UNPACKING ROAD SAFETY AT A DISTRICT LEVEL – THE CASE OF CAPE TOWN, SOUTH AFRICA

M VANDERSCHUREN*, A JANMOHAMMED* AND S PHAYANE**

*University of Cape Town, Cape Town, Private Bag X3, Rondebosch, 7701, South Africa
**SMEC, Johannesburg, 267 Kent Avenue, Ferndale, Randburg, 2194, South Africa

ABSTRACT

South Africa is known for its high level of road fatalities. The, so called, road safety burden in the Western Cape, and in particular Cape Town, has been decreasing, due to a prolonged investment in road safety measures. However, the decrease seems to have plateaued and further analysis of available data is required to identify further measures.

In this study, fatality data for the years 2011 to 2015 was taken to a local level. Absolute fatalities, as well as the fatalities per 100 000 population, are compared. The mode of transport used is also compared to the level of road fatalities.

The detailed analysis revealed that an area, such as Khayelitsha, which has a very high road fatality burden per annum, has a low level of fatalities per 100 000 population, i.e. the value is equal to the global average (much better than many African countries and cities). Comparatively, an area, such as Durbanville, has a lower absolute number of fatalities per annum, however, the fatalities per 100 000 inhabitants are very high. Finally, it was found that the vulnerable road users - pedestrians and cyclists - had a comparatively higher fatality number to mode usage.

The study deduced that the road safety burden in South African cities, including Cape Town, is still very high and that informed road safety measures are required. Overall, it could be concluded that both the average annual fatalities and the average annual fatalities per 100 000 population need to be determined when identifying areas where road safety measures should be implemented

1. INTRODUCTION

In 1973, road fatalities were labelled an epidemic in the British Medical Journal (1973). In May 2009, more than 100 representatives of 70 NGOs from 40 countries came together in Brussels at a meeting hosted by the World Health Organization. The NGO declaration in 2009 indicated that road fatalities and injuries had claimed over 30 million lives worldwide, at the time, and the World Health Organisation (WHO) reported in 2013 that at least 150 road fatalities daily, totalling 1.24 million people globally per annum. In Africa, the majority

of people killed on its roads are young breadwinners – 62% are aged between 15 and 44 years, and 3 out of every 4 deaths are males (Jobanputra, 2013; Ogendi et al., 2013; Kopits and Cropper, 2005).

In the WHO (2013) study, data was collected in 182 countries, and estimated, where appropriate, to account for varying levels of data quality to make data comparable across countries. When looking at the continental data, significant differences per 100 000 population are found (see Figure 1).

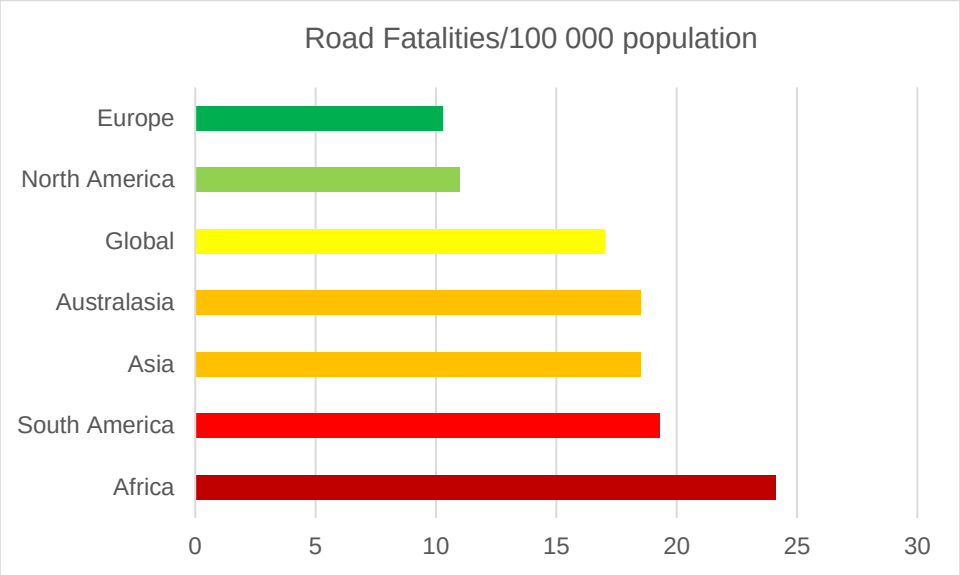

Figure 1: Road Fatality per 100 000 Population on the Different Continents
Source: WHO data, 2013

Europe (10.3) and North America (11.0) have road fatality rates that are better than the global average (17.0), while all other continents score below the global average. Africa is the worst performer, with 24.1 fatalities per 100 000 population (see Figure 1). Besides the high fatality rates, the fatality trends over time should also be reviewed. Between 2007 and 2010, the number of road fatalities decreased in 88 countries surveyed by the WHO (2013), suggesting that progress can be made with sufficient national commitment. Of these 88 countries, 42 are high-income countries, 41 are middle-income, while only five were low-income (see Figure 2). Nonetheless, there is a major, persisting concern in the 87 countries that saw increases in the numbers of road traffic deaths over the same period. Many of the African countries have an increased number of deaths, including South Africa.

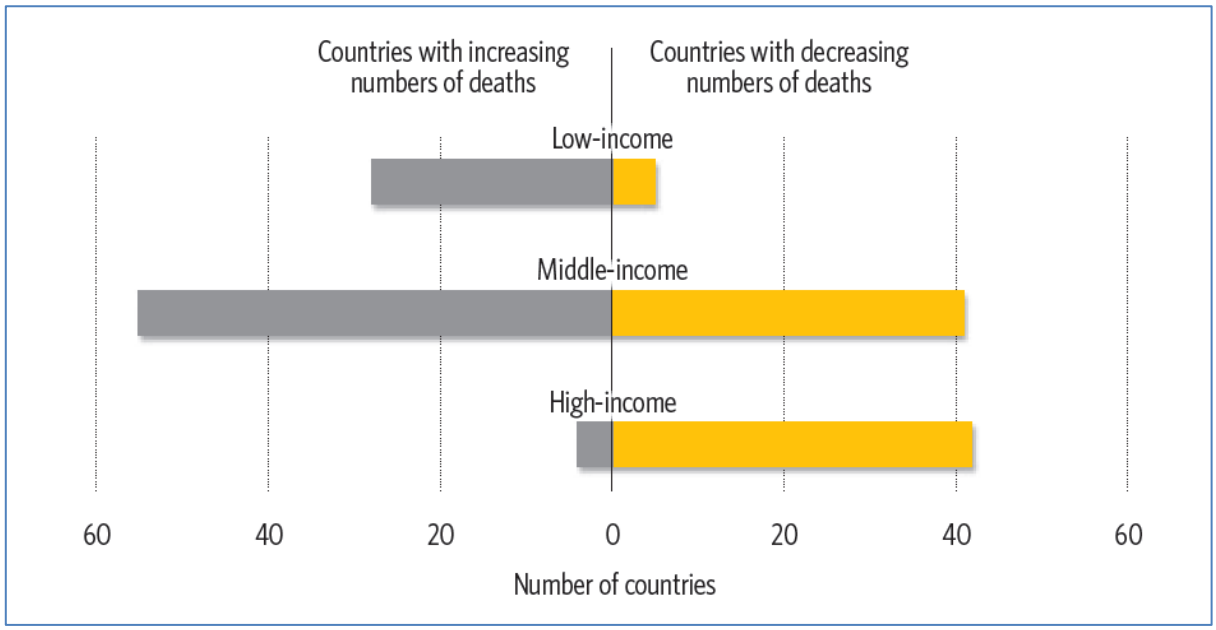

Figure 2: Road Fatality Trends in 182 Low, Middle and High Income Countries
Source: WHO, 2013 (Trends for 2007 to 2010)

For South Africa, specifically, the WHO (2013) references show increasing road fatality trends that were provided by the Road traffic Management Corporation (RTMC), see Figure 3.

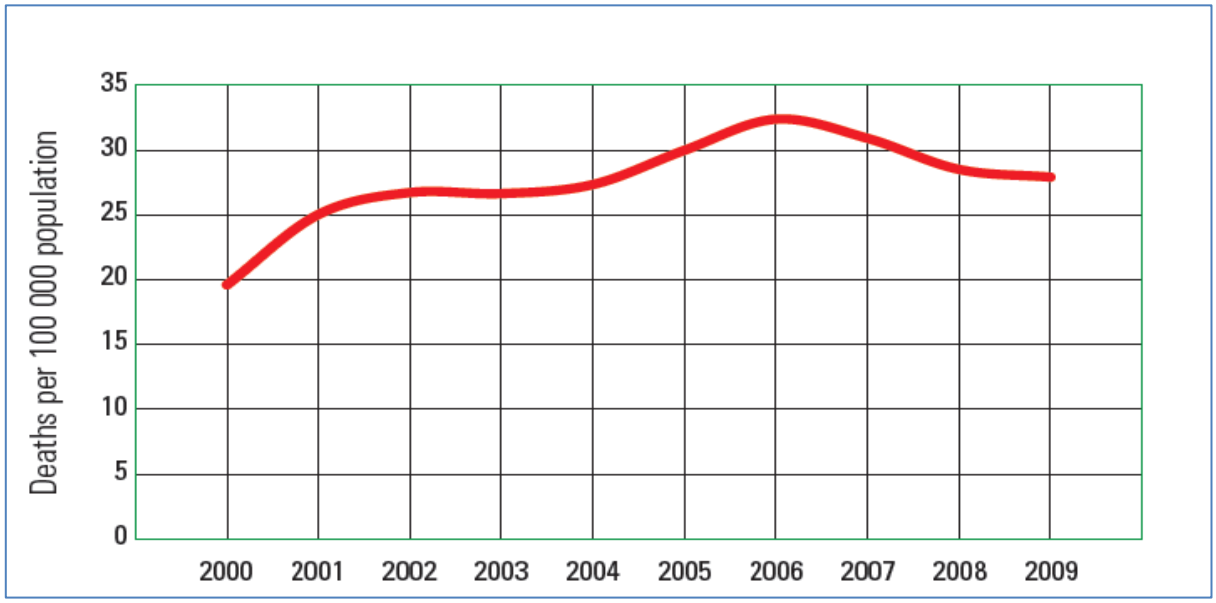

Figure 3: Road Fatality per 100 000 Population in South Africa
Source: RTMC in WHO, 2013

2. METHODOLOGY

The content of this paper is based on the work done for the Western Cape Government, while developing a 'Road Safety Strategy'. Within the project, a literature review was conducted regarding national and international best practices. The project team then

identified road safety issues based on first principles (for the human, the road and the environment/province). In parallel, a road safety status quo was established. The part for the Cape Metropole is discussed in this paper.

Within the larger project, a road safety action framework was developed using the previous three steps. Feasible measures are modelled to establish a 'Cost-Benefit' ratio, which will lead to a final road safety implementation plan (see Figure 4). The latter steps are ongoing and will be reported upon at a later stage.

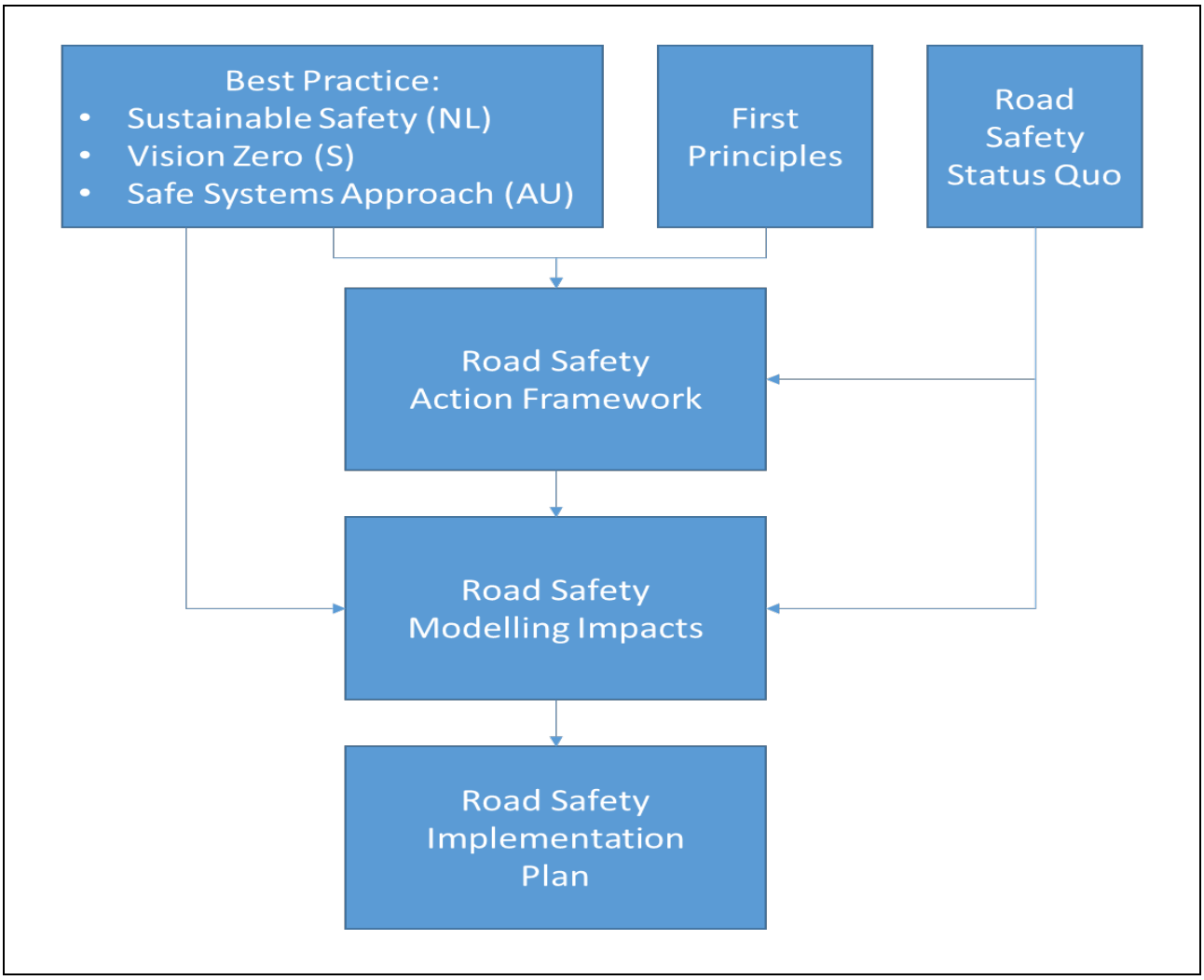

Figure 4: Research Approach

3. THE SOUTH AFRICAN ROAD SAFETY STATUS QUO

In general, road fatalities in South Africa vary from city to city. Vanderschuren and Zuidgeest (2017) reported on the fatality rates per 100 000 population in 39 international cities. African cities appeared to have fatality rates over the global and African average per 100 000 population. Figure 5 provides an overview of the six South African cities included in the study. While all cities have unacceptably high fatality rates, Bloemfontein (50) scores extremely high.

From the local and international data it became clear that road fatality rates vary severely depending on country income and local differences. The question that arose was: “Are there local differences regarding fatalities within a South African city”? The City of Cape Town was used as a case study. The remainder of this paper reports on local differences in 19 Traffic Assessment Zones (TAZs) in Cape Town.

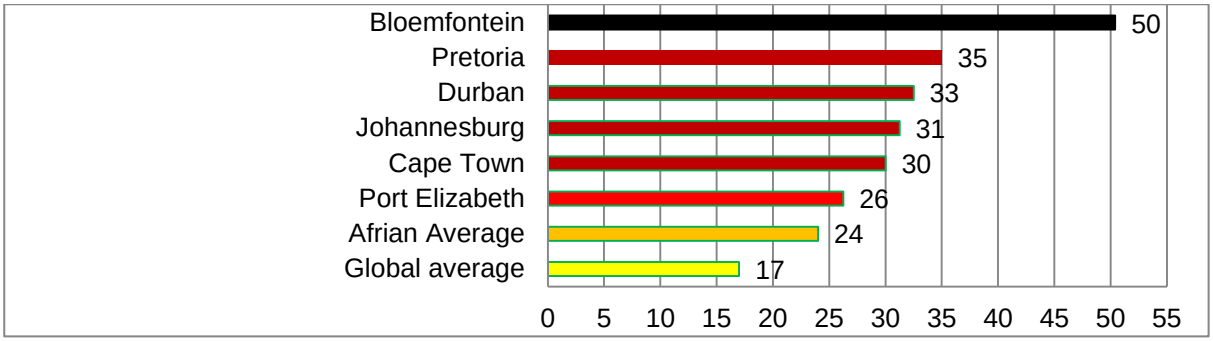

Figure 5: Road Fatality per 100 000 Population in Various South African Cities
Source: Vanderschuren and Zuidgeest, 2017 (adapted to the WHO data standards)

4. FINDINGS

Using data from the 2013 National Household Travel Survey and the Forensic Pathology Services (FPS 2015), the mode distribution and fatalities data were obtained for the City of Cape Town. The analysis is described and displayed in this section using the GIS background map for the City of Cape Town.

4.1 Mode Distribution

According to the 2013 National Household Travel Survey (NHTS, 2013), public and private transport are used by 64% and 36% of the population, respectively. The same data also reveals that a significant percentage (20%) of the population is dependent on walking. However, the mode distribution is not the same for every area of the city, whereby high-income areas have a higher dependency on private cars compared to public transport (see Figure 6).

In order to examine the mode distributions in different areas of the city, the Traffic Analysis Zones (TAZs) from the NHTS dataset were used. Since the FPS data, discussed later, contained interesting findings on Gugulethu, it was decided to separate this area from the Mitchells Plain TAZ. The modes examined include; trains, buses, metered taxis, minibus taxis, car passengers, cars, cycling, walking and other modes, with the results of the data presented in Figure 6.

The usage of cars, as would be expected, is popular in high-income areas, such as Somerset West (100%), Oostenberg (86%), Durbanville (74%) and Wynberg/Southern Suburbs (73%). However, in townships, such as Mitchells Plain, Gugulethu and Khayelitsha, the usage of cars was observed to be the least popular mode choice with 6%,

6% and 4%, respectively, of the population using this mode to undertake their trips. Hence, in these areas, the mode choice would be either public transport or walking.

4.2 Total Fatalities

Similar to mode usage, large variations are observed in the fatalities, for the 2011-2015 period, that affect the different road user types: i.e. cyclists, drivers, motorcyclists, passengers and pedestrians in these areas (see Figure 7).

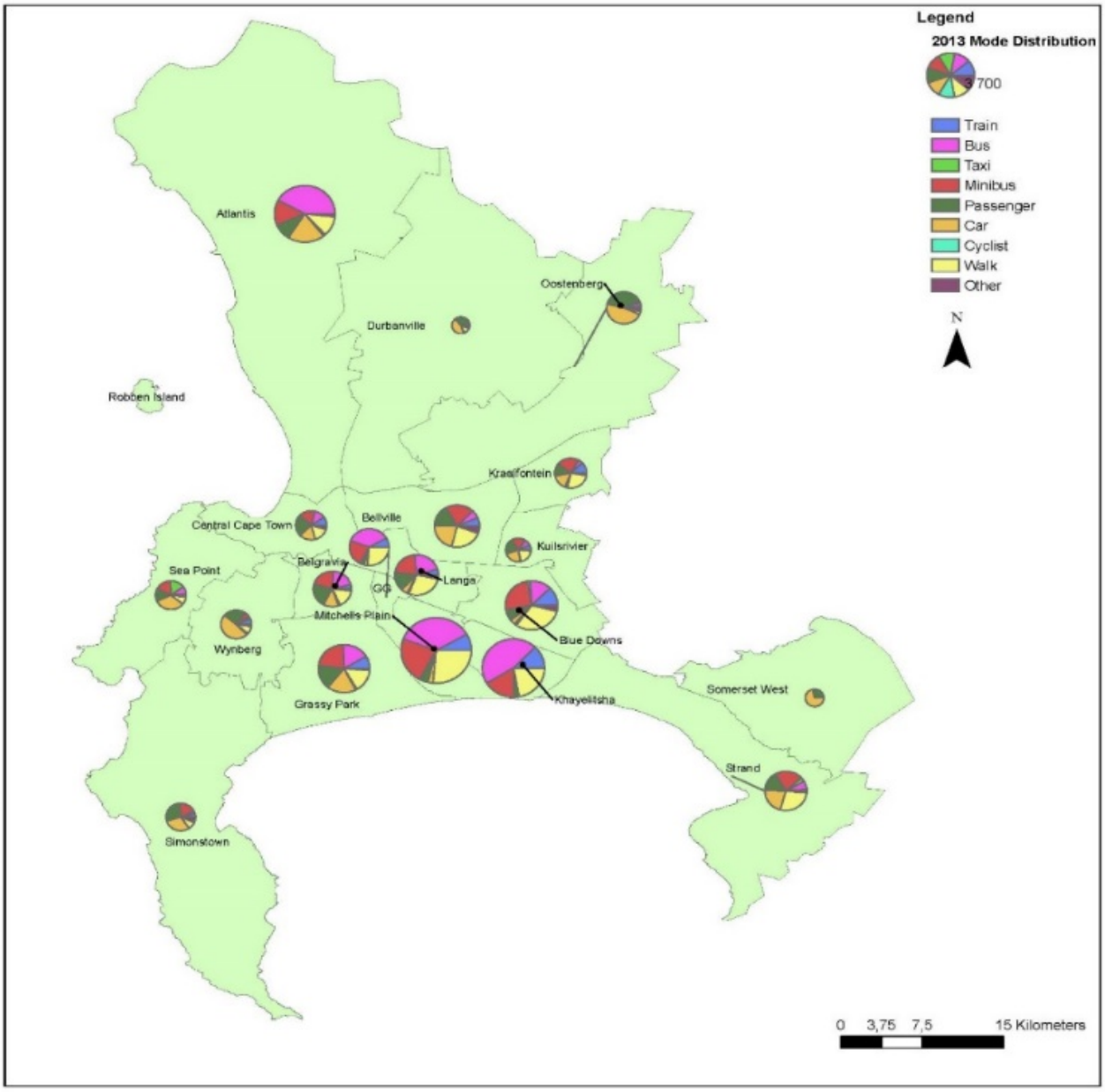

Figure 6: Mode Distribution
Source: NHTS data, 2013

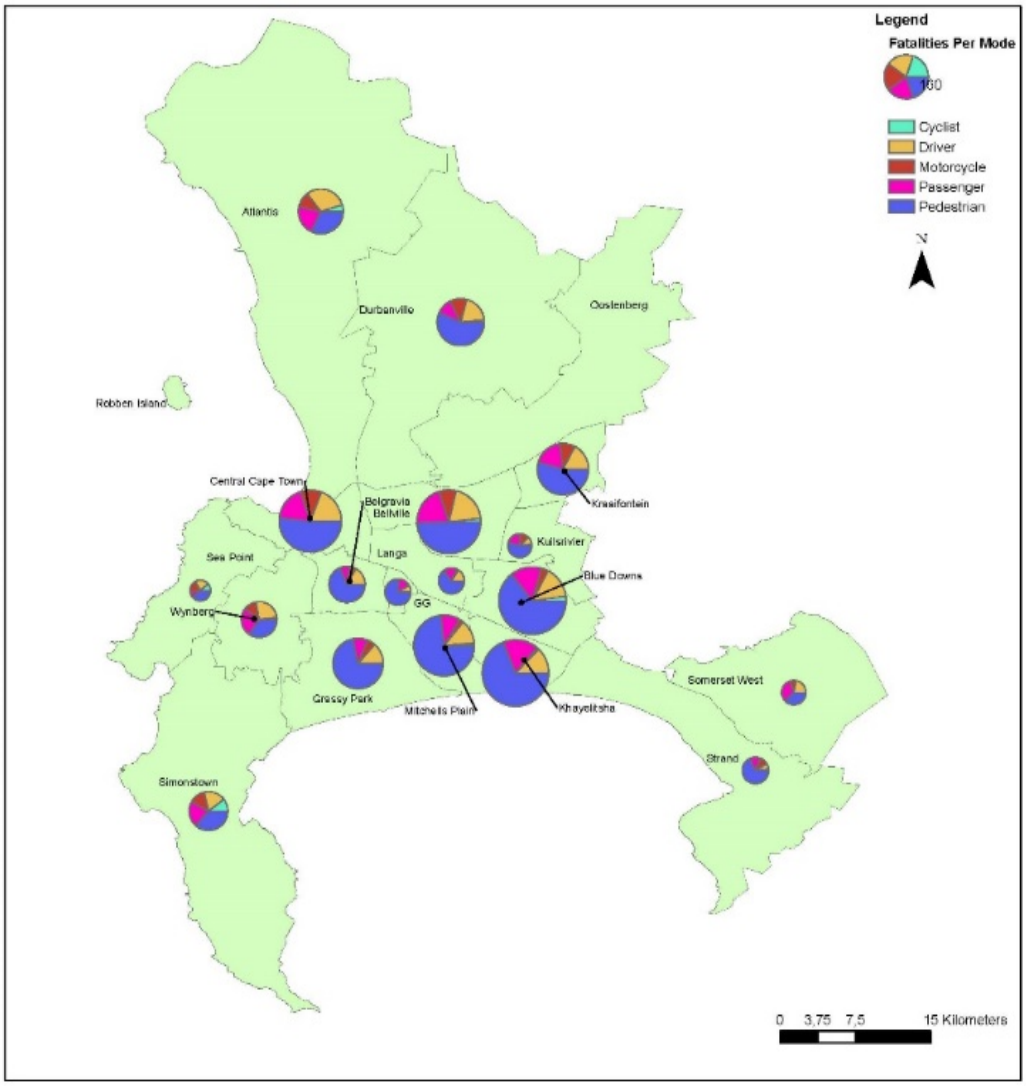

Figure 7: Fatalities Distribution (2011-2015 annual average)
Source: Forensic Pathology Services (FPS) data

The size of the pie charts in the figure is dependent on the total fatalities, whereby a larger size infers that the total number of fatalities in the area is higher when compared to other areas. As seen in Figure 7, the high-income areas (with a large portion of car usage) had high fatalities amongst pedestrians and passengers, although the total fatalities were lower when compared to other areas within the city.

Pedestrians were most affected in low-income areas, where public transport and walking were the most used modes for a large portion of the trips. Other areas with high total fatalities include Central Cape Town, Bellville, Blue Downs and Grassy Park, where similar trends to high-income areas were observed.

4.3 Average Annual Fatalities per 100 000 Population

In order to compare the risk of dying due to road crashes, rates per 100 000 population are a useful indication. For this, the total fatalities data was converted to average annual

fatalities per 100 000 population for each road user type. The results of the analysis are shown in Figure 8. Similar to Figure 7, the size of the pie charts in the figure is dependent on the total fatalities.

As mentioned previously, the data had interesting findings on Gugulethu and, as viewed in Figure 8, the risk of dying in the area alongside Mitchells Plain is the highest, when compared to other areas of the city. These areas, as discussed before, were also the most affected when considering pedestrian deaths. In addition to these areas, Central Cape Town, Bellville and Durbanville were other areas with a high risk of fatalities.

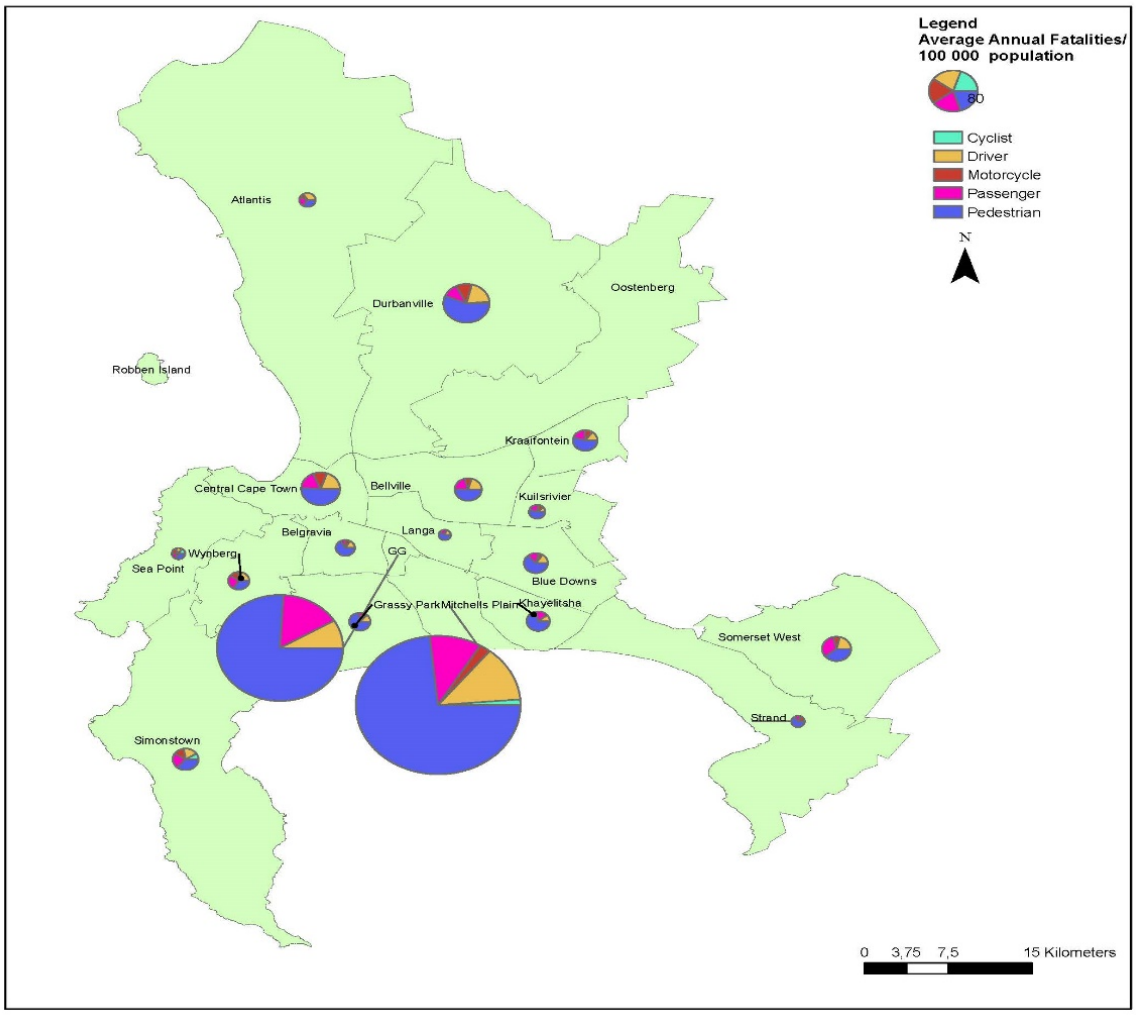

Figure 8: Average Annual Fatalities per 100 000 Population
Source: FPS data, 2011-2015

However, there are exceptions to this in the case of Langa, which is a low-income area but has fatality rates that are comparable to ‘Best Practice’ high-income countries, such as Sweden, Netherlands and the United Kingdom (UK).

Figure 9 compares the average annual road fatalities to the average annual road fatalities per 100 000 population in various parts of Cape Town. It is interesting to see that the areas that are identified, using the two different data sets, are often different.

It is interesting to see that the fatalities in low-income areas are high in absolute terms, but that the fatalities per 100 000 population are higher in high-income areas, such as Durbanville.

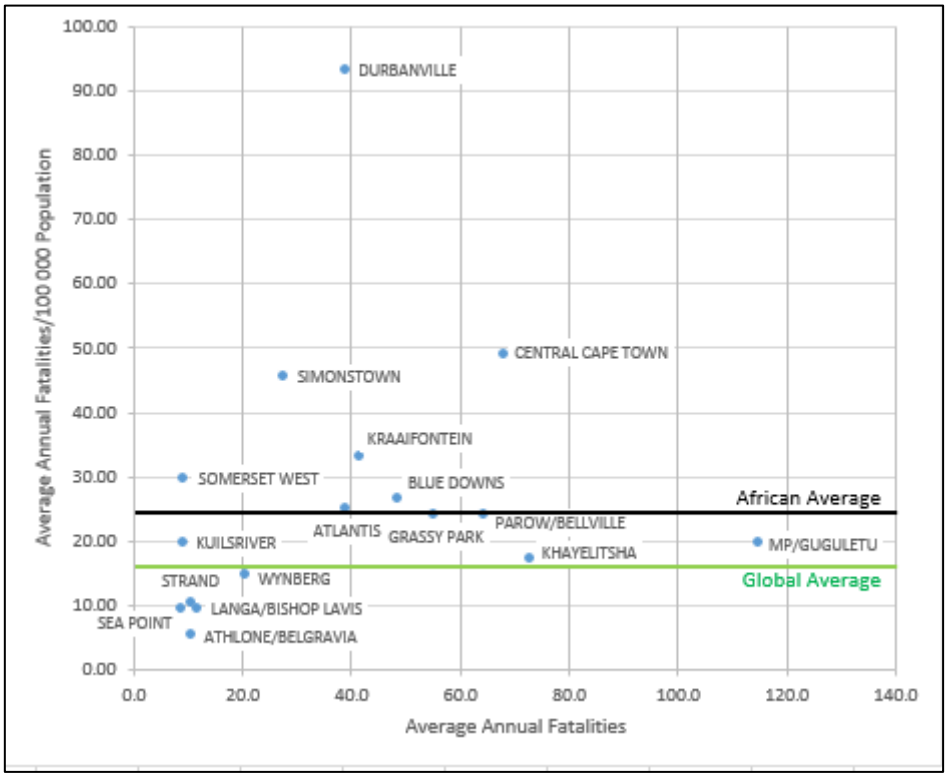

Figure 9: Average Annual Fatalities (AAF) Versus AAF per 100 000 Population
Source: FPS data, 2011-2015

4.4 Mode Usage versus Fatality Rates

In order to combine the analysis of mode distribution and fatalities, a percentage difference between the two was performed for each area. A positive difference deduces that the percentage death toll for the road user type is higher when compared to the percentage of the population that prefers that particular mode for their daily trips and vice versa (see Figure 10).

This analysis was performed for four of the five road user types: driver, passenger, pedestrian and cyclist. In the case of motorcyclists, the mode usage and fatality rates were observed to be very low; hence, no reliable analysis is possible.

The driver and passenger graphs in Figure 10 have an overall negative percentage, indicating less fatalities compared to the mode use, while the vulnerable road users (pedestrians and cyclists) have a positive overall percentage, indicating a higher fatality rate, compared to the mode use. However, the difference is not the same in all areas. In the case of passengers, for example, Belgravia, Khayelitsha, Mitchells Plain, Grassy Park and Gugulethu are areas with a negative difference of more than 40%, indicating lower fatality rates.

In almost all areas, the fatality rates for pedestrians are higher than their mode share (by between 15% and 55%), while cyclists are over-exposed, in Sea Point and Simonstown, which are part of the cycling training routes.

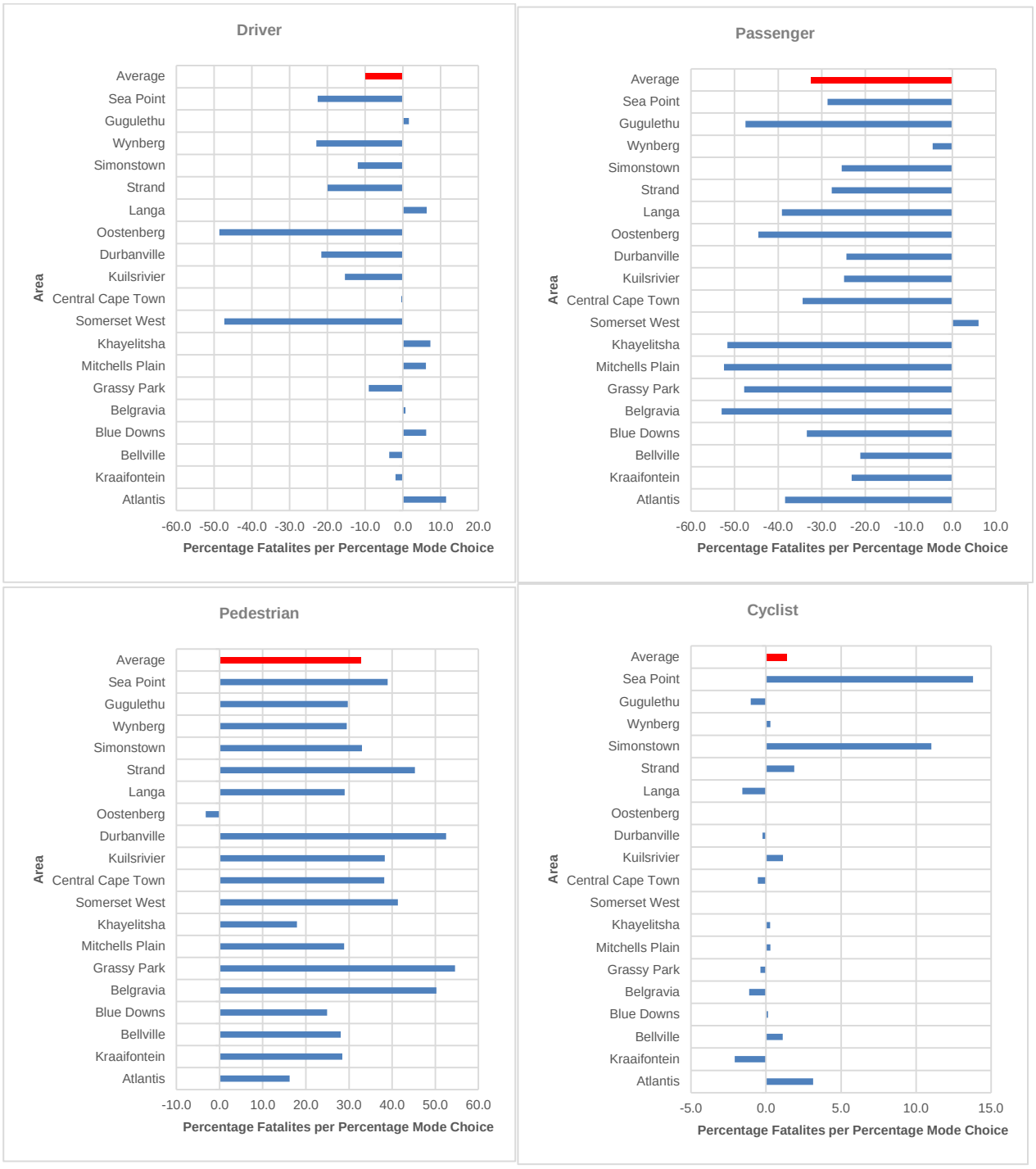

Figure 10: Percentage Difference between Mode Usage and Fatalities
Source: Analysis uses NHTS (2013) and FPS (2011-2015)

5. CONCLUSION

This research extracted the differences in mode usage at a local level in Cape Town. It was found that car usage was much more prevalent in high-income areas, and public transport or walking, as expected, are more prevalent in low-income areas.

The FPS data for the period 2011-2015 was, subsequently, used to determine the average annual fatalities for the same areas. In low-income areas, it was found that pedestrians were the most affected group, while in high-income areas high fatality numbers were seen amongst pedestrians and passengers.

The fatalities numbers were converted average annual fatalities per 100 000 population, to compare the local risk levels. Areas, such as Central Cape Town, Bellville, Blue Downs, Grassy Park and Khayelitsha, that had a high number of average annual fatalities, had low average annual average fatalities per 100 000 population. This signifies that both the average annual fatalities and the average annual fatalities per 100 000 population need to be determined to identify where road safety measures should be implemented. A comparison of the two variables was performed and, interestingly, it was found that the fatalities in low-income areas are high in absolute terms, but that the fatalities per 100 000 population are higher in high-income areas, such as Durbanville.

Finally, a percentage difference between mode usage and fatalities was performed for each area for four user types: drivers, passengers, pedestrians and cyclists. The results found that drivers and passengers have an overall negative percentage, indicating less fatalities compared to the mode use, while the vulnerable road users (pedestrians and cyclists) have a positive overall percentage, indicating a higher fatality rate, compared to the mode use. In the case of pedestrians, specifically, the percentage fatality rates were seen to be higher than their percentage mode share by between 15% and 55%.

Overall, it can be concluded that the road safety burden in South African cities, including Cape Town, is still very high and that informed road safety measures are required.

6. ACKNOWLEDGEMENTS

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