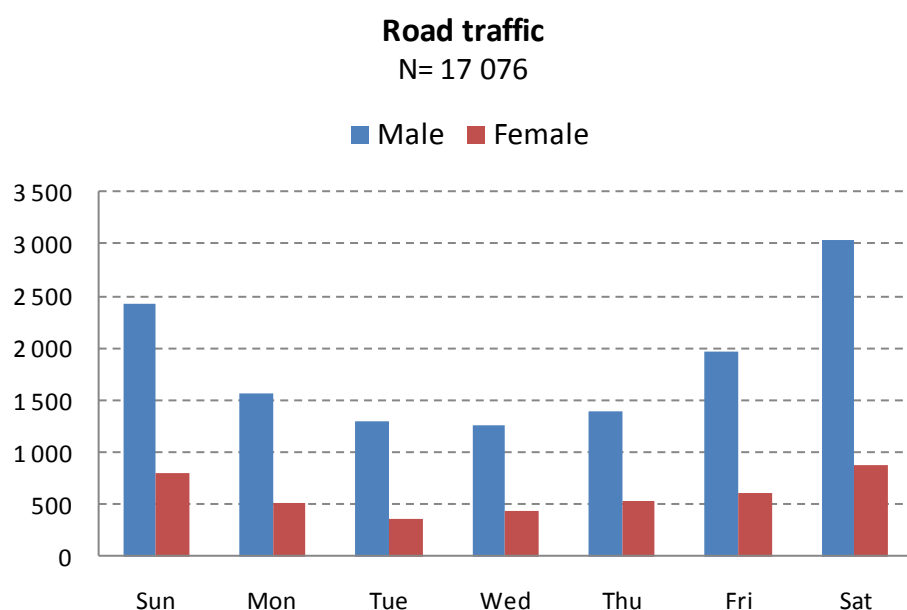


Figure 18: Distribution of road traffic injury deaths by week and sex, South Africa 2009 (N = 17 076)

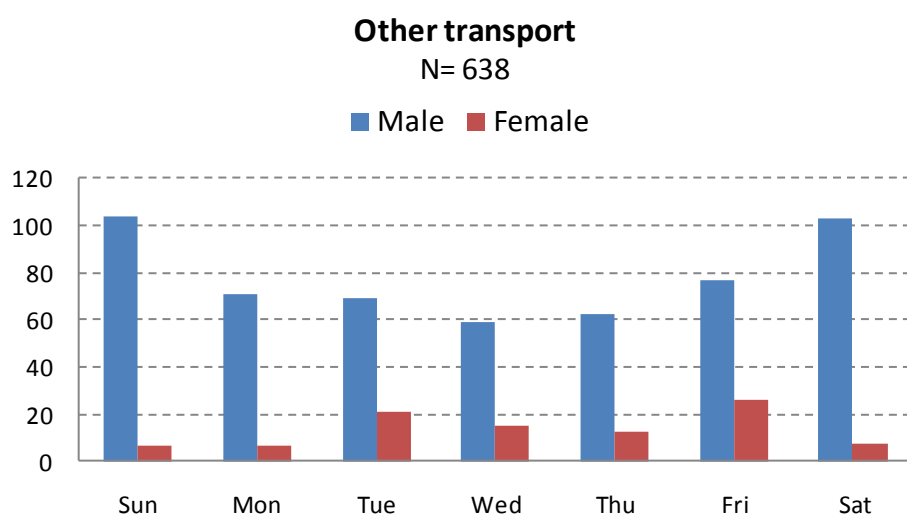


Figure 19: Distribution of other transport deaths by week and sex, South Africa 2009 (N = 638)

A provincial breakdown for transport and road traffic injuries (Figure 20 and Figure 21) indicates that most deaths in metropolitan areas occurred in Gauteng (43.3 percent) followed by KwaZulu-Natal (25.3 percent) and the Western Cape (14 percent). Deaths in non-metro areas were more evenly distributed across the provinces, and only in Gauteng were there substantially more transport and road traffic deaths in metro versus non-metro areas (Table 20). Other transport injuries (Figure 22), of which most were railway deaths, were concentrated in the metro areas of Gauteng, KwaZulu-Natal and the Western Cape.

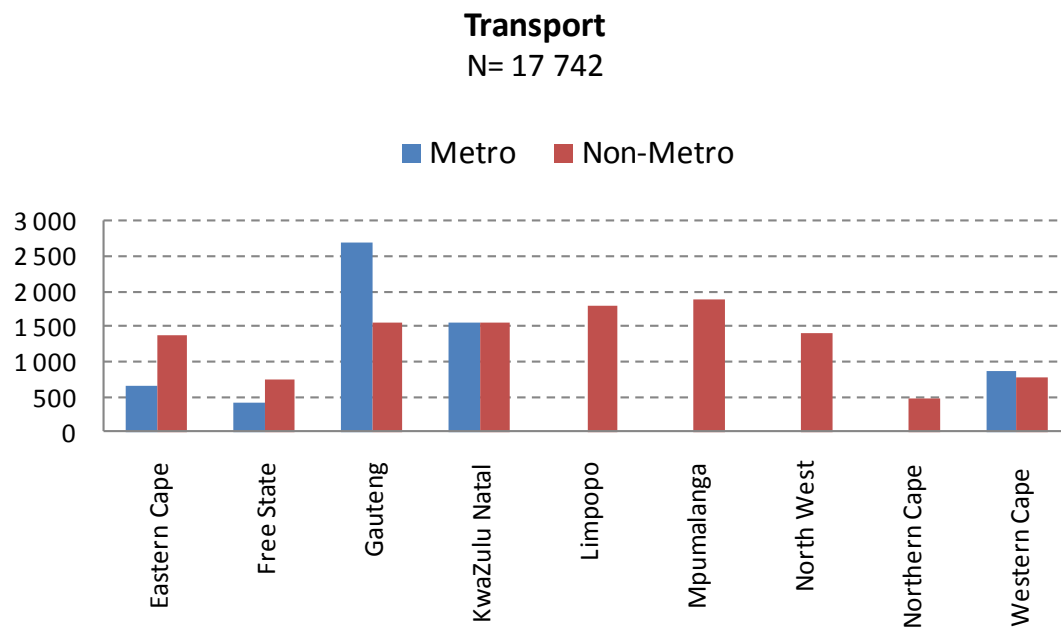


Figure 20: Distribution of transport deaths by metro/non-metro area and province, South Africa 2009 (N = 17 742)

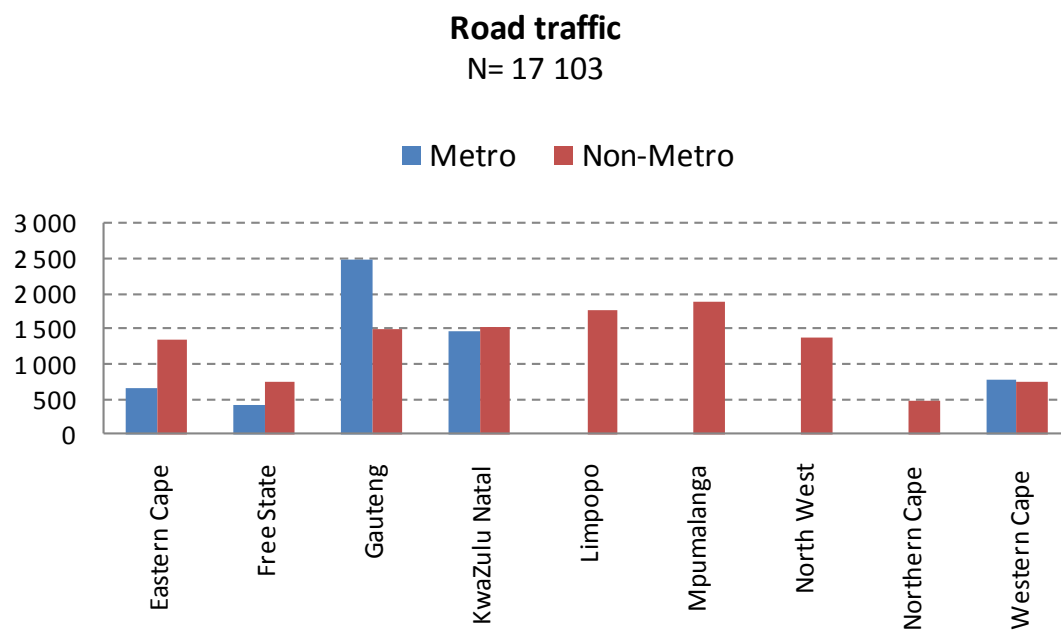


Figure 21: Distribution of road traffic deaths by metro/non-metro area and province, South Africa 2009 (N = 17 103)

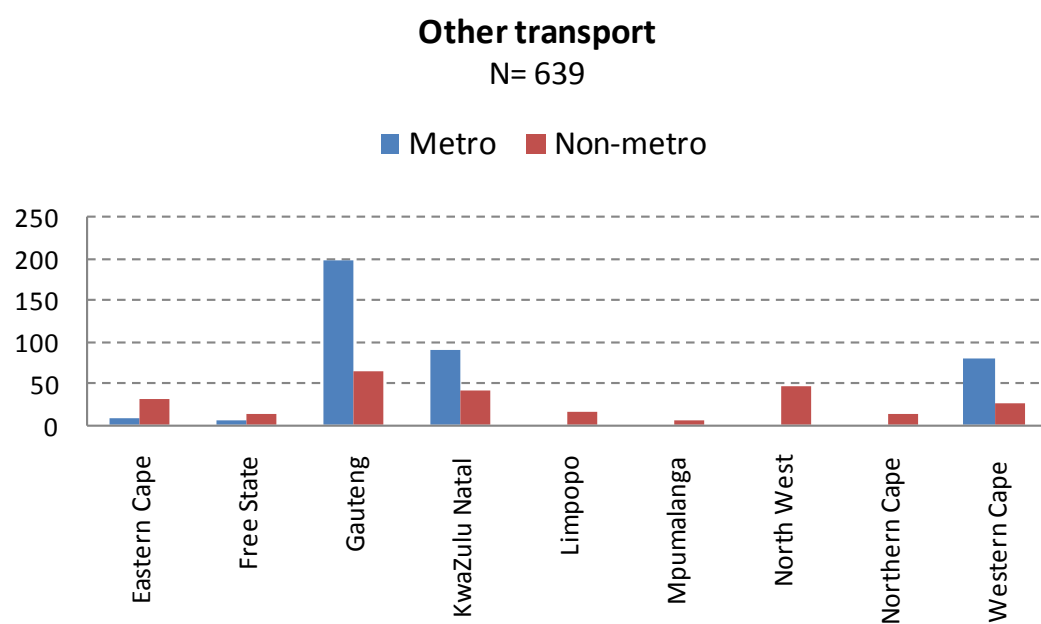


Figure 22: Distribution of other transport deaths by metro/non-metro area and province, South Africa 2009 (N = 639)

Table 21: Provincial distribution of transport and road traffic deaths by metro and non-metro areas, South Africa 2009

Province	Transport (weighted)					
	Metro		Non-metro		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Eastern Cape	648	(10.5)	1 362	(11.8)	2 011	(11.3)
Free State	427	(6.9)	753	(6.5)	1 180	(6.7)
Gauteng	2 675	(43.3)	1 561	(13.5)	4 236	(23.9)
KwaZulu-Natal	1 566	(25.3)	1 563	(13.5)	3 129	(17.6)
Limpopo	0	(0.0)	1 790	(15.5)	1 790	(10.1)
Mpumalanga	0	(0.0)	1 875	(16.2)	1 875	(10.6)
North West	0	(0.0)	1 413	(12.2)	1 413	(8.0)
Northern Cape	0	(0.0)	483	(4.2)	483	(2.7)
Western Cape	867	(14.0)	760	(6.6)	1 627	(9.2)
Total	6 183	(100.0)	11 559	(100.0)	17 742	(100.0)
Province	Road Traffic (weighted)					
	Metro		Non-metro		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Eastern Cape	640	(11.0)	1 332	(11.8)	1 971	(11.5)
Free State	421	(7.3)	739	(6.5)	1 161	(6.8)
Gauteng	2 478	(42.7)	1 496	(13.2)	3 973	(23.2)
KwaZulu-Natal	1 475	(25.4)	1 523	(13.5)	2 997	(17.5)
Limpopo	0	(0.0)	1 774	(15.7)	1 774	(10.4)
Mpumalanga	0	(0.0)	1 870	(16.5)	1 870	(10.9)
North West	0	(0.0)	1 366	(12.1)	1 366	(8.0)
Northern Cape	0	(0.0)	469	(4.2)	469	(2.7)
Western Cape	787	(13.6)	734	(6.5)	1 521	(8.9)
Total	5 800	(100.0)	11 303	(100.0)	17 103	(100.0)

5.4.4 Other unintentional

Of the 7 153 other unintentional deaths, 72 percent were male (Table 7), and Table 22 indicates that the overall peak was among the 1–4 year age group (11.3 percent), which was largely due to the peak for females of that age group (16.9 percent). Figure 23 also indicates that other unintentional deaths were high between the ages of 15 and 49 years, with a peak for males aged between 25 and 29 years (10 percent). Age was unknown for 3.8 percent of other unintentional deaths.

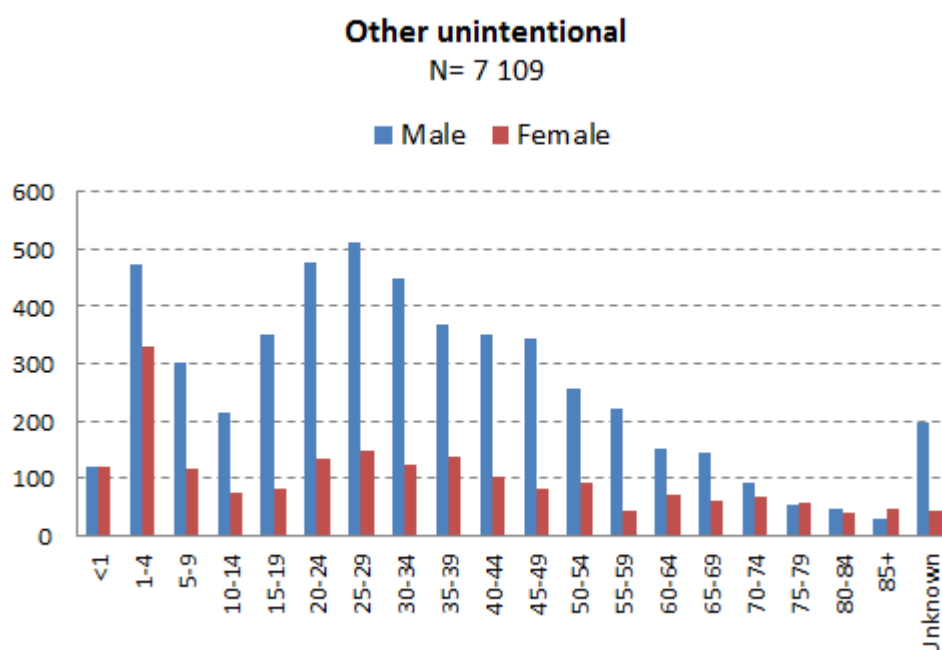


Figure 23: Distribution of other unintentional fatal injuries by age and sex, South Africa 2009 (N = 7 109)

Table 22: Age distribution of other unintentional fatal injuries by sex, 2009

Age	Other unintentional (weighted)							
	Male		Female		Unknown		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
<1	119	(2.3)	118	(6.0)	2	(4.4)	239	(3.3)
1–4	474	(9.2)	331	(16.9)	1	(2.2)	806	(11.3)
5–9	303	(5.9)	118	(6.0)	2	(4.4)	422	(5.9)
10–14	213	(4.1)	73	(3.7)	0	(0.0)	286	(4.0)
15–19	351	(6.8)	82	(4.2)	1	(2.2)	434	(6.1)
20–24	475	(9.2)	132	(6.7)	0	(0.0)	607	(8.5)
25–29	514	(10.0)	148	(7.5)	0	(0.0)	661	(9.2)
30–34	450	(8.7)	124	(6.3)	1	(2.2)	575	(8.0)
35–39	369	(7.2)	135	(6.9)	0	(0.0)	504	(7.1)
40–44	352	(6.8)	101	(5.2)	2	(4.4)	455	(6.4)
45–49	345	(6.7)	81	(4.2)	0	(0.0)	427	(6.0)
50–54	255	(5.0)	92	(4.7)	0	(0.0)	347	(4.8)
55–59	220	(4.3)	41	(2.1)	0	(0.0)	261	(3.7)
60–64	151	(2.9)	72	(3.7)	0	(0.0)	223	(3.1)
65–69	143	(2.8)	62	(3.1)	0	(0.0)	205	(2.9)
70–74	92	(1.8)	66	(3.3)	0	(0.0)	158	(2.2)
75–79	55	(1.1)	56	(2.9)	0	(0.0)	111	(1.5)
80–84	48	(0.9)	40	(2.1)	0	(0.0)	88	(1.2)
85+	27	(0.5)	45	(2.3)	0	(0.0)	73	(1.0)
Unknown	196	(3.8)	41	(2.1)	36	(80.0)	273	(3.8)
Total	5 151	(100.0)	1 958	(100.0)	45	(100.0)	7 153	(100.0)

Overall, the majority of other unintentional deaths were African, followed by the coloured population group (Table 23). The Asian population had 3.8 male deaths for every female death. The ratio was lower for the African, coloured and white population (2.8, 2.2 and 1.8 male deaths for every female death respectively).

Table 23: Sex distribution of other unintentional fatal injuries by population group, South Africa 2009

Population group	Other unintentional (Weighted)							
	Male		Female		Unknown		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
African	4 145	(73.5)	1 486	(26.3)	10	(0.2)	5 641	(100.0)
Coloured	558	(68.2)	259	(31.6)	1	(0.1)	817	(100.0)
Asian	99	(79.0)	26	(21.0)	0	(0.0)	125	(100.0)
White	319	(64.8)	173	(35.2)	0	(0.0)	493	(100.0)
Unknown	30	(39.0)	13	(17.3)	34	(43.7)	77	(100.0)
Total	5 151	(72.0)	1 958	(27.4)	45	(0.6)	7 153	(100.0)

Figure 24 shows that other unintentional deaths peaked in December for males, and were high during the summer and winter months. For females, other unintentional deaths peaked in March, August and November.

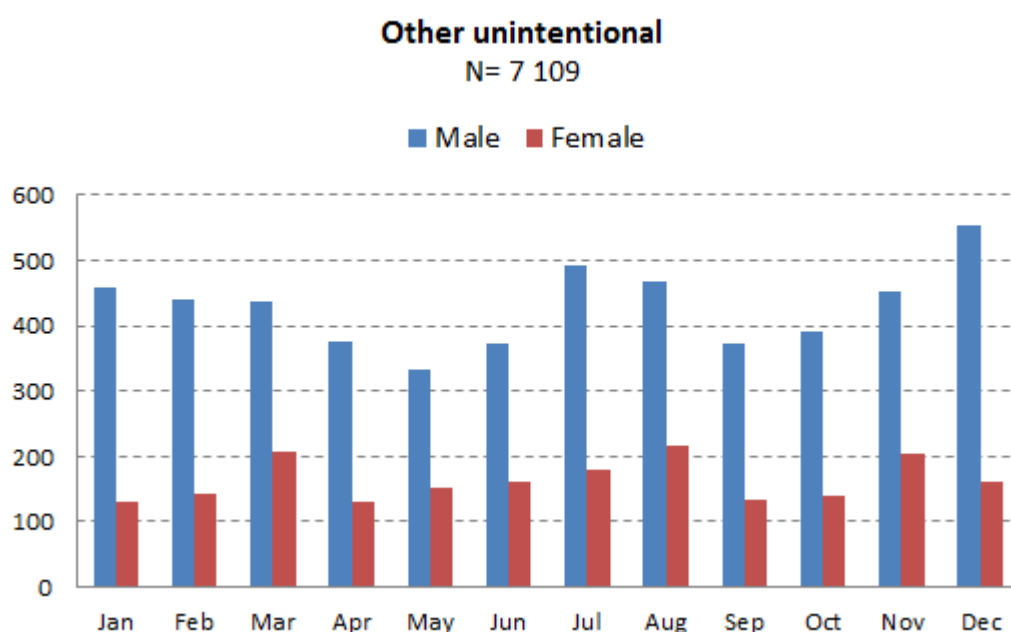


Figure 24: Distribution of other unintentional by month and sex, South Africa 2009 (N = 7 109)

For males, other unintentional deaths peaked on Sundays, while the peak for females was on Tuesdays (Figure 25). Nearly one-third of other unintentional deaths occurred on a Saturday and Sunday, but deaths were also high during the early period of the week.

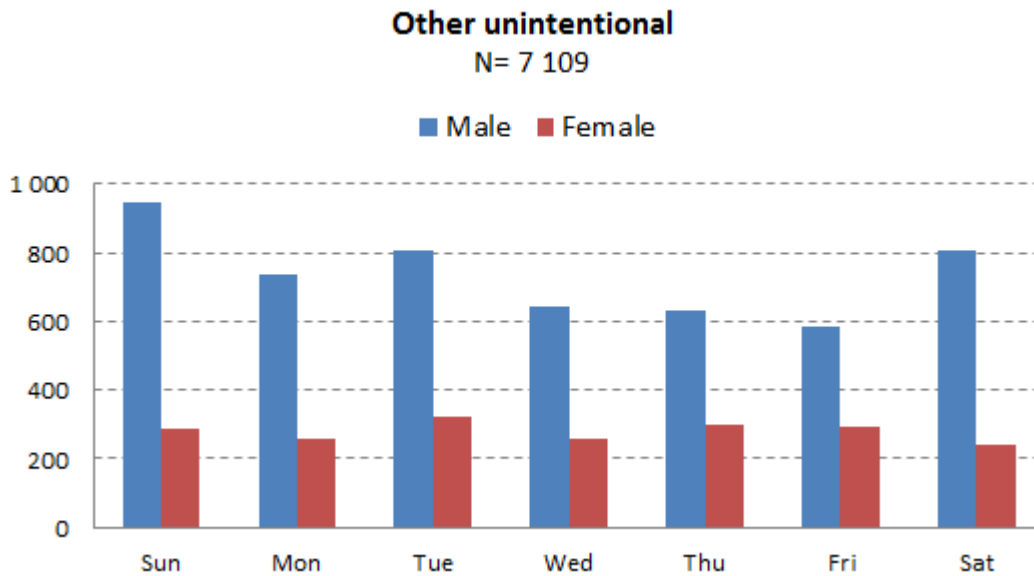


Figure 25: Distribution of other unintentional by week and sex, South Africa 2009 (N = 7 109)

A provincial breakdown for other unintentional deaths indicates that 22.5 percent of deaths were from Gauteng, followed by KwaZulu-Natal (19.1 percent) and the Western Cape (16.6 percent) (Table 24). These were also the provinces with the highest proportion of other unintentional deaths in metro areas. The Eastern Cape (17.8 percent) and KwaZulu-Natal (16.5 percent) had the highest proportion of other unintentional deaths in non-metro areas (Figure 26).

Table 24: Provincial distribution of other unintentional fatal injuries by metro and non-metro areas, South Africa 2009

Province	Other unintentional (weighted)					
	Metro		Non-metro		Total	
	n	%	n	%	n	%
Eastern Cape	282	(10.1)	775	(17.8)	1 057	(14.8)
Free State	176	(6.3)	292	(6.7)	468	(6.5)
Gauteng	1 073	(38.4)	537	(12.3)	1 611	(22.5)
KwaZulu-Natal	640	(23.1)	719	(16.5)	1 365	(19.1)
Limpopo	0	(0.0)	402	(9.2)	402	(5.6)
Mpumalanga	0	(0.0)	318	(7.3)	318	(4.4)
North West	0	(0.0)	512	(11.8)	512	(7.2)
Northern Cape	0	(0.0)	235	(5.4)	235	(3.3)
Western Cape	620	(22)	568	(13.0)	1 184	(16.6)
Total	2 792	(100.0)	4 358	(100.0)	7 153	(100.0)

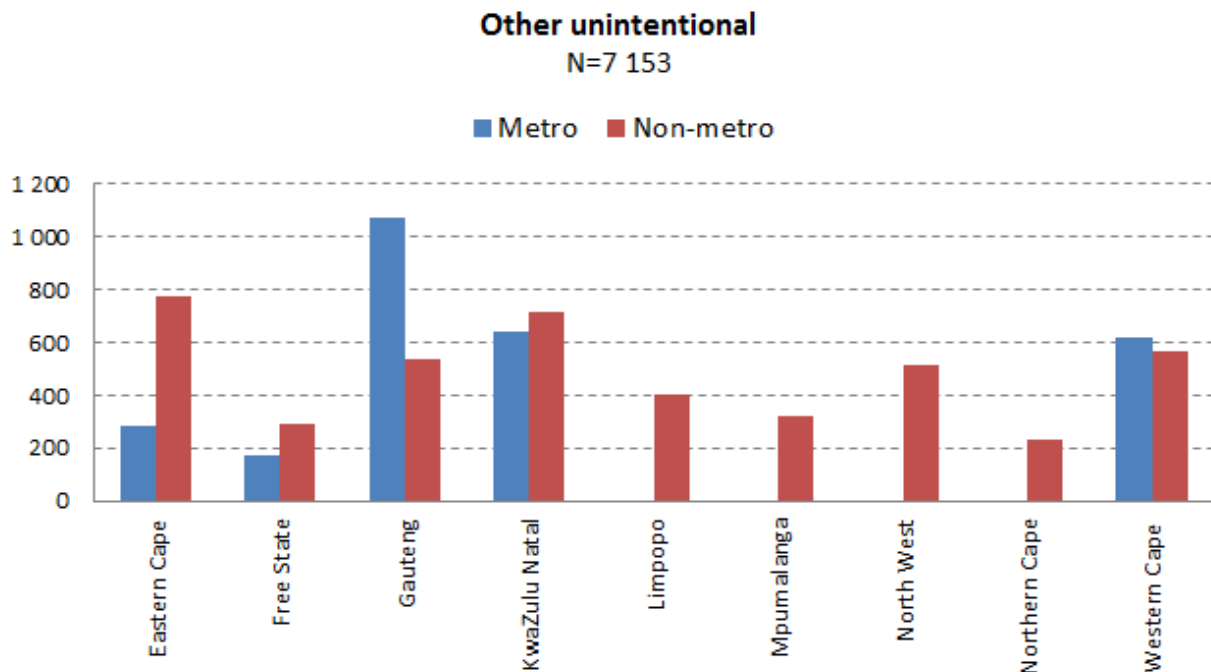


Figure 26: Distribution of other unintentional by metro/non-metro area and province, South Africa 2009 (N = 7 153)

Table 25 shows that fires and drowning were the leading circumstance of other unintentional deaths. A higher proportion of males drowned (26.7 percent), while females had a higher proportion of fire-related deaths (36.8 percent). There were slightly more male deaths due to falls (10.4 percent) and more female deaths due to surgical or medical complications (11 percent).

Table 25: Circumstance of other unintentional fatal injuries by sex, South Africa 2009

Circumstance	Other unintentional (weighted)							
	Male		Female		Unknown		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Fire	1 239	(24.1)	720	(36.8)	13	(29.8)	1 973	(27.6)
Drowning	1 376	(26.7)	307	(15.7)	7	(15.6)	1 690	(23.6)
Fell	538	(10.4)	154	(7.9)	5	(11.8)	697	(9.7)
Surgical	182	(3.5)	216	(11.0)	4	(9.1)	402	(5.6)
Ingestion	231	(4.5)	104	(5.3)	2	(4.4)	337	(4.7)
Electrocution	200	(3.9)	66	(3.4)	1	(2.2)	267	(3.7)
Lightning	198	(3.8)	60	(3.1)	0	(0.0)	258	(3.6)
Suffocated	152	(2.9)	53	(2.7)	0	(0.0)	205	(2.9)
Blunt force	174	(3.4)	29	(1.5)	0	(0.0)	203	(2.8)
Crushing	168	(3.3)	18	(0.9)	0	(0.0)	186	(2.6)
Gassing	94	(1.8)	37	(1.9)	0	(0.0)	130	(1.8)
Environmental	82	(1.6)	38	(2.0)	1	(2.2)	121	(1.7)
Animal contact	90	(1.8)	20	(1.0)	0	(0.0)	111	(1.5)
Circumcision	83	(1.6)	0	(0.0)	0	(0.0)	83	(1.2)
Sharp force	42	(0.8)	6	(0.3)	0	(0.0)	48	(0.7)
Firearm	40	(0.8)	8	(0.4)	0	(0.0)	48	(0.7)
Machinery	23	(0.4)	3	(0.1)	0	(0.0)	26	(0.4)
Explosive blast	19	(0.4)	0	(0.0)	0	(0.0)	19	(0.3)
Other	34	(0.7)	9	(0.5)	4	(9.2)	47	(0.7)
Unknown	187	(3.6)	109	(5.6)	7	(15.6)	303	(4.2)
Total	5 151	(100.0)	1 958	(100.0)	45	(100.0)	7 153	(100.0)

5.4.5 Undetermined deaths

Of the 2 099 undetermined deaths, 77 percent were male (Table 7), and Table 26 indicates that the peak was among the 30–34 year age group (12 percent). Figure 27 also indicates that undetermined deaths were high between the ages of 20 and 34 years, after which it declines. Age was unknown for 9.8 percent of undetermined deaths. Compared to males, females had a higher proportion of deaths in the younger than 15 year age group (Table 26).

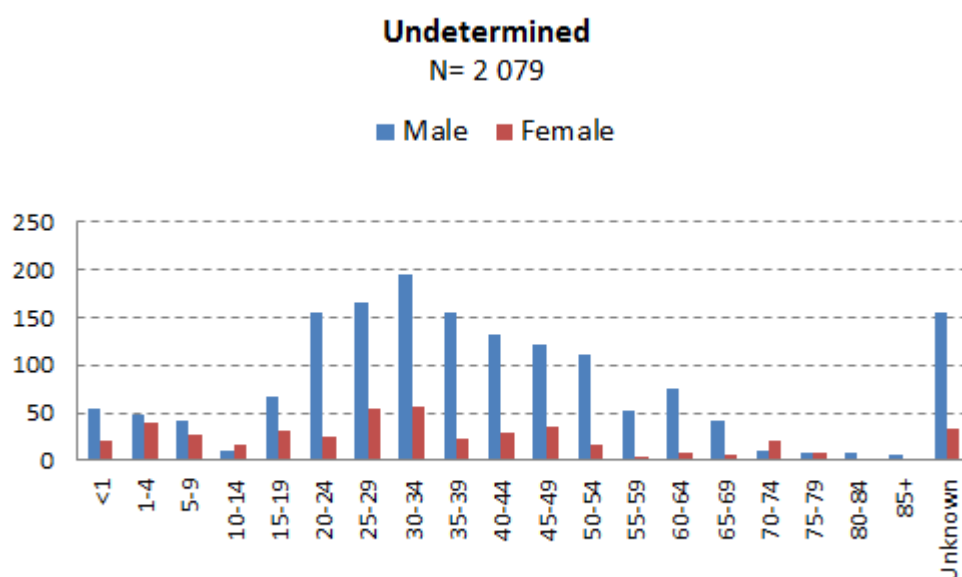


Figure 27: Distribution of undetermined deaths by age and sex, South Africa 2009 (N = 2 079)

Table 26: Age distribution of undetermined deaths by sex, South Africa 2009

Age	Undetermined intent (weighted)							
	Male		Female		Unknown		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
<1	54	(3.3)	22	(4.8)	0	(0.0)	76	(3.6)
1–4	48	(3.0)	39	(8.5)	0	(0.0)	87	(4.1)
5–9	42	(2.6)	27	(5.8)	0	(0.0)	68	(3.3)
10–14	11	(0.7)	18	(3.9)	0	(0.0)	29	(1.4)
15–19	68	(4.2)	31	(6.7)	0	(0.0)	99	(4.7)
20–24	156	(9.6)	24	(5.3)	0	(0.0)	180	(8.6)
25–29	165	(10.2)	55	(12.0)	0	(0.0)	221	(10.5)
30–34	195	(12.1)	56	(12.2)	0	(0.0)	251	(12)
35–39	156	(9.6)	22	(4.9)	3	(15.5)	181	(8.6)
40–44	132	(8.1)	29	(6.4)	0	(0.0)	161	(7.7)
45–49	121	(7.5)	36	(7.9)	0	(0.0)	158	(7.5)
50–54	111	(6.9)	17	(3.7)	0	(0.0)	129	(6.1)
55–59	52	(3.2)	4	(0.8)	0	(0.0)	56	(2.7)
60–64	76	(4.7)	8	(1.6)	0	(0.0)	84	(4.0)
65–69	41	(2.5)	6	(1.3)	0	(0.0)	47	(2.2)
70–74	10	(0.6)	22	(4.7)	0	(0.0)	32	(1.5)
75–79	8	(0.5)	9	(1.9)	0	(0.0)	17	(0.8)
80–84	9	(0.5)	1	(0.2)	0	(0.0)	10	(0.5)
85+	7	(0.4)	1	(0.2)	0	(0.0)	8	(0.4)
Unknown	156	(9.6)	33	(7.2)	17	(84.5)	206	(9.8)
Total	1 618	(100.0)	461	(100.0)	20	(100.0)	2 099	(100.0)

The leading circumstances of undetermined deaths were ingestion (19.9 percent) followed by fires and blunt force (Table 27). Females had a higher proportion of ingestion (26.2 percent) and fire-related deaths (21.9 percent) compared to males. For males, death due to blunt force, firearms, falls and hanging were higher than for females. These circumstances indicate that the deaths could be contributed to varying apparent manners of death. For a further one-quarter of deaths, the circumstance was unknown.

Table 27: Circumstance of deaths of undetermined intent by sex, South Africa 2009

Circumstance	Undetermined intent (Weighted)							
	Male		Female		Unknown		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Ingestion	293	(18.1)	121	(26.2)	3	(15.5)	417	(19.9)
Fire	179	(11.1)	101	(21.9)	3	(15.9)	283	(13.5)
Blunt force	251	(15.5)	22	(4.7)	0	(0.0)	273	(13.0)
Drowning	91	(5.6)	34	(7.4)	0	(0.0)	125	(6.0)
Firearm	82	(5.1)	5	(1.2)	0	(0.0)	87	(4.2)
Gassing	63	(3.9)	22	(4.8)	0	(0.0)	85	(4.0)
Fell	60	(3.7)	8	(1.8)	0	(0.0)	69	(3.3)
Hanging	61	(3.8)	5	(1.0)	0	(0.0)	66	(3.2)
Strangled	21	(1.3)	16	(3.6)	0	(0.0)	37	(1.8)
Surgical	12	(0.7)	11	(2.3)	0	(0.0)	23	(1.1)
Sharp force	20	(1.2)	3	(0.6)	0	(0.0)	22	(1.1)
Electrocution	17	(1.0)	4	(0.8)	0	(0.0)	21	(1.0)
MV unspecified	0	(0.0)	4	(0.8)	0	(0.0)	4	(0.2)
Rail pedestrian	3	(0.2)	0	(0.0)	0	(0.0)	3	(0.2)
MV pedestrian	1	(0.1)	2	(0.3)	0	(0.0)	3	(0.1)
Other	46	(2.9)	18	(4.0)	63	(27.4)	64	(3.1)
Unknown	418	(25.8)	85	(18.5)	14	(68.6)	517	(24.6)
Total	1 618	(100.0)	461	(100.0)	20	(100.0)	2 099	(100.0)

5.5 Injury mortality profiles

Figure 28 shows the ranking of non-natural deaths nationally for 2009 by sex. Homicide accounted for 36.2 percent of non-natural deaths, followed by one-third of deaths as a result of road traffic injuries. Suicides accounted for a higher percentage of male deaths (12.3 percent compared to among females) and were the third leading cause of injury death overall. The profile for metro and non-metro areas are shown in Figure 29 and Figure 30 respectively.

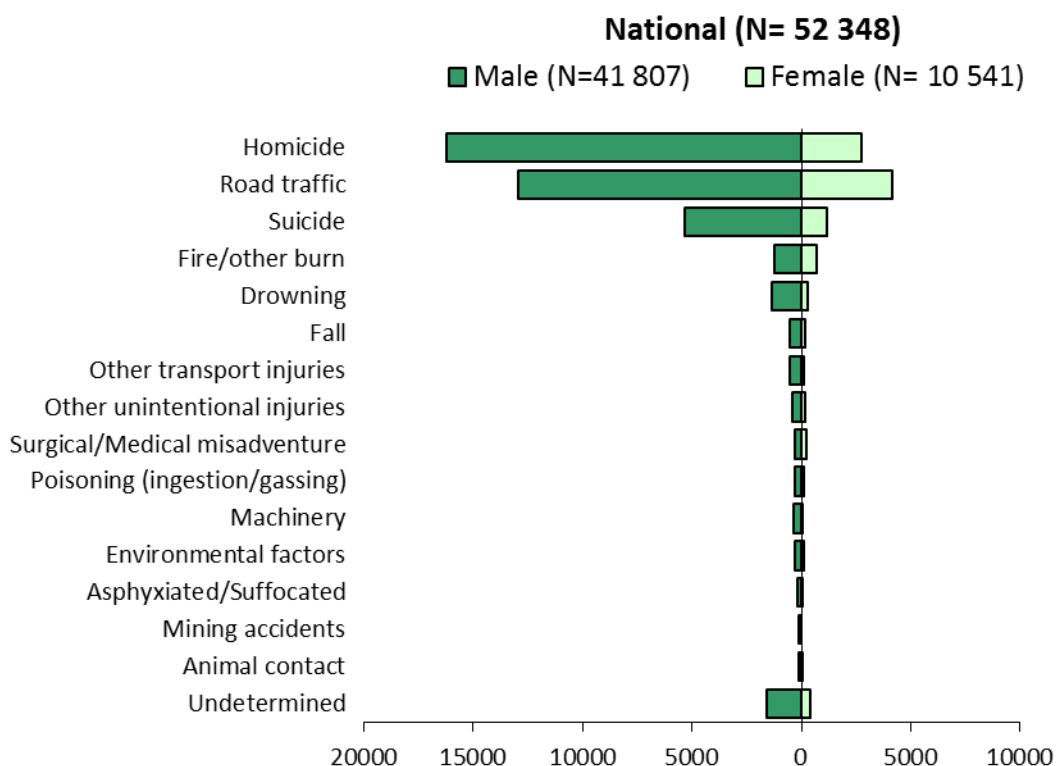


Figure 28: Injury death profile by sex, South Africa 2009 (N = 52 348)

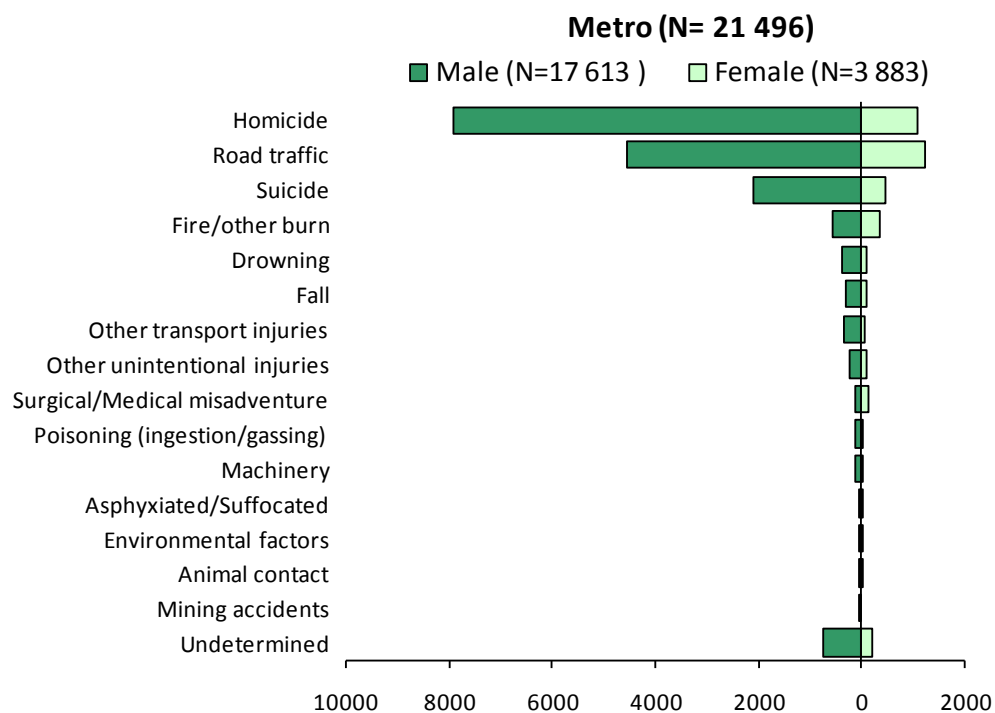


Figure 29: Injury death profile by sex for metro areas, South Africa 2009 (N = 21 496)

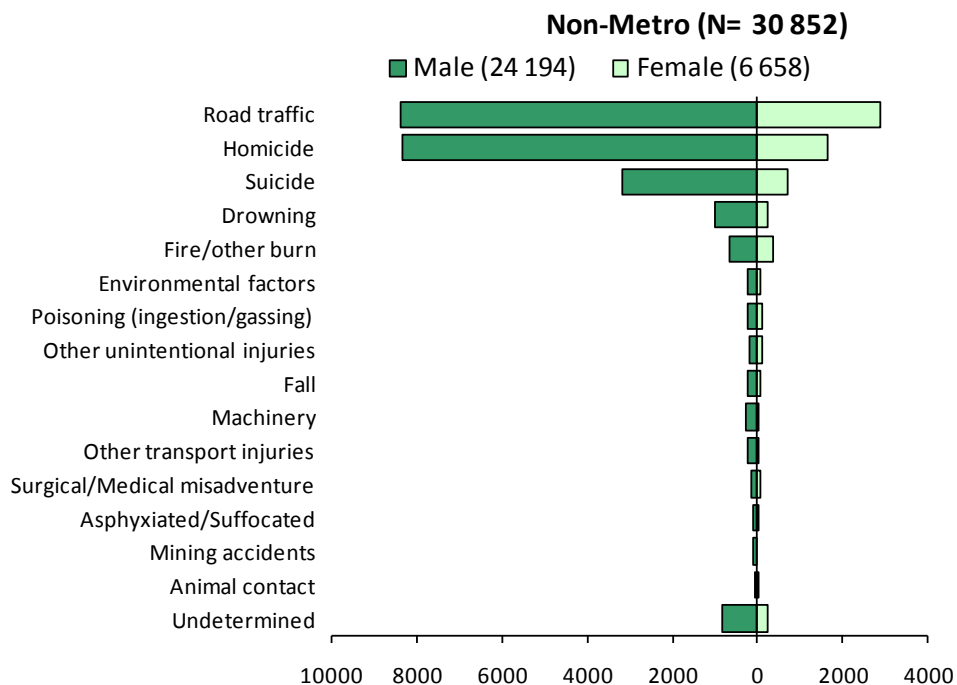
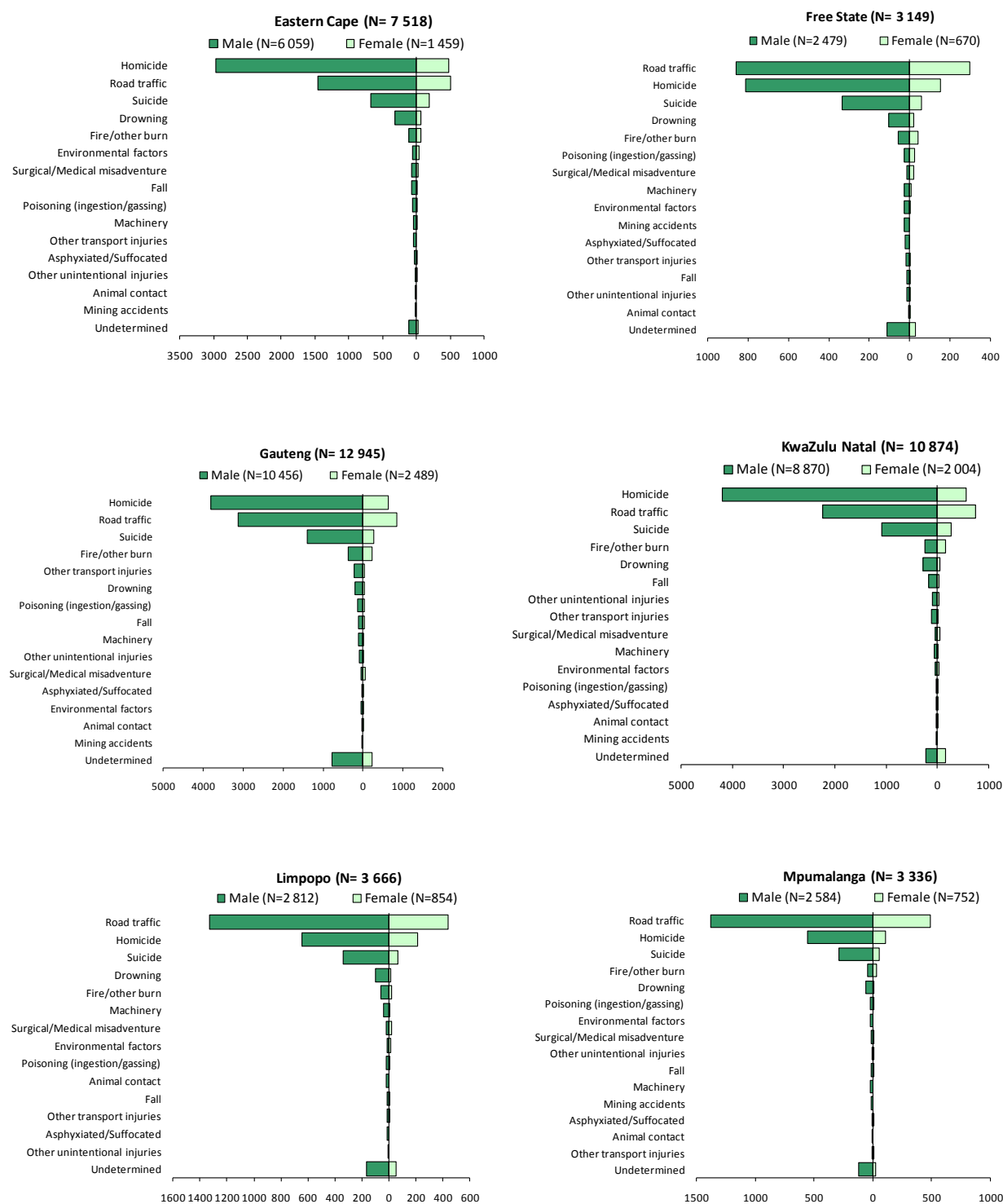


Figure 30: Injury death profile by sex for non- metro areas, South Africa 2009 (N = 30 852)

Figure 31 shows the ranking of non-natural deaths for each of the nine provinces by sex. Homicide ranked highest for five of the nine provinces, except for the Free State, Limpopo, Mpumalanga and North West provinces, where road traffic injuries ranked highest. Suicide ranked third highest for all provinces, while the ranking for other specified unintentional injuries, i.e. fires, drowning, falls, etc. varied by province. Detailed information is available in Table 28.



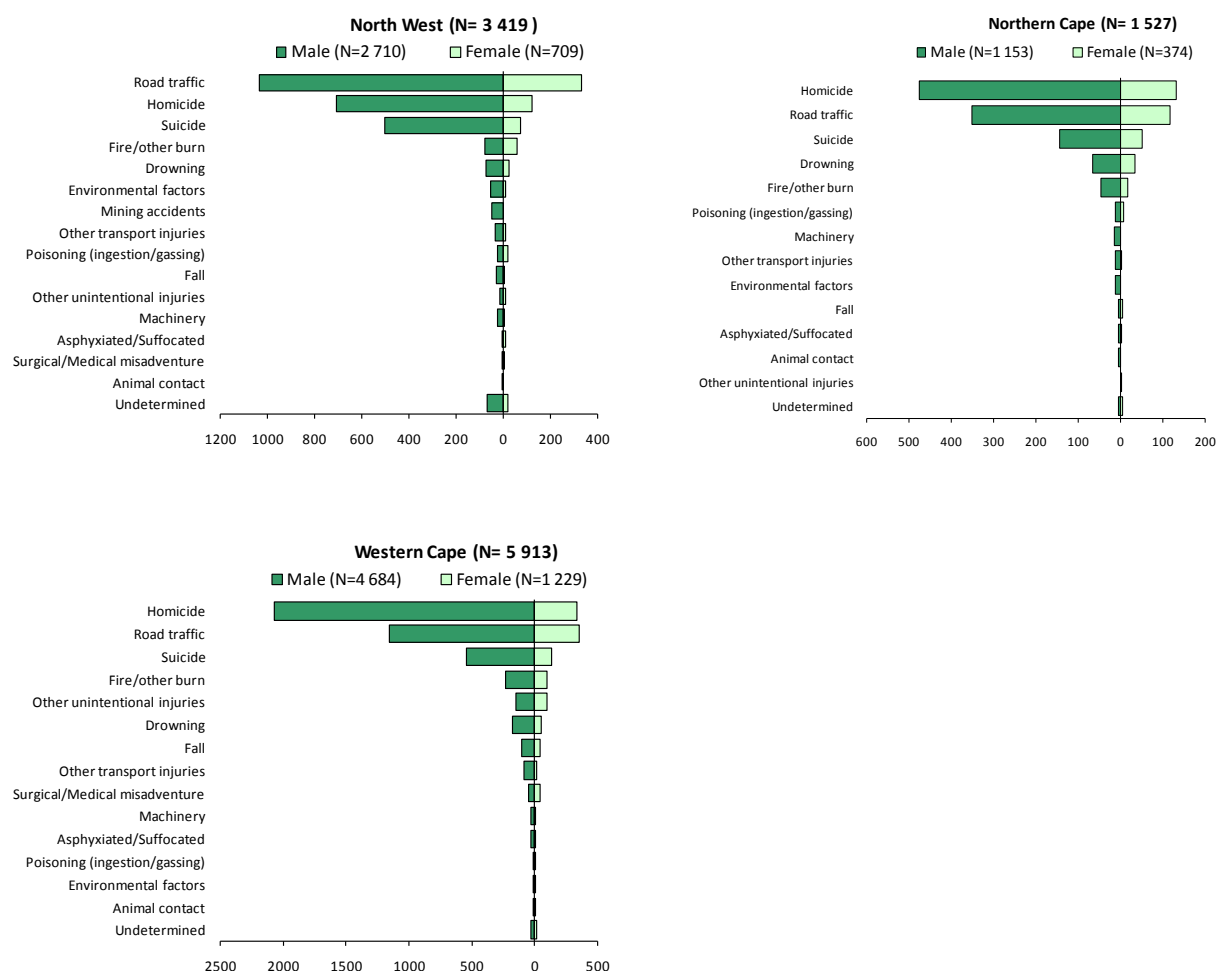


Figure 31: Provincial injury death profiles by sex, 2009

Table 28: Injury death profile by province, 2009

	Eastern Cape		Free State		Gauteng		North West		KwaZulu-Natal		Limpopo		Mpumalanga		Northern Cape		Western Cape		South Africa	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Homicide	3 458	(45.9)	970	(30.7)	4 436	(34.2)	829	(24.2)	4 779	(43.8)	860	(23.4)	668	(20.0)	607	(39.7)	2 422	(40.7)	19 028	(36.2)
Road traffic	1 969	(26.2)	1 161	(36.8)	3 973	(30.6)	1 366	(39.9)	2 997	(27.5)	1 774	(48.2)	1 870	(55.9)	469	(30.7)	1 521	(25.5)	17 100	(32.6)
Suicide	861	(11.4)	395	(12.5)	1 656	(12.8)	577	(16.9)	1 354	(12.4)	410	(11.1)	339	(10.1)	197	(12.9)	683	(11.5)	6 471	(12.3)
Fire/Other burn	185	(2.5)	99	(3.1)	589	(4.5)	134	(3.9)	403	(3.7)	82	(2.2)	77	(2.3)	64	(4.2)	334	(5.6)	1 969	(3.8)
Drowning	384	(5.1)	122	(3.9)	231	(1.8)	98	(2.9)	334	(3.1)	116	(3.2)	69	(2.1)	99	(6.5)	236	(4.0)	1 690	(3.2)
Fall	92	(1.2)	19	(0.6)	151	(1.2)	38	(1.1)	194	(1.8)	19	(0.5)	18	(0.5)	9	(0.6)	149	(2.5)	689	(1.3)
Other transport	39	(0.5)	19	(0.6)	262	(2.0)	46	(1.3)	132	(1.2)	16	(0.4)	5	(0.2)	14	(0.9)	106	(1.8)	639	(1.2)
Other unintentional	31	(0.4)	17	(0.5)	116	(0.9)	27	(0.8)	133	(1.2)	8	(0.2)	20	(0.6)	2	(0.2)	259	(4.3)	614	(1.2)
Surgical/medical misadventure	94	(1.2)	36	(1.1)	106	(0.8)	12	(0.3)	106	(1.0)	44	(1.2)	21	(0.6)	0	(0)	89	(1.5)	508	(1.0)
Poisoning (ingestion/ gassing)	70	(0.9)	48	(1.5)	172	(1.3)	44	(1.3)	25	(0.2)	24	(0.6)	36	(1.1)	20	(1.3)	27	(0.5)	465	(0.9)
Mechanical forces	55	(0.7)	34	(1.1)	129	(1.0)	27	(0.8)	70	(0.6)	48	(1.3)	18	(0.5)	16	(1)	42	(0.7)	439	(0.8)
Environmental factors	99	(1.3)	33	(1.0)	45	(0.3)	62	(1.8)	64	(0.6)	31	(0.9)	23	(0.7)	13	(0.9)	8	(0.1)	377	(0.7)
Asphyxiated/ Suffocated	31	(0.4)	25	(0.8)	46	(0.4)	15	(0.4)	20	(0.2)	0	(0)	10	(0.3)	7	(0.4)	38	(0.6)	203	(0.4)
Mining accidents	3	(0.0)	27	(0.9)	16	(0.1)	50	(1.4)	3	(0.0)	11	(0.3)	16	(0.5)	0	(0)	0	(0)	116	(0.2)
Animal contact	18	(0.2)	8	(0.2)	27	(0.2)	7	(0.2)	16	(0.1)	20	(0.5)	8	(0.2)	4	(0.3)	4	(0.1)	111	(0.2)
Undetermined	140	(1.9)	141	(5.4)	1 008	(7.8)	91	(2.6)	287	(2.6)	217	(5.9)	145	(4.3)	8	(0.5)	38	(0.6)	2 075	(4.0)
Total	7 527	(100)	3 155	(100)	12 964	(100)	3 421	(100)	10 917	(100)	3 679	(100)	3 345	(100)	1 529	(100)	5 956	(100)	52 493	(100)

5.6 Comparison with other national data sources

The results set out in the preceding sections describe the raw and weighted data from the survey. In preparation for the National Burden of Disease Study, it is necessary to understand how these results compare with other data. In this section, the IMS results are compared to several other data sources that might provide useful comparisons, namely:

- profile and completeness of death certification data reported by Stats SA
- murder (i.e. homicide) and road traffic mortality statistics from the South African Police Services and the Department of Transport respectively
- comparison of female and child homicide with the *Female and Child Homicide* study undertaken by the MRC's Gender and Health Research Unit
- mortuary-based surveillance statistics from the National Injury Mortality Surveillance System (NIMSS) in provinces with complete and near-complete coverage (Gauteng and Mpumalanga).

5.6.1 Death certification

The value of the data collected in this survey is immediately apparent when comparing the apparent manner of injury death profile (Figure 4) with data from Stats SA for the corresponding period (Figure 32). It is clear that the coding regimen adopted by Stats SA, which codes gunshot wounds of unknown intent to ICD code X59 in the unintentional injury category (the default as applied in high income countries), artificially increases other unintentional injury deaths, which the current survey is better able to allocate to other categories.

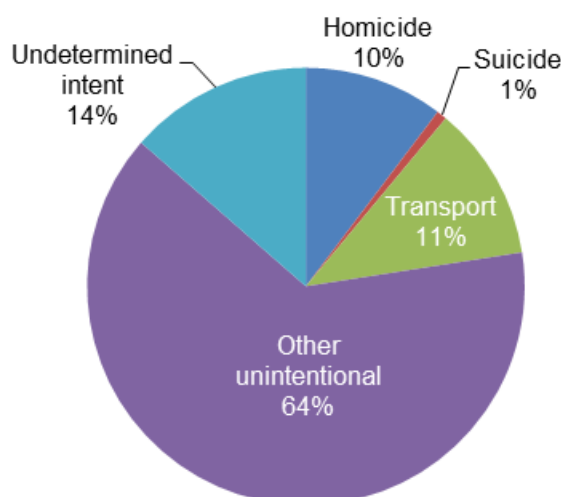


Figure 32: Apparent manner of injury deaths, Stats SA 2009 (N = 49 456)

It is also clear that at face value, the current survey recorded approximately 6 percent more injury deaths than were recorded by Stats SA in the corresponding period (52 493 vs. 49 456). The 95 percent confidence interval for the IMS total injuries is 45 949–59 037, which is within the number reported by Stats SA. However, analysis by age suggest that Stats SA recorded more infant injury deaths and more injury deaths among people older than 60 years (Figure 33). Analysis of Stats SA data suggests that there is considerable age mis-statement at older ages for all causes of death (22). It is also conceivable that inflated numbers of injury deaths in the older age categories in the Stats SA data has resulted from the mis-classification of deaths of undetermined cause (i.e. where it was not certain whether deaths were due to natural or non-natural causes) as ill-defined injury deaths (Figure 33). This might be because the deaths under investigation that are initially categorised as injury deaths when reported to Stats SA, are not updated once the investigations are completed. However, the updated information would have been available in the mortuary records.

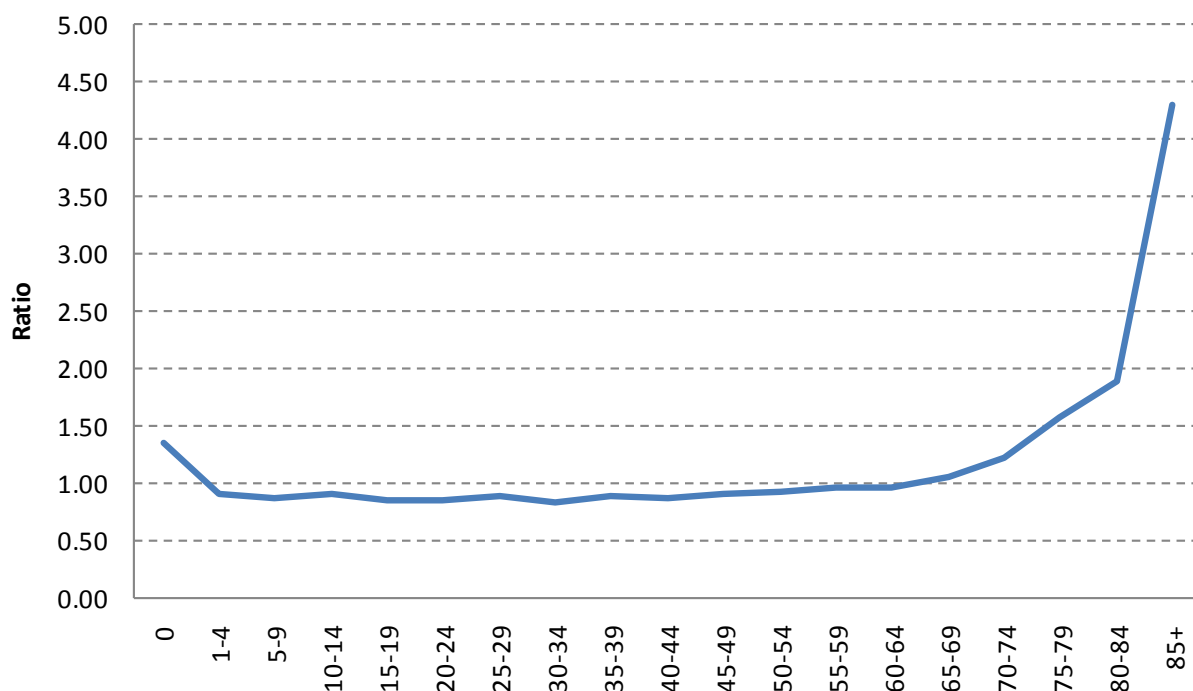


Figure 33: StatsSA:IMS ratio by age group

5.6.2 Murder and road deaths

The police recorded 16 834 murders during the 2009 “financial year”. i.e. from 1 April 2009 to 31 March 2010^{vi} This represented 12 percent fewer cases than the estimated 19 028

^{vi} SAPS Crime Research and Statistics. 2011. Murder in RSA for April to March 2003/2004 to 2010/2011.

homicides in this survey, but the difference was not statistically different at the 5 percent level (95 percent CI: 16 380 to 21 676). Similarly, the Road Traffic Management Corporation estimated that there were 13 768 road deaths in 2009,^{vii} whereas the survey estimated 17 103 road deaths. This was below the 95 percent confidence limits of the survey (14 693–19 513). However, it should be noted that it is unlikely that both homicides and road traffic injuries, which together account for almost 70 percent of the estimated non-natural deaths, are being overestimated simultaneously by the survey.

5.6.3 *Femicide and child homicide study*

The *Female and Child Homicide* study conducted over the same period by the MRC's Gender and Health Research Unit using a comparable sampling framework, but a far more detailed record review than the process undertaken in the current study, provided another useful source of data for comparative purposes. The *Female and Child Homicide* study recorded a total of 2 368 female homicides among women older than 14 years of age compared to the 2 534 recorded in this study. This difference would fit within the sampling error of both surveys.

In addition, the *Female and Child Homicide* study identified a total of 598 homicides among children younger than 15 years of age for both sexes, compared to the 568 recorded in this study. Nevertheless, there were considerable discrepancies when these data were stratified by age. This study recorded 286 homicides among children younger than 5 years of age compared to the 400 in the *Female and Child Homicide* study and 203 homicides among children between 10 and 14 years of age, compared to 110. There was no discernable difference in the 5–9 year age category: 83 homicides compared to 88.

5.6.4 *Mortuary-based surveillance statistics*

Since 2008, the NIMSS has provided full coverage of injury mortality in Mpumalanga and near full coverage in Gauteng. In Table 29, the mortality profiles from these surveillance systems are compared with data drawn from the current Injury Mortality Survey. The data indicate that the cause profiles are similar but that the current IMS study has a lower proportion of injury deaths due to undetermined intent, as the IMS distinguishes these from deaths due to undetermined causes. There were also differences in the total number of non-natural deaths recorded. The NIMSS' higher caseload for Mpumalanga seems to be an

Available at: <http://www.saps.gov.za/statistics/reports/crimestats/2011/categories.htm>. Accessed 20 June 2012.

^{vii} The RTMC figure is an estimate, as the total number of deaths is based on an estimated number of deaths per fatal crash (the unit of reporting). However, no confidence interval was available.

overestimate^{viii}, whereas the higher caseload reported by the IMS in Gauteng is most probably due to the NIMSS excluding Pretoria mortuary from their sample.

Table 29: Comparison of provincial estimates from the IMS versus routine mortuary-based injury surveillance systems, 2009

	Mpumalanga			Gauteng		
	NIMSS	IMS		NIMSS	IMS	
	<i>n</i> (%)	<i>n</i> (%)	95% CI	<i>n</i> (%)	<i>n</i> (%)	95% CI
Natural	532 (10.5)	472 (12.1)	136 :808	1 401 (11.0)	1 889 (11.9)	1 452 :2 326
Non-natural	4 520 (89.5)	3 345 (85.8)	1 430 :5 260	11 329 (89.0)	12 964 (81.7)	9 492 :16 437
Homicide	1 015 (20.1)	668 (17.1)	353 :984	3 671 (28.8)	4 436 (28.0)	3 032 :5 840
Suicide	494 (9.8)	339 (8.7)	174 :504	1 278 (10.0)	1 656 (10.4)	1 250 :2 062
Transport	2 046 (40.5)	1 875 (48.1)	638 :3 111	3 248 (25.5)	4 236 (26.4)	3 194 :5 278
- Road traffic	2 036 (40.3)	1 870 (48.0)	631 :3 108	3 081 (24.2)	3 973 (25.1)	3 039 :4 907
Other unintentional	387 (7.7)	318 (8.2)	140 :496	937 (7.4)	1 611 (10.2)	1 245 :1 978
Undetermined	578 (11.4)	145 (3.1)	81 : 209	2 195 (17.2)	1 026 (6.5)	662 :1 389
Foetus	0 (0.0)	42 (1.1)	18 :65	0 (0.0)	541 (3.4)	341 :740
Undetermined (whether natural/non-natural)	0 (0.0)	40 (1.0)	6 :74	0 (0.0)	467 (2.9)	314 :619
Total	5 052 (100.0)	3 899 (100.0)		12 730 (100.0)	15 860 (100.0)	

Source: Mpumalanga PIMSS 2009 and Gauteng PIMSS 2009

^{viii} We compared the NIMSS and IMS totals with data from StatsSA and Home Affairs data for 2009 and the NIMSS data for Mpumalanga in 2008 and 2010. The IMS 2009 data and the NIMSS 2008 and 2010 closely track the StatsSA estimates. The 2009 NIMSS total is the only outlier, which may suggest a combination of double counting and/or misclassification of natural deaths.

5.7 Injury mortality rates

Age-specific and age-standardised injury mortality rates are summarised in Table 30. The national age-standardised mortality rate for all injuries was 109.8 per 100 000 population and the rate for males was 4.3 times higher than for females. The age-specific all-injury mortality rate peaked in the 30–44 year age group at 162.5 per 100 000 and the rate for children under 5 years of age (45.6 per 100 000) was double the rate in the 5–14 year age group (22.7 per 100 000). The injury mortality rate was higher in the metro areas, largely due to the higher all-injury mortality rates among males aged 15–29 years and the higher rates in older ages.

The national age-standardised homicide rate was 39 per 100 000 population. When the age-specific rates for homicide were compared, the 15–29 and 30–44 year age groups were highest at 62.3 and 61.6 per 100 000 respectively. The high rates for these age groups were largely due to the high number of homicides among males, who overall had a homicide rate that was six times higher than for females. A comparison between metro and non-metro areas indicated that homicide rates were higher in metro areas, particularly between the ages of 15 and 44 years. The national, age-standardised road traffic mortality rate of 36.2 per 100 000 population was marginally lower than the homicide rate. Rates were generally higher from the age of 15 years and peaked in the 30–44 year age group at 54.3 per 100 000 population. This was largely due to the high rates for males in non-metro areas. The male road traffic mortality rate was 3.5 times higher than for females and the non-metro road traffic mortality rate (38.2 per 100 000) was higher than the rate in metro areas (33.8 per 100 000).

Table 30: National, metro and non-metro age-specific and age-standardised injury mortality rates (per 100 000 population), South Africa 2009^{ix}

	National			Metro			Non-metro		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Homicide									
0–4	6.8	4.6	5.8	6.6	4.9	6.0	6.9	4.4	5.7
5–14	3.9	1.8	2.9	4.3	2.4	3.3	3.7	1.6	2.7
15–29	111.7	12.9	62.3	170.	15.6	93.7	83.3	11.6	47.3
30–44	110.3	15.6	61.6	125.	17.2	72.6	98.0	14.5	53.4
45–59	67.6	14.0	38.4	74.3	14.8	43.0	62.9	13.5	35.4
60–69	52.1	15.0	31.0	50.6	17.3	32.4	52.9	13.8	30.3
70–79	37.2	18.0	25.3	36.7	7.5	19.1	37.4	22.5	28.1
80+	62.3	11.8	26.8	56.0	11.1	25.7	65.3	12.1	27.2
Age Std	68.9	11.3	39.0	87.5	12.3	49.8	58.7	10.7	33.1
Road									
0–4	16.9	12.7	15.0	17.0	13.0	15.0	16.8	12.6	15.0
5–14	12.7	8.0	10.4	13.8	8.6	11.4	12.2	7.7	10.0
15–29	61.7	17.7	39.7	67.9	15.1	41.6	58.7	19.0	38.7
30–44	91.4	19.5	54.3	72.4	14.5	44.1	107.	22.9	61.9
45–59	78.0	19.5	46.1	62.5	15.9	38.0	88.8	21.8	51.4
60–69	65.4	23.7	41.7	67.0	22.1	42.4	64.5	24.5	41.3
70–79	50.0	20.8	31.8	58.1	21.7	36.3	45.8	20.3	29.6
80+	49.3	13.5	24.1	65.2	19.0	34.1	41.4	11.2	19.7
Age Std	57.8	16.7	36.2	53.7	14.6	33.8	61.7	18.0	38.2
Suicide									
0–4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5–14	1.7	0.8	1.2	1.5	1.1	1.3	1.8	0.7	1.2
15–29	30.2	7.6	18.9	36.1	8.4	22.3	27.4	7.2	17.3
30–44	38.5	6.8	22.2	37.4	6.3	22.2	39.4	7.2	22.2
45–59	31.8	5.0	17.3	28.1	7.2	17.3	34.5	3.6	17.3
60–69	25.1	1.7	11.7	21.9	3.9	12.0	27.0	0.5	11.6
70–79	17.2	3.9	8.9	25.1	3.3	12.0	13.0	4.2	7.4
80+	15.9	2.0	6.1	5.0	1.2	2.4	21.3	2.4	7.7
Age Std	23.6	4.5	13.6	24.1	5.1	14.5	23.6	4.2	13.1
All									
0–4	51.9	38.3	45.6	63.5	46.4	55.4	46.7	34.7	41.2
5–14	29.8	15.3	22.7	31.8	17.7	25.1	29.0	14.4	21.7
15–29	232.1	45.5	138.6	310.	50.2	180.9	194.	43.3	118.5
30–44	280.4	51.8	162.5	276.	47.2	164.6	283.	55.0	161.2
45–59	222.2	47.0	126.7	206.	49.0	123.6	233.	45.7	128.7
60–69	193.0	53.8	113.8	200.	58.7	122.7	188.	51.1	108.8
70–79	147.5	65.3	96.3	168.	69.0	109.1	136.	63.7	90.3
80+	208.5	58.1	102.7	228.	100.6	142.8	198.	40.7	85.3
Age std	183.8	42.7	109.8	202.	45.4	123.1	175.	41.7	103.5

^{ix} To ensure geographic correspondence between the deaths and population estimates, the whole of Gauteng is considered metro and whole of Free State as non metro for the analysis of rates.

The age-specific suicide rate showed a peak in the 30–44 year age group at 22.2 per 100 000 population. The national, age-standardised suicide rate was 13.6 per 100 000 population and the suicide rate for males was 5.2 times higher than for females. Suicide rates were marginally higher in metro areas, where the peak occurred in the 15–44 year age group, while the age-specific profile in non-metro areas was similar to the national profile.

5.7.1 Comparison with first National Burden of Disease Study in 2000

The first National Burden of Disease Study for 2000 estimated injury mortality rates (Table 30) from several data sources based on several assumptions. If they were correct, the homicide rates for both males and females appear to have decreased substantially since 2000. For both road traffic injuries and suicide, the mortality rates amongst females appear to have decreased, whereas amongst males they have remained remarkably similar.

Table 31: National age-specific and age standardised injury mortality rates (per 100 000 population), South Africa 2000

	Male	Female
Homicide		
0–4	14.0	11.7
5–14	5.6	2.6
15–29	184.0	22.5
30–44	180.2	31.7
45–59	107.7	21.0
60+	85.2	32.3
Age Std	113.4	21.0
Road traffic		
0–4	26.7	21.3
5–14	21.4	9.9
15–29	51.9	16.8
30–44	84.2	24.4
45–59	79.9	27.0
60+	81.9	44.7
Age Std	59.4	22.6
Suicide		
0–4	0.0	0.0
5–14	2.1	0.8
15–29	26.3	6.5
30–44	29.4	8.7
45–59	35.0	7.7
60+	38.1	10.9
Age std	23.3	6.1

Source: Norman et al (2007)

5.7.2 Comparison with global age-specific mortality rates

In 2000, male homicide rate in South Africa was approximately eight times the global average and the female homicide rate was five times higher than the global average (2). The male suicide rate was 20 percent higher and amongst females it was less than half the global average. For road traffic injuries the male rate was double and the female rate was approximately 40 percent higher than the global average.

However, when the 2009 IMS results are compared with 2008 global rates (24), the homicide rate for South African males was approximately five times higher, and the female homicide

rate was four times higher than the global rate. In addition, it can be seen that the peak in the homicide rate for South African males was for a broader age group of 15–44 years, while the global age-specific rates showed a gradual decline after the 15–29 year age group (Figure 34). Due to the enormous differences in the rates, it was necessary to use different scales in Figure 34.

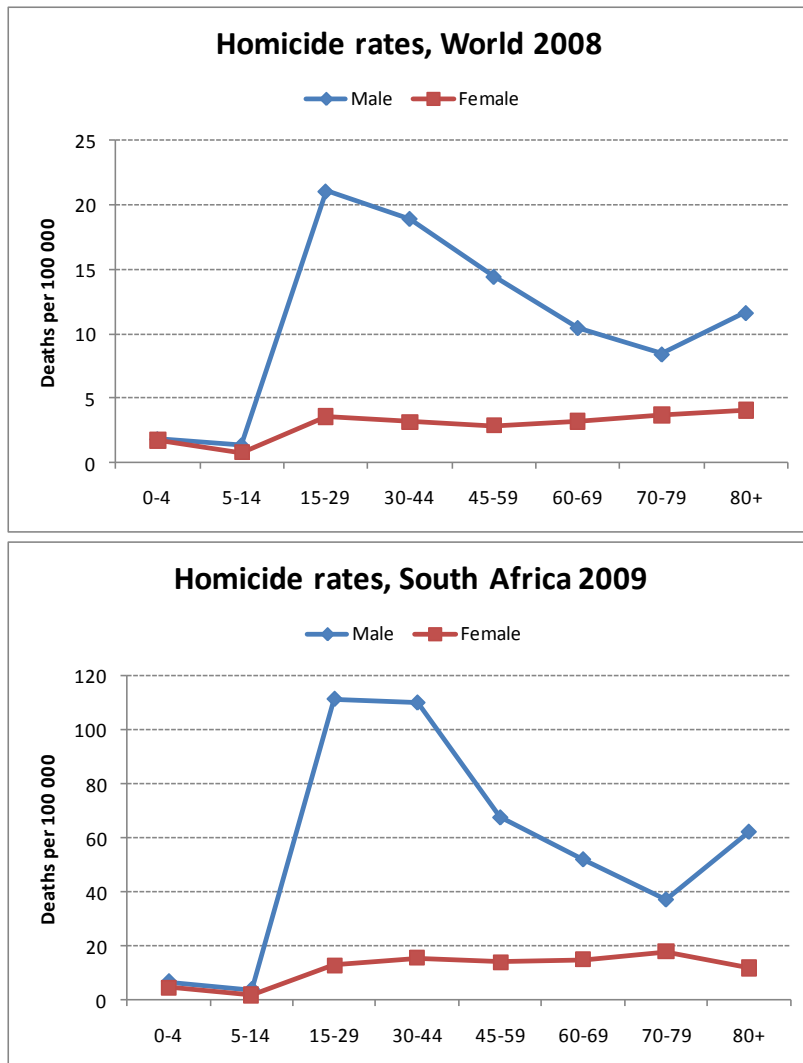


Figure 34: Comparison of age-specific homicide rates

Source: Adapted from WHO, 2011

The suicide rate for males in South Africa was 1.6 times the global rate, however the global female suicide rate was 0.6 times higher than the rate for South African females. Globally, suicides peaked among the elderly, but in South Africa it peaked among the 30–44 year age group for males and the 15–29 year age group for females (Figure 35).

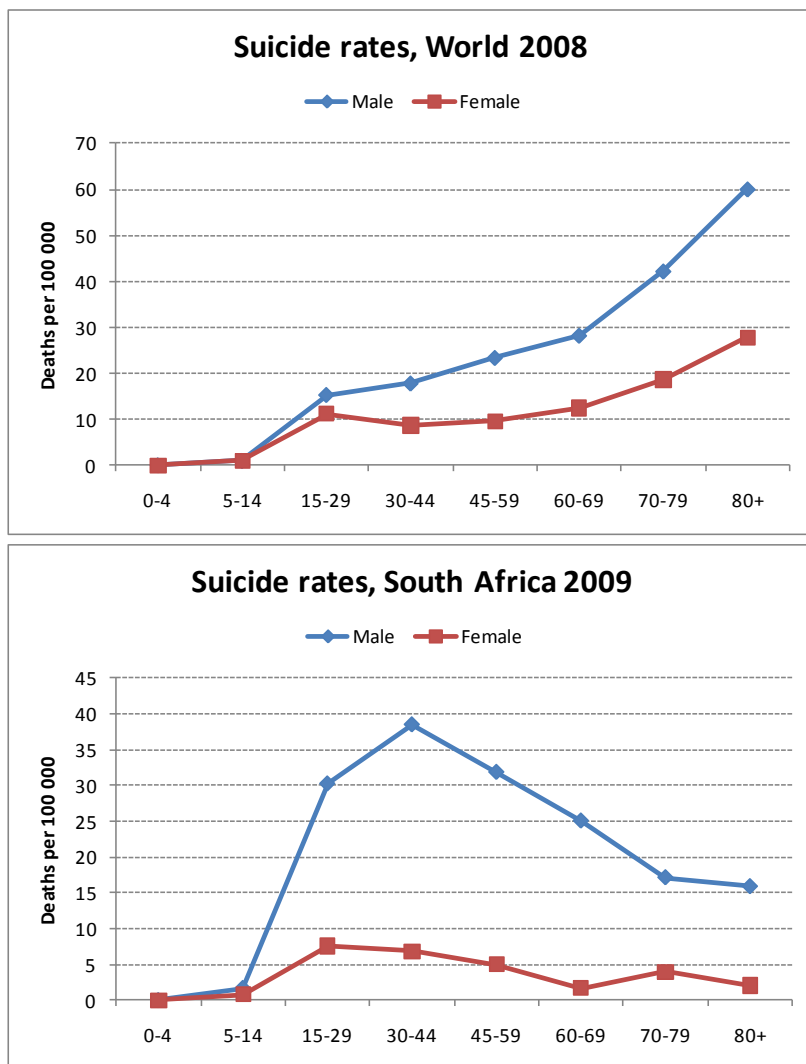


Figure 35: Comparison of age-specific suicide rates

Source: Adapted from WHO, 2011

The road traffic mortality rate was double the global average, and while the South African rates were on a higher scale, the age-specific pattern appeared very similar to that of suicide, except for the female 60–69 year age group (Figure 36).

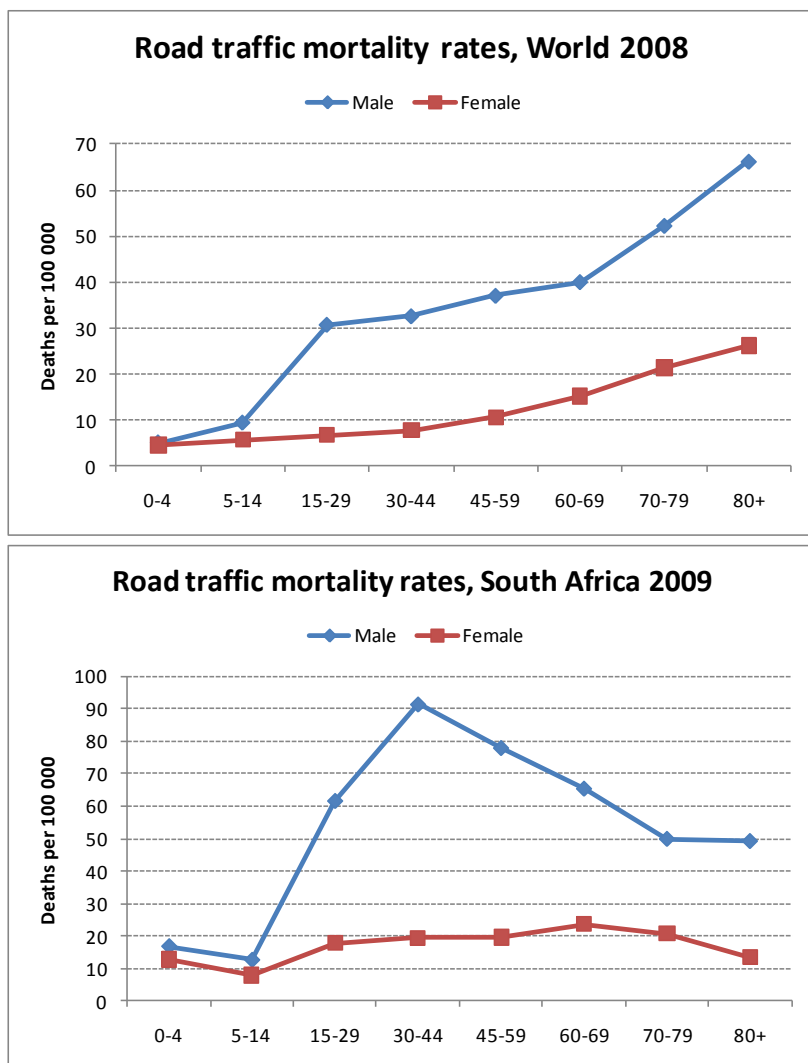


Figure 36: Comparison of age-specific road traffic mortality rates

Source: Adapted from WHO, 2011

When the all injury mortality rates are compared, the rate for males is approximately 1.8 times higher than the global rate, and the female global injury rate was slightly higher compared to the rate for South African females. The global all-injury mortality rate was much higher among the elderly (80 years and older) as a result of the high suicide and road traffic mortality rates observed for this age group (Figure 37). For South Africa, the all-injury mortality rate peaked among the 15–29 and 30–44 year age groups for males, and followed a similar age profile as that for homicide. For females, the all-injury mortality rates were high from the age of 15 years, and declined across all manners of death from age 80 years and older.

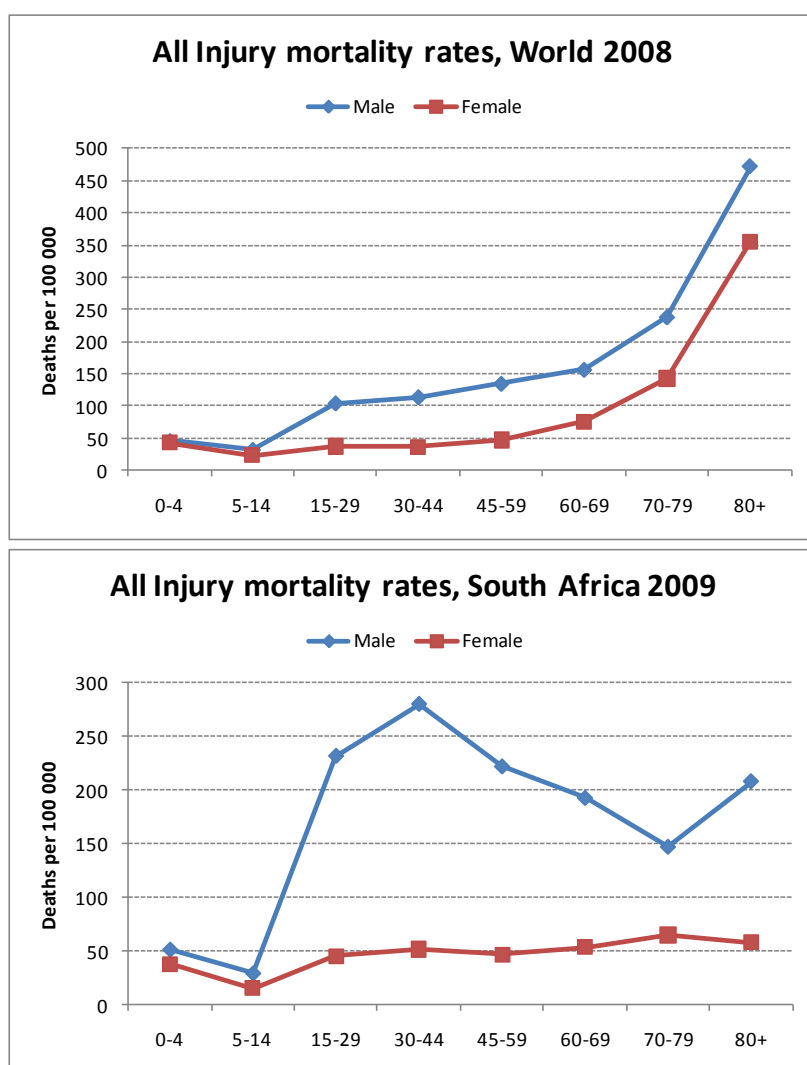


Figure 37: Comparison of all-injury mortality rates

Source: Adapted from WHO, 2011

6 CONCLUSIONS

This study has provided a reliable, nationally representative estimate of injury mortality rates by specific cause (as well as provincial level estimates). The results indicate that homicide and road traffic injuries continue to contribute substantially to the burden of disease in South Africa, although there are clear indications that homicide has declined since 2000.

Next steps will involve integrating the estimates arising from this study with the overall cause of death profile from other sources to produce revised injury mortality estimates as part of the second National Burden of Disease Study (NBD2) for 2009. This will be instructive in identifying key areas where policy changes have had an effect in reducing injury related causes, as well as identifying emerging priorities for prevention both at national and provincial levels.

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APPENDIX I Sample size justification

The sample size estimation was guided by the following requirements and assumptions:

1. The smallest proportion of injury by specific cause, age, sex that will be measured in the second NBD study, using injury estimates from the first NBD study; this was determined as 0.1 percent.
2. The acceptable precision of estimates was determined as ± 0.04 –0.05 percent.
3. A design effect of 2 was assumed.
4. It was expected that up to 10 percent of folders may not be available or could have missing information.

To meet the required representation, a total of 45 mortuaries was sampled with the provincial distribution given in Table 32A. Based on the information obtained prior to the study, the total number of folders that was expected to be realised after implementing the sampling strategy in the eight provinces was 20 455.

Table 32A: Number of mortuaries selected per province and expected number of folders to be reviewed

Province	Selected number of mortuaries	Number of folders available	Expected number of folders after sampling at mortuary level	Expected number of folders after sample realisation*
Eastern Cape	6	4 028	2 879	2 591
Free State	5	3 616	2 887	2 598
Gauteng	8	10 958	7 098	6 388
Kwazulu-Natal	11	8 302	5 372	4 835
Limpopo	4	2 171	1 361	1 224
Mpumalanga	4	1 845	1 205	1 084
North West	4	2 117	1 314	1 183
Northern Cape	3	943	614	553
Total	45	33 981	22 733	20 455

* Folders not available for review or folders with critical information missing

For larger proportions of percent, the precision would be good. The expected 95 percent confidence intervals calculated for estimates of specific cause of death are shown in Table 33A. However, for less common causes, the precision would not be ideal. It should be noted that there are some tables which show small numbers such as 1-15 deaths. Based on this, these estimates are somewhat unreliable. For a specific cause of death with prevalence of 0.1 percent (21/20 455) the standard error of the estimate was 0.045 percent taking the design effect and sample size into account, and expected precision was 0.088 percent. Hence, a 95 percent confidence interval for this cause of death would be 0.012–0.188 percent. This interval of 0.0178 percent is wider than the required length (precision) of 0.010 percent. However, improving the precision for such a prevalence would require a sample that is more than three times larger than the current sample, which was considered not feasible.

Table 33A: Expected 95% confidence intervals for cause specific proportions with a realised sample of 20 455 folders

Cause of death	Estimate	<i>n</i>	SE	95% CI	
Homicide	46.0%	4 703	0.5%	45.0%	47.0%
Road traffic injuries	26.7%	2 729	0.4%	25.8%	27.5%
Suicide	9.1%	932	0.3%	8.6%	9.7%
Fires	6.9%	705	0.3%	6.4%	7.4%
Drowning	2.3%	238	0.1%	2.0%	2.6%
Surgical/medical misadventure	2.0%	201	0.1%	1.7%	2.2%
Falls	1.7%	177	0.1%	1.5%	2.0%
Other transport injuries	1.7%	171	0.1%	1.4%	1.9%
Other unintentional injuries	1.4%	143	0.1%	1.2%	1.6%
Poisoning	1.1%	109	0.1%	0.9%	1.3%
Suffocation and foreign bodies	0.4%	45	0.1%	0.3%	0.6%
Mining-related injuries	0.4%	42	0.1%	0.3%	0.5%
Natural and environmental factors	0.3%	31	0.1%	0.2%	0.4%

APPENDIX II Questionnaire

Injury Mortality Survey		
A UNIQUE STUDY RECORD NUMBER SHOULD BE CREATED AS THE DATA UPLOADS TO THE CENTRAL DATABASE		
1 What data entry is this?	☐ Initial ☐ 20th record	2 Fieldworker code
IF "20th record" THEN ALLOW DUPLICATES FOR FIELD 4 "DR NO" AND FIELD 22 "BI-1663" THIS SHOULD BE LINKED TO MORTUARY CODE		
3 Mortuary code	4 DR No.	
5 Record	6 Date of death	
☐ Found ☐ Missing PM ☐ Missing folder → EXIT AFTER 11 ☐ Storage → EXIT AFTER 11	7 Date of birth	
AUTOMATICALLY CALCULATE AGE: 109 CUT-OFF IF NO D.O.B skip to Estimated Age		
8 Estimated Age		
999 IF UNKNOWN, NO CUT-OFF		
9 Sex	10 Population group	
11 Cause of death		
☐ Non-natural PROCEED TO 12 ☐ Natural EXIT ☐ Foetus EXIT ☐ Undetermined PROCEED TO 12		
12 Apparent manner of death (if Non-natural)		
☐ Homicide ☐ Suicide ☐ Transport ☐ Other Unintentional ☐ Undetermined ↓ skip 13 ↓ skip 14 ↓ skip 15 ↓ skip 16 ↓ skip 17		
13 Circumstances of injury (if Homicide)		
☐ Firearm Discharge ☐ Sharp force (cut / stabbed) ☐ Blunt force (beaten with object, punched or kicked) ☐ Strangled/Asphyxiated/Suffocated ☐ Poison, ingestion ☐ Poison, gassing ☐ Fire /other burn	☐ Abandoned baby (if <1YEAR) ☐ Pushed from height ☐ Crushing ☐ Electrocution ☐ Drowning, immersion ☐ Explosive blast ☐ Other _____ ☐ Unknown skip → 18a	
14 Circumstances of injury (if Suicide)		
☐ Firearm Discharge ☐ Sharp force (cut / slit) ☐ Hanging ☐ Poison, ingestion (e.g. overdose) ☐ Poison, gassing (e.g. exhaust)	☐ Fire /other burn ☐ Jumped from height ☐ Railway pedestrian ☐ Other _____ ☐ Unknown skip → 18a	

15 Circumstances of injury (if Transport)

☐ MV Pedestrian
☐ MV Passenger
☐ MV Driver
☐ MV Unspecified
☐ Motor-cycle Driver
☐ Motor-cycle Passenger

☐ Bicycle
☐ Railway pedestrian
☐ Railway passenger
☐ Aviation casualty
☐ Other _____
☐ Unknown

skip → 18a

16 Circumstances of injury (if Other Unintentional)

☐ Firearm Discharge
☐ Sharp force (cut)
☐ Blunt force
☐ Asphyxiated / Suffocated
☐ Poison, ingestion (e.g. overdose)
☐ Poison, gassing (e.g. exhaust)
☐ Fire /other burn
☐ Fall
☐ Crushing
☐ Drowning, immersion

☐ Animal contact (e.g. dog bite)
☐ Machinery (e.g. farm/recreational)
☐ Lightning
☐ Natural/Environmental factors
☐ Electrocution
☐ Explosive blast
☐ Circumcision
☐ Surgical/Medical Misadventure
☐ Other _____
☐ Unknown

skip → 18a

17 Circumstances of injury (if Undetermined)

☐ Firearm Discharge
☐ Sharp force
☐ Blunt force
☐ Asphyxiated / strangled
☐ Hanging
☐ Poison, ingestion
☐ Poison, gassing
☐ Fire /other burn
☐ Fall/push/jump
☐ Drowning, immersion

☐ Abandoned baby
☐ MV Pedestrian
☐ MV Passenger
☐ MV Driver
☐ MV Unspecified
☐ Motor-cycle Driver
☐ Motor-cycle Passenger
☐ Bicycle
☐ Railway pedestrian
☐ Railway passenger
☐ Aviation casualty

☐ Animal contact (e.g. dog bite)
☐ Machinery (e.g. farm/recreational)
☐ Crushing
☐ Lightning
☐ Natural/Environmental factors
☐ Electrocution
☐ Explosive blast
☐ Circumcision
☐ Surgical/Medical Misadventure
☐ Other _____
☐ Unknown

18a Was the injury **work-related**?

☐ Y ☐ N ☐ U

↓ skip if No/Unknown
19

18b Was the injury related to **Mining**?

☐ Y ☐ N ☐ U

19 Was the "**Sexual Assault Kit**" used?

☐ Y ☐ N ☐ U

20 Was the death in custody (police, prison etc):

☐ Y ☐ N ☐ U

21 Blood Alcohol level

0 . g/100ml

22 BI-1663

A O

ALLOW DUPLICATE IF FIELD 1="20th record"
OTHERWISE MUST BE UNIQUE NUMBER

NOTE: EVERY 20TH RECORD/FOLDER SHOULD BE FLAGGED TO PUT ASIDE FOR DOUBLE DATA ENTRY
BY A 2ND FIELDWORKER

APPENDIX III Agreement between initial and repeat captures of data

Table 34A: Agreement between initial and repeat captures on apparent manner of death

		Repeat									
		Missing/ Inconsist- ent	Homicide	Suicide	Transport	Other Unintent- ional	Undetermined	Natural	Foetus	Undeter- mined cause	Total
Initial	Missing/ Inconsistent	0	1	2	0	1	0	0	0	0	4
	Homicide	1	256	2	5	3	10	2	0	1	280
	Suicide	0	2	78	1	1	4	1	0	1	88
	Transport	0	3	1	282	1	4	1	0	0	292
	Other Unintent- ional	0	3	1	1	75	10	2	0	0	92
	Undetermined	1	11	7	1	9	37	1	0	8	75
	Natural	0	0	0	0	0	3	140	2	2	147
	Foetus	0	0	0	0	0	0	0	20	0	20
	Undetermined cause	0	0	2	0	2	7	3	0	25	39
	Total	2	276	93	290	92	75	150	22	37	1037

	Complete agreement	88.0%
	Positive disagreement	6.0%
	Negative disagreement	5.4%
	Weighted Kappa	0.8599

Table 35A: Ascertainment of age according to initial and repeat capture

Age	Initial		Repeat	
	<i>n</i>	%	<i>n</i>	%
Ascertainment				
Calculated age	927	89.4	929	89.6
Estimated age	50	4.8	46	4.4
Unknown age	60	5.8	62	6.0
Total	1 037	100.0	1 037	100.0

Table 36A: Agreement between initial and repeat captures categorising age and foetal death

	Repeat									
		Foetus	<1	1-4	5-19	20-44	45-59	60+	999	Total
Initial	Missing	0	0	0	0	2	0	0	0	2
	Foetus	20	0	0	0	0	0	0	0	20
	<1	1	23	2	1	0	0	0	2	29
	1-4	0	2	42	0	0	1	0	0	45
	5-19	0	1	0	71	0	0	0	1	73
	20-44	0	0	0	0	544	1	1	0	547
	45-59	0	0	0	0	3	177	0	2	182
	60+	0	0	0	1	0	0	91	0	92
	999	1	1	0	1	1	0	0	43	47
	Total	22	27	44	75	550	179	92	48	1037

	Complete agreement	97.5%
	Positive disagreement	1.1%
	Negative disagreement	1.2%
Weighted Kappa		0.9537

Table 37A: Agreement between initial and repeat captures of sex

	Repeat				
		Male	Female	Unknown	Total
Initial	Missing/ Inconsistent	1	2	0	3
	Male	766	12	3	781
	Female	9	230	0	239
	Unknown	3	0	11	14
	Total	779	244	14	1037

	Complete agreement	97.1%
	Positive agreement	1.7%
	Negative agreement	1.2%
Weighted Kappa		0.9198

APPENDIX IV Fieldworkers for mobile data capture

NAME	SURNAME
CIMI	BONGIWE
NATASHA	BUDHRAM
CHRISTINE KAPIRA	CHINGONDOLE
MOOKETSI THEOPHILLUS	CWAILE
NOMPILO JOY	DLAMINI
THULASIZWE ERNEST	DLAMINI
NANDIPA	DZINGWE
ANDILE	FALTEIN
JANI	GREEFF
MAHLABE	MAESELA
MLULEKI	MAFUNA
MAPHEE ERNEST	MAILE
JABU LYBON	MALULEKA
NDILEKA	MANYANDELA
SIYABONGA WISEMAN	MAVUSO
MICHAEL	MOHLOIWA
MARIETTE	MOMBERG
NELISA BONGISWA	MYATAZA
DEBRA	NAIDOO
REGINALD LEBO	NTHOLENG
NOBOM PHYNA	NTINGANTI
CHUMA INNOCENTIA	NTSHANGASE
MZWAMAJAMA	PAKADE
TEBOGO PRUDENCE	PHASHA
THABO HERMAN	RAKGWADI
MICHEAL SELAELO	RAKUBU
TSHILIDZI CONSTANCE	RAMASUNGA
VEEREN	RAMPERSAD
NWABISA	XWAYI