

## Analysis of Road Traffic Accident Claimants Evaluated for Medico-Legal Assessment, Pretoria, South Africa

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**Background:** Injuries sustained after a road traffic accident (RTA) can lead to financial distress through loss of a source of income. The victim could sustain a permanent disability which could also affect the family.

**Objectives:** The objective was to analyze road traffic claimants/victims with musculoskeletal injuries who presented for medico-legal assessment for compensation.

**Methods:** This was a retrospective study analyzing the files of 3000 claimants who presented for medico-legal evaluation in order to obtain compensation from the Road Accident Fund (RAF) following a road traffic accident based on the assessment of a private orthopaedic surgeon for a period of six years.

**Results:** More males (66.6%) than females (33.4%) were involved in the study. The majority of claimants (70.6%) were working before the accident occurred and students accounted for about (15.8%). About 1162 (54.9%) of workers were able to return to work but 955 (45.1%) lost their jobs. For those who returned to their workplace, 1063 (91.5%) went back to the same position and 99 (8.5%) were redeployed. Private cars (78.3%) were responsible for many accidents. Passenger involvement (52.2%) was higher than that of drivers (15.9%) and pedestrians (31.3%). The cervical spine (21.9%) had higher number of body injuries. The leg (18.8%) sustained higher extremity fracture. Associated musculoskeletal injury was head injury (64.5%). Some claimants presented with multiple injuries at an average of 1.3%. Majority of claimants were admitted in government hospitals (85.6%) than private hospitals (14.4%) and (74%) of those who were admitted were treated surgically.

**Conclusion:** The study had a high number of socio-economically active males involved in road traffic accidents. Majority of claimants were treated in government hospitals. Hence there is a high demand for many trauma hospitals in every province to combat the vast needs of those requiring specialized medical treatment.

**Keywords**

Road traffic accident; Claimants; Medico-Legal assessment

**Introduction**

Any road user could be a victim of a road traffic accident (RTA) whether resulting in fatal or non-fatal consequences. A road traffic injury is one of the leading causes of death globally. These deaths occur commonly in low- and middle-income countries where rapid economic growth has been accompanied by increased motorization [1]. Western Cape Province (WCP) regards an RTA as a large major incident with a figure of 94% compared to other causes of trauma [2]. In the Mthatha area of SA (South Africa), a high death rate as compared to global figures was reported following RTA [3]. The South African Road Traffic Management Corporation estimated that RTA cost the country about R142.95 billion, equating to 3.4% of gross domestic product (GDP) [4]. The World Health Organization (WHO) estimates that 1.25 million people die each year and as many as 20 to 50 million suffer non-fatal injuries, with many incurring a disability as a result of their injury. The burden of RTA affects not only the victim but also the individual's loved ones; moreover, the country as a whole suffers as well. In low- and middle-income countries, road traffic death and injuries are estimated to cause economic loss of up to 3% of GDP [1].

The Road Accident Fund (RAF) provides compulsory cover to all users of South African roads (citizens and foreigners) against injuries sustained, or death arising, from road traffic accidents within the borders of South Africa. It is a form of indemnity insurance to

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persons who are involved in a motor vehicle accident. The family can also claim following a road death. The victim can claim only after receiving the appropriate medical treatment and only when the injuries have healed. The claimant may lodge a claim directly or through an attorney where he/she (claimant) has to be assessed by a medical practitioner to evaluate the injuries. The claimant can be compensated by the RAF for medical loss of income, loss of support, general damages and funeral costs. The socio-economic role of the RAF is to re-integrate victims of road accidents into society from a health and economic perspective, and protect wrongdoers and their families from financial ruin [5].

## Methods

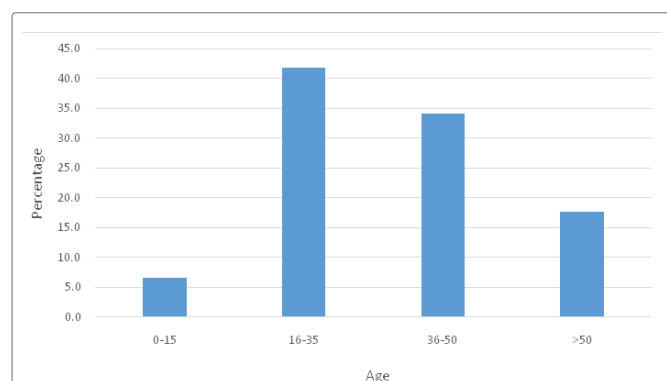
The study was a retrospective one analyzing 3000 claimants/victims who presented for medico-legal evaluation to get compensation examined by a single orthopaedic surgeon from June 2009 to June 2014. All relevant data was put on a Windows Excel spreadsheet. All variables were compared pair-wise where necessary using the Fisher exact test. All analysis was on IBM SPSS statistics 22 running on Microsoft Windows. Ethical clearance was obtained from the Sefako Makgatho Health Sciences University Research and Ethics Committee.

## Results

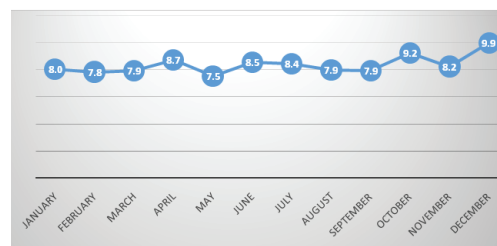
The incidence of male involvement was 1998 (66.6%) while females accounted for 1002 (33.4%). Claimants from the ages of 16 to 35 years and 36 to 50 years, in both genders, showed a high incidence of 41.7% and 34.1% respectively (Figure 1). Extreme ages showed a high number of elderly people (17.6%) above children (6.6%). Most accidents occurred in the month of December, followed by October (Figure 2). Many claimants (70.6%) had been working before the accident with 61.1% permanently employed, 6.4% having piece jobs and 3.1% in temporary employment. Students represented 15.8% of the total (Figure 3). A total of 1162 (54.9%) workers were able to return to work but 955 (45.1%) lost their jobs. Of those who returned to their workplace, 1063 (91.5%) went back to the same position and 99 (8.5%) were redeployed. Private cars (78.3%) were responsible for the majority of road traffic accidents. Other vehicles involved were minibus taxis (16.1%), motorbikes (2%), buses (2.4%) and bicycles (0.9%) (Table 1). Regarding the role of the claimant, figures for passengers (52.2%) were higher than those for drivers (15.9%) and pedestrians (31.3%). Statistically, walking along the

Type of vehicle	No. of claimants	% of claimants
Private car	2349	78.3%
Minibus taxi	482	16.1
Bus	72	2.4%
Motorbike	62	2.10%
Bicycle	27	0.9%

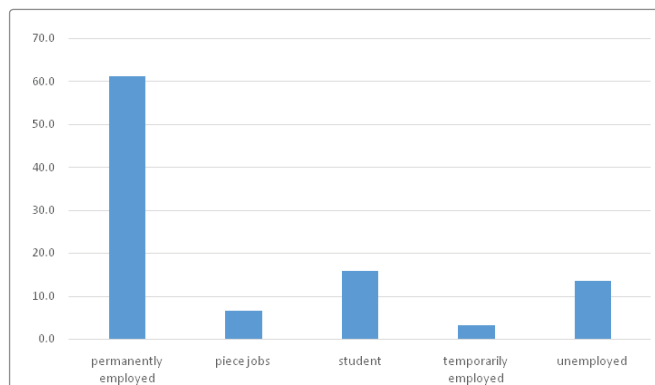
**Table 1:** Types of vehicle involved in RTA



**Figure 1:** Age groups involved in RTA



**Figure 2:** Months of RTA involvement



**Figure 3:** Occupation status before the accident

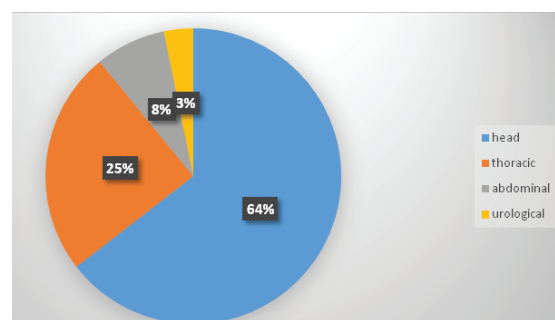
road (42.6%) or crossing the road (40.6%) had similar results while 16.8% of pedestrians could not remember the relation of their accident with the road.

The cervical spine (21.9%) was the area of the body where the highest number of injuries occurred, with whiplash (18.7%) accounting for a large percentage of cervical injuries. The most common extremity fracture sustained was a leg fracture (18.8%). The radial nerve was the most commonly injured nerve and was mostly associated with a humerus fracture. Table 2 outlines the injury pattern. Head injury (64.5%) was the injury most associated with musculoskeletal injury (Figure 4). A number of claimants presented with multiple injuries at an average of 1.3%. Regarding admission, government hospitals admitted more claimants (85.6%) than private hospitals (14.4%). The majority (74%) of those who were admitted to either category of hospital were treated surgically.

## Discussion

### Demographics

Most victims of RTA are males of an economically productive age, irrespective of whether the accident occurred in a developing or developed country, urban or rural environment [3,6-10]. This study analysis has revealed a high level of male involvement at 63.3% following RTA. Statistically this figure is relatively similar to that of a study done in Karnataka (India) which reported 69% of male involvement, although in Uganda and Budapest (Hungary) studies showed an even higher level of male involvement than ours



**Figure 4:** Associated injuries

Anatomical area	% of claimants	Anatomical area	% of claimants	Anatomical area	% of claimants
<b>Cervical spine</b>		<b>Thoracic spine</b>		<b>Shoulder</b>	
whiplash	18.7%	fracture	1.3%	dislocation	0.8%
dislocation	0.3%	fracture dislocation	0%	fracture	3.1%
subluxation	0.2%	<b>Total</b>	<b>1.3%</b>	fracture dislocation	0.1%
fracture dislocation	0.5%	<b>Lumbar spine</b>		<b>Total</b>	<b>4%</b>
fracture subluxation	0.3%	fracture	2.2%		
fracture	1.9%	fracture subluxation	0.1%		
<b>Total</b>	<b>21.90%</b>	<b>Total</b>	<b>2.3%</b>		
<b>Humerus</b>		<b>Elbow</b>		<b>Forearm</b>	
open fracture	0.9%	dislocation	0.2%	close fracture	3.3%
closed fracture	4.5%	fracture	0.9%	open fracture	0.5%
<b>Total</b>	<b>5.4%</b>	fracture dislocation	0.1%	<b>Total</b>	<b>3.8%</b>
		<b>Total</b>	<b>1.2%</b>		
<b>Wrist</b>		<b>Hand</b>		<b>Upper limb tendons</b>	
dislocation	0.2%	dislocation	0.2%	flexor	0%
fracture	1.1%	open fracture	0.5%	extensor	0.4%
fracture dislocation	0%	closed fracture	1.3%	<b>Total</b>	<b>0.4%</b>
<b>Total</b>	<b>1.3%</b>	<b>Total</b>	<b>2%</b>		
<b>Upper limb nerves</b>		<b>Acetabular/hip</b>		<b>Pelvis</b>	
brachial plexus	0.1%	dislocation	0.6%	iliac wings fracture	0.5%
median	0.1%	fracture	3.4%	pubic ramus fracture	3.4%
ulna	0.2%	fracture dislocation	0.8%	<b>Total</b>	<b>3.9%</b>
radial	0.7%	<b>Total</b>	<b>4.8%</b>		
<b>Total</b>	<b>1.1%</b>				
<b>Femur fracture</b>		<b>Knee</b>		<b>Leg</b>	
closed fracture	14.1%	dislocation	0.6%	closed fracture	12.2%
open fracture	0.6%	patellar fracture-		open fracture	6.6%
<b>Total</b>	<b>14.7%</b>	open	0.1%	<b>Total</b>	<b>18.8%</b>
		closed	0.7%		
<b>Foot</b>		ligaments injuries	0.9%	<b>Ankle</b>	
closed fracture	1.60%	meniscus	0.1%	closed fracture	5.1%
open fracture	0.30%	<b>Total</b>	<b>2.4%</b>	open fracture	3.4%
<b>Total</b>	<b>1.9%</b>			<b>Total</b>	<b>8.5%</b>

**Table 2:** Percentage of injury pattern

with figures of 75% and 89.2% respectively [7-9]. In both genders, young adults (41.7%) were vulnerable to sustaining injuries and these findings are similar to other studies [3,8]. The high rate of male involvement in RTA can be attributed to various reasons (Table 3) [3,11-13]. In Pietermaritzburg, SA, the highest number of admissions was found in the age group of 15-44 years following RTA [14]. In a study done at Baragwanath Hospital on children involved in RTA, it was found that those aged between 4 and 8 years had a higher rate of orthopaedic injuries [15]. Children younger than 16 years are those most likely to be struck by a motor vehicle [16]. Table 4 shows reasons why children are at risk of sustaining RTA [15, 16]. The level of education of the parents can be related to RTA. Diedericks reported that young people with well-educated parents experienced fewer RTAs than those whose parents were less educated [17].

### Employment

The economic impact of RTA can be felt by both the claimant or family members. This can occur when a breadwinner has sustained injuries that will result in loss of income. Socio-economic status also plays a pivotal role in RTA. Diedericks found that there was a high percentage of orthopaedic injuries in SA unemployed victims, despite

Greater risk-taking behaviour in males
Alcohol consumption and speeding
Changing lanes illegally
Failure to use safety belt
Males working as drivers for long hours resulting in fatigue
Males are on the roads far more frequently than females

**Table 3:** Reasons attributed to male involvement during RTA

I. View of road obscured due to their short stature
II. Head and shoulders at bumper height
III. Possibly lack judgement to avoid oncoming traffic
IV. Slow reflexes with limited peripheral vision and auditory perception
V. Unable to react or move quickly enough as perceptions of speed, distance and time are still developing

**Table 4:** Reasons attributed to children's risk of RTA

not mentioning the reasons for this phenomenon [17]. However, in Uganda the situation is not the same because both students and peasant farmers were found to be at a higher risk of sustaining injuries [7]. Mock et al. [18] reported that in Kumasi (Ghana) 64% of RTA victims were employed.

There were numerous claimants (54.9%) who returned to work compared to those who lost their jobs (45.1%) in our study. Of those who retained employment, the study revealed lower figures than those reported by Hou [19]. About 52% of claimants with lower limb injuries in our study went back to work following RTA. These findings are similar to those of Read et al. [20] who reported that about 56% of patients with similar injuries went back to work after one year. We could not include the duration of sick leave or whether claimants were paid during sick leave as the orthopaedic surgeon did not routinely ask such questions. Read et al. [20] in their study found that 56% of patients with fractures of lower extremities were able to return to work after one year. About 3.3% of the claimants were redeployed from their original employment due to limitations in the execution of the task or duties. This number is far lower than the figures of Pfeifer et al. [21] who reported that about 52% to 64% of RTA victims have some limitation in performing their duties at work. The work limitation can occur as a result of joint injuries or failure to retain normal skeletal alignment after treatment which later in life can give rise to complications resulting in post-traumatic joint disease whereby patients have limitations to their performance at work years after the accident. Gozzard et al. [22] stated that 7% of whiplash victims were unable to return to work. Following whiplash injury, women tend to have a high rate of insurance claims and there is also a trend of them returning to work more slowly than males [22,23]. Inability to return the economically active worker to work after major trauma is a tragedy for the SA economy which has a high unemployment rate [24].

### Medical care

There is a huge unequal provision of health care for the South African population between government and private hospitals. The majority of government hospitals serve mainly the poorer black population [25]. It was interesting to discover that of the claimants, about 85.6% were admitted to government hospitals and only 14.4% to private hospitals. These findings are similar to those for South African government hospitals (84%) and private hospitals (16%) in the provision of health care services in the country [25]. Many of those claimants (74%) who were admitted to both government and private hospitals were treated surgically thus indicating how severe were their injuries. Compared to other body injuries, patients with musculoskeletal injuries (67%) have a high rate of undergoing operations [26].

We also noted that some claimants were treated in three hospitals for the same injuries due to lack of expertise. For example, in a rural area a claimant might have an accident and sustain a spinal injury. Then the patient would be evacuated to a district hospital from where he/she would be transferred to a regional hospital. At the regional hospital there might not be a spinal surgeon and the claimant would be further transferred to an academic/Level 3 hospital for definitive management. In summary, the claimant would have travelled  $\pm$  500 km by ambulance to obtain appropriate management.

### Associated injuries

Musculoskeletal injuries following RTA are reported to be the most common injury. The injuries can occur with other body injuries [6,26,27]. A head injury (64.5%) was revealed to be the most commonly associated injury in our study. In the majority of instances, management of a head injury requires treatment at an intensive care unit to prevent morbidity and mortality. Thoracic injuries were commonly seen with thoracic spinal injuries.

### Time factor

The month of December was found to be busy, which is common in most SA trauma units mainly due to the long holidays, despite having road traffic campaigns on the national roads in an attempt to prevent RTA [27,28]. However, we were puzzled by the month of

October, as it was found statistically to be similar to December; this might be attributed to the fact that our study was a retrospective one. Injuries to children in SA are not related to seasonal variation in contrast to the northern hemisphere where fractures are mostly seen in the warmer summer months when children will be playing outside [15].

### Type of vehicle and role of claimant

The Arrive Alive Road Traffic Report notes that a high number of fatal crashes are caused by private cars [29]. In Ghana, bus/minibus transport is said to have a high rate of crashes, whereas in India heavy motor vehicles are associated with a high number of accidents [8,30]. The high number of private cars involved in RTA in our setting is similar to that found in developed countries [31]. Some developing countries have a high rate of involvement on the part of motorbike drivers [32]. The study also found that a high number of claimants were passengers, which is similar to other studies done in South Africa [3,14,27]. The minibus taxi industry in this country is extensive with many low-income travellers using this mode of transportation rather than bus services or trains [27].

Statistically, there was a small difference between pedestrians crossing the road (40.6%) or walking along the road (42.6%). In Soweto, children are involved in a high number of pedestrian injuries with a figure of 86% as compared to 13.3% of motor vehicle occupants and 2% for bicycles [15]. In comparison, children in the USA account for 30% of all pedestrian injuries [16]. Pedestrian involvement might be because of crossing roads in an unsafe area or not using clearly marked footpaths. Roads in South Africa often do not have pedestrian lines or bridges permitting safe crossing. The other factor that should be researched is whether the RTA occurred because of the failure of the pedestrian or of the driver to obey safety rules.

### Injury pattern

Parkinson et al. [14] found that the most commonly injured body region following RTA was the lower limbs followed by the upper limbs. Due to the impact of the vehicle and the ground against a pedestrian, the lower limb is at a higher risk of being injured. The other reason is because of energy transferred. A fast-moving vehicle transfers high energy which can result in severe human injuries [9,16]. The study done by Mehdan et al. [10] reported a higher incidence of head injuries (73.6%) as compared to injury to the lower limbs (33.2%), although the majority of victims were driving motorbikes. However, Chalya et al. [33] reported a higher number of musculoskeletal injuries (60.5%) than head injuries (52.1%). A 10-year survey in Taiwan following RTA attempted to investigate orthopaedic fractures and other injuries. Its finding was that orthopaedic injuries accounted for 29.36% with head injury being a commonly associated injury of between 14% and 26% [34]. We could not include injuries like lacerations or soft tissue injuries to the musculoskeletal with no major structural injury.

WHO released Save LIVES, a road safety technical package which presents measures to reduce fatalities associated with RTA. It focuses on Speed management; Leadership; Infrastructure design and improvement; Vehicle safety standards; Enforcement of traffic laws; and post-crash Survival [1].

The impact of road traffic accident is also affecting patients who are on elective lists due to non-traumatic conditions. Patients are waiting for longer period to get non-trauma operations (joint replacements) [35]. Developing countries should invest on building health care facilities that are equipped to manage RTA injuries. The mode of hospital transport was not included in our research as it was not routinely asked during evaluation; that might have highlighted whether an emergency medical service was easily accessible to evacuate victims of RTA.

### Conclusion, Limitation and Recommendations

Road traffic accidents constitute a major public health care problem especially to economically productive males. The majority of accidents are caused by private cars despite the fact that many low-income South Africans use minibus taxis as a mode of transport. Neck



injuries accounted for more injuries when compared to other body parts; leg fractures were the most common of the extremity fractures. The socio-economic ramifications of RTA resulted in victims losing their jobs due to inability to cope with the effects of the accident. The burden of RTA is affecting the South African economy which already has a high percentage of unemployment. The number of claimants that were treated in government or private hospitals was statistically similar to figures the hospitals provided for general health care services to the population.

The study was retrospective and undertaken by a single surgeon that sees victims from all nine provinces. The government should invest more in building trauma centres that are well equipped especially in those provinces that do not have trauma hospitals.

## Conflict of Interests

The authors of this article have no conflicts of interest to disclose.

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