

An exploration of holistic road safety model to prevent pedestrian fatalities in the Limpopo Province of South Africa

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Abstract

This paper explores a holistic road safety model to prevent pedestrian fatalities in Limpopo Province. The inability of both pedestrians and motorists to understand and interpret the rules of the road is a major problem in the Limpopo Province. The study utilised quantitative approach. The sample consisted of 195 respondents. Comprises of 15 civil engineering companies, 23 civil society organisations, 52 community members, 51 teachers and 54 traffic police officials. The findings from the study revealed among many others, that 65.6% of the respondents in the study agreed or strongly agreed that road safety education could prevent pedestrian fatalities; 72% of the respondents agreed to strongly agree that road construction engineering could prevent pedestrian fatalities; 64% of the study respondents either agreed or strongly agreed that empowerment could prevent pedestrian fatalities in Limpopo Province. 62.9% of the respondents agreed or strongly agreed that enforcement was not emphasized at provincial level in preventing pedestrian fatalities. Firstly, department of education and transport need to work together to formulate road safety curriculum from grade R to 12 to educate learners from young age about the importance of road safety. Secondly, enforcement interventions should focus on traffic measures that promote road user's adherence to traffic regulations such as regulating driver behaviour and the monitoring of pedestrian behaviour to counteract pedestrian fatalities. Furthermore, separating pedestrians from cars, enhancing visibility at night, and reducing motorised speeds will assist in reducing pedestrian fatalities. Also, there is a need for road infrastructure improvements which include the separation of different types of traffic, better road markings and road signs.

Keywords: Holistic, road safety, prevention, pedestrian, fatality, and Limpopo Province.

Introduction

Pedestrian Safety remains one of the most important challenges to road safety authorities worldwide even in South Africa it is prevalent. It is the responsibility of road users to ensure their safety on the road by following the rules of the road and also law enforcement officials must ensure that they implement the law at all times to ensure consistency and by ensuring consistency, means that road users will always be alert on the road by following the rules of the road. Improving road safety requires strong political will on the part of governments. Countries should aim to ensure that sufficient resources are available, commensurate with the size of the road

safety problem in their country, Kofi Anan, United Nation secretary general, 2003. The history and segregated development within South Africa further necessitate that we do much more for the protection of our pedestrians. With a multi-disciplinary approach and implementation of global best practices, it is however possible to significantly reduce pedestrian fatalities and make our roads safer for all road users. The road traffic fatality rate in South Africa, at almost 40 per 100,000 populations, is among the highest in the world and nearly double the world average (Norman et al., 2007). A legacy of apartheid city planning, and contemporary urban sprawl mean that pedestrians frequently residing in informal settlements are forced to navigate the country's high-speed road networks, Arrive Alive (2005). These risk conditions contribute to the high proportion of traffic-related mortality in South Africa's non-natural death profile. Driver and pedestrian compliance with laws are critical to pedestrian safety. This compliance refers specifically to legal vehicle speed limits, drinking and driving regulations, red-light signal compliance and pedestrian traffic control signals, Arrive Alive (2005). These can be achieved, if there is a working relationship between municipal police officials, road users and all other stakeholders involved in ensuring road safety.

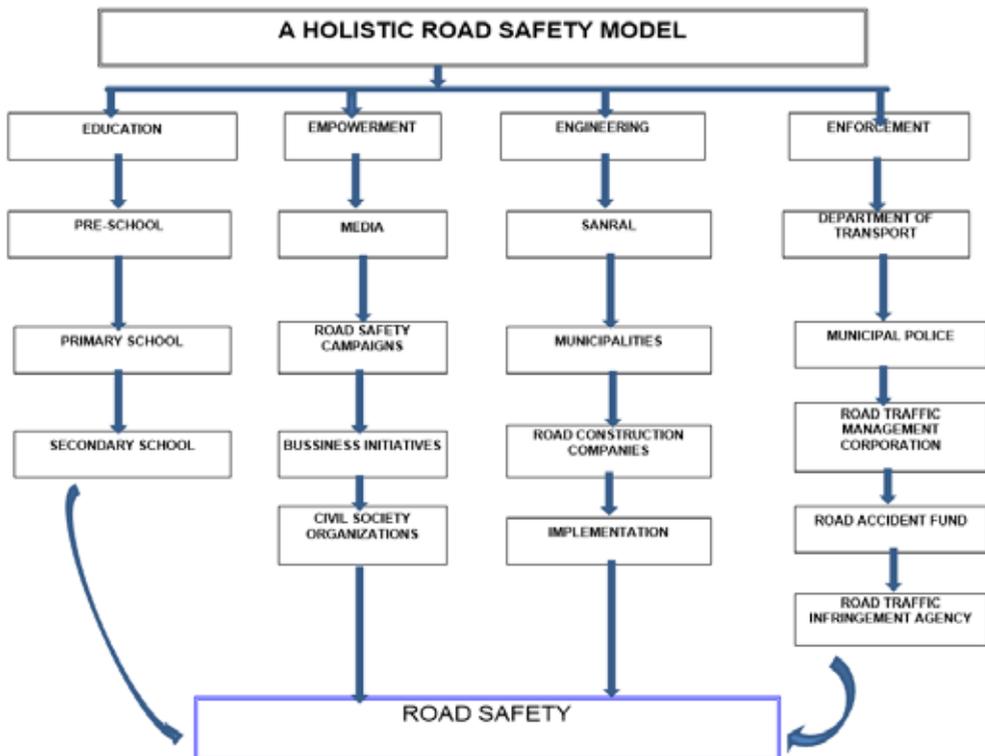
Many studies have been conducted to overcome road traffic accidents and the results are not satisfying as many pedestrians are killed on the road. In South Africa, estimates reveal that pedestrian fatalities, and road traffic crashes in general, remain a serious problem (Arrive Alive, 2005; Matzopoulos, 2004). Road Traffic Management Corporation (RTMC), (2005) stated that Limpopo Province has got high number of road traffic deaths in South Africa including vulnerable road users such as pedestrians. Road Traffic Management Corporation (2016:43) stated that Limpopo Province had 100 pedestrian fatalities and nationwide 1398 pedestrians were killed, and much should be done to counteract this problem to make our roads safer for all road users. In addition, in 2016 Limpopo Province had 1261 road traffic fatalities and there was increase of road traffic accidents in 2017 were they recorded 1326, an increase of 65 road traffic fatalities as compared to 2016, Arrive Alive (2017). A holistic road safety model highlights how this problem could be prevented because one death is too many therefore zero tolerance approach should be implemented through this model. It is of great importance to ensure visible policing on the road especially on weekends where many accidents happen and strengthening road safety campaigns to encourage safety on the roads. The law is there it needs to be adequately enforced and by ensuring that law enforcement officials are well trained and have got necessary skills to deal with pedestrian fatalities and also it is not the responsibility of law enforcement officials only to ensure road safety, it is also the task of all road users to ensure that they follow the rules of the road. Many severe road crashes are preventable, and history provides evidence that the right interventions can make a significant positive impact, Australian Transport Council (2011:4).

A holistic road safety model

The problem of Road Safety is largely a problem of motor vehicles, drivers, pedestrians, cyclists, and motor cyclists. The road safety establishment often forgets to provide for pedestrians, cyclist, motor cyclists and wheel-chair users, all the road users who

still must get solid road safety promotion programmes from the government and collaborating agencies, Thebe (2011:76). Often, remedial measure focuses more on reducing accidents rather than on changing the behaviour and attitudes of road users other than the motorists. However, roads must not be hostile to safe driving. Advocacy campaigns indicate that warnings are part of the good messages on roads, where drivers are told to reduce speed and to heed road constructions ahead, Thebe (2011:76). The reason why a road safety strategy is needed today it is because it offers a well-planned, coordinated approach which addresses each element of road traffic safety and focuses on sustainable, substantial and low-cost improvements, Yu, Guo, Zhang and Wang (2013). A holistic road safety model would make roads safer to all road users and it is also to assist vulnerable road users such as pedestrians in terms of how to conduct themselves whenever they are on the road. The model is based on four E's of road traffic calming which are Engineering, Enforcement, Education and Empowerment. The model could make a major difference in terms of how law enforcement and road users handle road safety situations in the Province. The National Development Plan (NDP) acknowledges that an integrated approach to safety and security will require coordinated activity across a variety of departments, the private sector and community bodies, and it encourages community activism and responsiveness (National Planning Commission, 2012).

Conceptualisation of road safety model (modipa, 2021)



Enforcement

The challenges in addressing road safety in South Africa are primarily those of human behaviour i.e. a lack of knowledge of the rules of the road, and willingness to abide by those rules, as well as inadequate enforcement and a lack of follow up of fines and the resulting culture of impunity in respect to punishment of offenders, Arrive Alive (2010:7). South Africa's road death toll for 2017 is one of the worst in years, despite safety campaigns to end the carnage. Current road safety initiatives are simply not working and according to Automobile Association (2018) as quoted by Times Live that 14 050-people died in road crashes in South Africa in 2017. Many pedestrian crashes are the result of unsafe motor vehicle driver and pedestrian behaviours, Zegeer, Sandt and Scully (2009:2). The ever-growing number of road traffic crashes and related deaths demonstrate that the current systems for combating traffic offences prove to be inadequate. Given the fact that no less than 12,700 people now die on our roads annually (almost 38 per day), road safety clearly should be a national priority, Arrive Alive (2018). The level of "un-safety" is related to the degree of lawlessness on the roads, which is too high and can no longer be tolerated. Traffic offences, reckless, negligent, inconsiderate, aggressive, and arrogant driver behaviour also encourage road rage to a large extent, Arrive Alive (2018).

Visibility of municipal/ traffic police officials on the road play a major role as most of the road users obey the rules of the road when they see officials on the road and inconsistency in terms of how traffic police officials enforce the law is questionable because you will see some drivers not getting fine for violating the rules of the road due to bribes they pay to officials. Zaal (1994:19) stated that road users usually only modify their behaviour at the enforcement site or where they perceive the risk of apprehension is greatest. Once the road user believes that the enforcement threat is no longer present their behaviour soon reverts to pre-enforcement levels. The problem is that there are not enough policing resources to cover the entire road network and road users understand the risk of apprehension at any time is extremely low. Department of transport and its agencies such as Municipal Police, Road traffic Management Corporation, Road Accident Fund and Road Traffic Infringement Agency must play their role and ensure that corrupt officials are out of their agencies as they compromise the safety of road users on the road and ensure that they play their role in terms of changing the behaviour of road users. To win the battle of road traffic accidents, agencies should clean their departments so that when they encounter this problem of pedestrian fatalities, they do not have members who are corrupt on their side. Their mission to halve the number of road traffic fatalities as it is in line with UN decade of action 2020-2022 could be possible as long their departments are clean from wrongdoing. The effect of corruption is not only a loss of state revenue. When corrupt officials allow motorists who speed, or who are driving vehicles that are not roadworthy, to proceed with their journey, the consequences for other road users are potentially disastrous. A breakdown in public trust of the integrity of traffic officials is also likely to result in an increase in lawlessness among road users, Arrive Alive (2018).

Studies on crime in South Africa revealed that corruption was most evident in

encounters with traffic officials, followed by the police, and then during interactions with officials over employment opportunities. This support the perception that corruption is a problem in local government traffic departments, municipal police services and the SAPS, and highlights the discretionary power of some of these officials. For example, the public largely interacts with traffic officials on the road where the actions of corrupt officials are difficult to monitor, Arrive Alive (2018). The model emphasise the importance of training of traffic personnel, so that they could do their work at their level best and to encourage collaborations with traffic schools to come on board on the issue of corruption happening in the traffic centres because road traffic deaths start there, with traffic officials issuing fraudulent driver's license and all illegal aspects happening at the centres. Road Traffic Management Corporation (RTMC), Tactical Response Team and Hawks continued arresting corrupt officials in Limpopo Province.

In South Africa road accident fund provides for the payment of compensation for the loss or damages wrongfully caused by the driver of a motor vehicle. The financial performance of the Road Accident Fund impacts on the public's expectation of what compensation they will receive for personal injury and fatalities due to certain road accidents. It therefore influences the portion of the fuel levy allocated to the fund and influences the concerns of stakeholders and the government regarding the sustainability of the Fund to meet its future commitments. The mandate of the Road Accident Fund, derived from section 3 of the Road Accident Fund Act (No. 56 of 1996), is the payment of compensation for loss or damage wrongfully caused by the driving of motor vehicles in South Africa. The Fund's strategic goals over the medium term are to develop a legislative dispensation that is aligned with the principles of social security, to ensure that the organisation is solvent, liquid, and sustainable by 2020, and to ensure that the organisation is customer friendly, operationally effective, and efficient by 2017. It is important for road accident fund to make this kind of information available to road users, so that when they are involved in road traffic accidents, they can claim for compensation from road accident fund. Road accident fund should also work closely with law enforcement agencies especially during joint operations to provide necessary information to road users, for example Limpopo Province is a rural province in South Africa and most of the communities are not aware of this institution, therefore it is of utmost important that their service should go to the people, so that they can be informed.

Pro- active measures should also be put into place so that the institution can be sustainable in terms of their finances by ensuring that they work with other institutions to prevent pedestrian fatalities. Unfinalised claims are one of the pressing issues where victims of road traffic accidents spend lot of money on lawyers to be compensated. This kind of issues could be prevented by ensuring that they have competent investigators in their institution and as a result they will be avoiding legal actions taken by the victims of road traffic accidents and save money on those cases. It is important for institution to store information/claims in a secure place to avoid misplacing of documents which at the end those who are claiming will be suffering emotionally and financially in terms of way forward. It is important for the institution to assign their members to have direct contact with those affected by the accidents

until they finalised the claims. It should not be other way round where the victim or family member of road traffic accident will spend money going to their offices now and then without getting help. The institution should have members who care about the people, client orientated and who are there to assist the institution to achieve its goals in the short, medium, and long term.

The RTIA (Road Traffic Infringement Agency) promotes road traffic quality by providing for a scheme to discourage road traffic contraventions and adjudication of road traffic infringements and supports the prosecution of road traffic offences. It is the independent adjudicator or arbiter of traffic infringements and fines issued under the AARTO Act, No. 46 of 1998. As an adjudicator it ensures that all matters that arise from traffic fines are resolved fairly. This is done by ensuring that traffic fines are decriminalised and dealt with through the administrative justice process to free the courts to deal with more serious crimes. It is of great importance to ensure that the RTIA deals with those infringers of the law because there are many fines which are not paid by infringers and as a result it impacts on the transport department and its agencies in terms of executing their mandates because those fines could help in terms of ensuring road safety to all road users in the country. The RTIA (2018) derives its mandate and functions from the Administrative Adjudication of Road Traffic Offences Act, 1998 (Act No. 46 of 1998), herein-after referred to as the AARTO Act, which states that the objects of the Agency, are, despite the Criminal Procedure Act, 1977 (Act No. 51 of 1977), herein-after referred to as the CPA:

- (a) To encourage compliance with the national and provincial laws and municipal by-laws relating to road traffic and to promote road traffic safety;
- (b) To encourage the payment of penalties imposed for infringements and to allow alleged minor infringers to make representations;
- (c) To establish a procedure for the effective and expeditious adjudication of infringements;
- (d) To alleviate the burden on the courts of trying offenders for infringements;
- (e) To penalise drivers and operators who are guilty of infringements or offences through the imposition of demerit points leading to the suspension and cancellation of driving licenses, professional driving permits or operator cards;
- (f) To reward law-abiding behaviour by reducing demerit points where they have been incurred if infringements or offences are not committed over specified periods;
- (g) To establish an agency to support the law enforcement and judicial authorities and to undertake the administrative adjudication process; and
- (h) To strengthen co-operation between the prosecuting and law enforcement authorities by establishing a board to govern the agency

Road safety must be supported by equally effective public awareness, communication, and education programmes; as well as a highly efficient, transparent, and expeditious adjudication process to bring traffic offenders to task. World-wide best practice proves that for law enforcement to be effective, Road Traffic Infringement Agency (2018). It is important for Road Traffic Infringement Agency to embark on a marketing campaign, so that people can be aware of this organisation and to inform road users about what they stand for in terms of road safety. To achieve road safety to all road users especially the vulnerable pedestrians, law enforcement agencies need to work

together. Credible systems are needed to ensure data integrity of all the entity's operations. There is a need to introduce an online ticket system which could be used to issue tickets to road users/infringers unlike the manual system which is currently used in the law enforcement agencies.

Engineering

Effective engineering plans take into consideration both infrastructure and technology. A well-designed infrastructure reduces road hazards and promotes the safety of road users. Moreover, vehicle and infrastructure related technologies increase road and vehicle safety while reducing fatal accidents, Price Waterhouse Coopers (2017:12). Roadway design and intersection signal controls are a fundamental part of a safe system design for pedestrians. In conjunction with implementing an integrated pedestrian strategy, there are many measures that work to improve pedestrian safety, Canadian Council of Motor Transport Administrators (2013). Engineering countermeasures for pedestrians can be classified into broad categories; separation of pedestrians from vehicles through space or time, reducing or eliminating concurrent movements of vehicles and people, reducing pedestrian crossing distances, increasing the visibility of pedestrians including through better lighting, alerting drivers to the location of crosswalks and reducing vehicle speeds, Canadian Council of Motor Transport Administrators (2013). Bloomberg Global Road Safety Program (2012:24) stated that road safety infrastructure improvements can reduce the risk of road traffic fatalities and injuries by 25–40% for all road users, including car occupants, motorcyclists, bicyclists, and pedestrians. such improvements include widening shoulder lanes, improving intersections, and installing medians, side barriers, crosswalks, and lane markings.

It is important to prioritise safety of road users by implementing safety measures at high accident zone in Limpopo Province. This could be achieved through road construction engineering by designing roads which will accommodate all road users because in the past the designers were not considering the safety of pedestrians when designing the roads. The results of poor road design had a severe damage to roads, road users and financial budget. Lack of road signs, traffic lights, pedestrian bridges, streetlights, road marking, drainage system and other basic road safety measures contribute negatively on the safety of pedestrians. Limpopo Province in the past years, some of the major roads where not having roundabouts, traffic lights and other basic road safety measures. There were lot of accidents for example in GaMothapo and Mothiba intersection where there were headlines about Polokwane City players being killed at that intersection and other pedestrians in 2012.

It is important to important to build roads which will contribute to traffic calming and prevent road traffic accidents. Road construction engineering should accommodate all the aspects of road users especially the pedestrians to ensure that the roads are in good condition. A feature of traffic characteristic in developing countries like South Africa is the large numbers of pedestrians and cyclists. It is common for road design and traffic control measures to be geared to meeting the demand of motorized traffic in interaction with a limited number of pedestrians and cyclists, Falck-Jansen, Kildebogaard and Robinson (2013:41). Problems can also arise within intersections

because of the conflicts between different categories of traffic. Often, large proportions of pedestrians and cyclists obstruct the intended flow of motorised traffic, Falck-Jansen, Kildebogaard and Robinson (2013:50).

Roads connect people and enable citizens to move within the province, commuting to and from work, visiting family, getting to holiday destinations or places of worship. Apartheid planning kept communities apart, so well-developed road and transport infrastructure is important to connect and integrate people across historical divides, Sanral (2017:5). SANRAL has been entrusted with the task of developing and maintaining the national road network which is of great strategic importance to the economic growth of South Africa. SANRAL has since its inception in 1998 used various models and strategies to achieve its mission, primarily through predicting and reacting timeously to the demand of a sophisticated road national network. South Africa has the longest road network in Africa, it is estimated to be about 750 000km, Sanral (2017:5). The South African National Roads Agency Limited (SANRAL) was established by the South African National Roads Agency Limited and National Roads Act (No. 7 of 1998).

Routine Road Maintenance (RRM) is the day- to-day upkeep of the road network. This includes filling potholes, grass cutting, repairing damaged guardrails hit by cars, fixing road signs, cleaning stormwater culverts, removing dead animals and clearing the road after accidents, Sanral (2017:5). It is important for Sanral to ensure that maintenance of the roads is done on regular basis to prevent accidents caused by roads which are not in good condition. Sanral together with communities should work together to ensure that the roads are safe for road users. These could be done by communities through communication with Sanral where there are problems, Sanral should be notified so that they could act to that problem. The primary goal of crosswalk design is to provide safe places for pedestrians to cross while encouraging drivers and pedestrians to make safer decisions that will result in reduced levels of human trauma, Canadian Council of Motor Transport Administrators (2013:8).

Municipalities are struggling to maintain their road network even though they get an equitable share to local government to assist with operations and maintenance. Contrary to popular belief that rural municipalities are the ones struggling with road infrastructure finance it is apparent that all municipalities are inundated by road infrastructure backlogs servicing both poor and non-poor households, South African Local Government Association (S.a:5). There is therefore a need to address this problem and seek to identify a sustainable solution for all municipalities and not only focus on rural areas. Poor road infrastructure is one of contributory factors to road traffic accidents in Limpopo Province especially to vulnerable road users such as pedestrians. The local government is the only sphere that is closer to the local communities for purposes of service provision, emphasised that municipalities should strive to fulfil a constitutional mandate by delivering service to the South African citizens, Mamabolo (2016:30).

Road infrastructure delivery should therefore be considered a genuine shared responsibility among the three spheres of government in South Africa. It is of paramount importance for business community, traditional leaders and other stakeholders to come on board and build our communities in terms of building

quality roads to ensure that the roads are accommodating to all road users because municipality alone cannot since they have limited budget and as a result they prioritise services to the people and road infrastructure is always compromised especially with small municipalities. Road users are being killed on daily basis and one of the contributory factors is the road environment and much should be done to counteract this problem through PPP (Public Private Partnership) and all other major stakeholders in the Province. South African roads especially in rural areas are not in good condition and are used by big trucks which huge impact on the tar road and it end-up having potholes. The space is also used by pedestrians who are vulnerable because some of the roads do not have marked yellow lane where the pedestrians could use to walk.

Government departments responsible for public works must appoint companies with credible record to build roads in the country to ensure safety of road users, in most cases companies who get those tenders they do not have the necessary skills to embark on the work and end up leaving the work halfway and as a result it leaves traffic congestion and as well as road users frustrated. In most cases road rage is caused by unnecessary traffic congestion which was caused by these road construction engineering companies and government. Tenders for road construction should be transparent to all relevant stakeholders to get right companies to the work and ensure road safety to all road users. Planners and engineers when they draft roads, they should consider the safety of vulnerable road users such as pedestrian and it upon the responsibility of companies to have highly skilled engineers to deliver quality service in road infrastructure when appointed to do so by municipality or government department. Kapila, Prabhakar and Bhattacharjee (2013:11) indicated that there are key elements of safe road infrastructure design, which are as follows:

- Inside widening for sharp curves.
- Provision of raised footpath for pedestrians in Urban Areas
- Barriers should be designed to deflect the vehicle and not crash it.
- Road signs should be standardised all over the country.
- Properly designed traffic calming measures like the speed humps, rumble strips, small roundabouts, etc.

One of the major obstacles with road construction companies when it comes to implementation phase is that they use materials which are not of good quality to build roads and one of the examples is the pedestrian bridge which was collapsed in the City of Johannesburg where workers and pedestrians were killed and injured which was all over the media outlets in South Africa. For example, in 2011 in Limpopo Province in the village called Kgapanne an engineering company was appointed to build roads and bridges in the area after completion of those roads and bridges were washed away because one of the bridges built at the township's Meloding Section is effectively a hill of soil covered with pavement and it has no concrete layers. The money of taxpayers was wasted on companies which do not have necessary skills and who do not even care about the safety of road users as they use materials which are not good for building.

It is important for government department, community and as well as municipalities to work together in terms of monitoring because in most cases the road construction

companies are not accountable for the problems they created while they benefited from taxpayer's money. One of the principles in section 195 of the constitution address the issue of value for money it is important as the companies get those tenders to deliver quality road infrastructure to the communities and ensure road safety to all road users in the country. It is also the responsibility of construction companies to ensure that the safety of their workers is not compromised on the road as some are being hit by motorists especially at night because some they do not wear reflective gear, rainy conditions, speeding and other risks associated with road workers' safety. The safety and well-being of road workers can be improved with the following guidelines, Arrive Alive (2010):

- Wearing sunscreen, a hat, and long-sleeved shirts to protect from sunburn, dehydration, and overheating.
- Drinking a cup of water every 20 minutes or so in very hot weather to help prevent dehydration.
- Managers should ensure that new employees are prepared to work in all types of traffic, they should feel comfortable using flagmen - workers who use flags to signal drivers and warn them that they're approaching a work site and have enough road sense to never turn their back to oncoming traffic.
- New workers should be taught how to maneuver around massive pieces of equipment and to safeguard a site for optimal security
- Use protective equipment and personal protective gear (such as hard hats and steel-toed shoes).
- Reflective clothing is also crucial, especially for night shift work.
- Noise levels should be monitored always to prevent hearing loss – it is suggested that workers wear earmuffs or earplugs to shield their eardrums from high decibels.
- There should be training in how to set up a safe work zone - You can't just get out there and flag and yell, 'Slow down,'. There is a way to properly instruct vehicles to slow down and away to set up a work zone.
- Workers should be constantly reminded to remain vigilant and alert.

Many motorists view road construction workers as an inconvenience, but they should rather look at them as a service. Road and maintenance workers are doing their best to minimise motorist inconvenience. No matter how it seems to the motorist, road workers and flaggers are striving to improve traffic safety conditions, and it is up to the driver to be alert, aware, and responsive. It is also important for both road workers and road users to work together during building and maintenance phase to avoid unnecessary traffic incidences and by working together through putting the interests of road users first most of the road traffic accidents could be prevented.

Limpopo Province experience lot of pedestrian fatalities and it is important for all spheres of government to work together to counteract this problem because many areas where there is a high number of pedestrian fatalities are in rural, therefore it is important for all major stakeholders such as business community, civil society organisations and non-governmental organisations to work together to prevent pedestrian fatalities. If these stakeholders can come on board and work with Department of Transport and its agencies this problem of pedestrian fatalities can

be solved by way of building roads and pedestrian bridges which are of quality to counteract this problem. Design of pedestrian bridges should be complimented by good implementation of contractors appointed by Sanral or municipality because if it is well implemented, the safety of pedestrians will be secured, and traffic congestion will be reduced, and smooth operations of the economy will take place and the country will benefit from that implementation. It is important for all the spheres of government and its agencies when they implement their policies to ensure that highly skilled people are appointed to deliver quality service to the community not a situation where there will be casualties while working on project for example during the building phase of pedestrian bridge in Johannesburg some workers and road users lost their lives when the bridge collapsed. At all times the companies appointed to build pedestrian bridges should have screened in terms of their previous projects and not appoint people who will put road users as well as their workers at risk while implementing key road safety measures in our country.

Education

Road safety measures aimed at achieving this safety goal by preventing traffic crashes and reducing their severity, are traditionally referred as the four E's: Enforcement measures, Engineering measures, Education measures and Empowerment. From the experiences of the best performing countries, it has become evident that for road users to become safe on the road, one of the important traffic calming measures which is education should be used to counteract the problem of pedestrian fatalities in the country especially in Limpopo Province where many pedestrians are killed when they cross the road and to curb this problem much should be done on education especially at higher age. Children and young people are at significant risk on our roads. Road trauma is the leading cause of death and the second most frequent cause of hospitalisation among children in South Africa. Schrieber and Vegega (2002) in their report stated that road traffic crashes between child pedestrians and motor vehicles decline after classroom education, but the degree of pedestrian behavioural change was not large. By comparison, correct behaviours for certain road crossing skills had increased up to 40%-70% among children exposed to skill training interventions in the United Kingdom and to 30% -50% of lower elementary children exposed to such training in the United States.

Road safety education plays an important role in shaping the attitudes and behaviours of road users and it will be relevant if it can start at early age where children can learn about road safety in order for them to conduct themselves in a responsible manner and children can also influence their parents about road safety if they learn it at schools, for example if children are being taught about speeding and other contributory factors to road traffic accidents, they can simply say no to unlawful conduct or advise them to follow the rules of the road. Mandela said, "Education is the most powerful weapon which you can use to change the world". It is important for all road users to learn about road safety to make our roads safer and more accommodating in terms of bring ideas to relevant authorities in terms of improving road safety in the country. Mandela also said that "no country can really develop unless its citizens are educated" and by this statement it is important for us all as the nation to be more encouraged

to learn as it will assist us in terms of how we conduct ourselves on the road. Many of road traffic accidents are caused by human factor and this factor can be addressed swiftly by educating our people about road safety. It is important for all stakeholders to come together and address this problem as it affects everyone and come up with ways on education to curb this problem. The only way to address human behaviour as the contributory factor is by ensuring that our citizens are educated to make good decisions and make our roads safer to all.

Road safety education should focus on three key areas which are knowledge, skills, and attitude. Department of Transport as well as Department of Education in the Province should work together in drafting road safety curriculum and it is also important to ensure that our people learn about the rules of the road because in most cases they learn about them when applying learner's license and from that they are done, and the question is what they have learned during learner's license enough to be a good participant on the road? And the answer is no as many of our road users are always on the wrong side with law enforcement officers and much should be done to come up more information on road safety so that they can be able to conduct themselves in a better. Road users need to know about the consequences of not following the rules of the road and the impact of road traffic accidents on families and country because economically it put pressure on Road Accident Fund to commit more money on the victims of road traffic accidents and that money could be used to improve road infrastructure in the country.

It also impacts on families as children are left behind without breadwinners and some are left paralysed due to road traffic accidents. It is of paramount importance for road users to be more informed about consequences of their behaviour on the road. One of the measures which can be used under education on road safety is by ensuring that our road users have skills to conduct themselves on the road and the question is how they will get those skills? It is a collective effort to ensure that road users have necessary skills to conduct themselves on the road, it starts at pre-schools to tertiary levels as well as department of transport providing rules which they should follow whenever they are on the road and the other measure is attitude which can be changed if people are willing to change it especially on pedestrians and young drivers as in most cases they are the one involved in road traffic accidents. Road users should know that driving under the influence of drugs and alcohol is wrong as this contribute to speeding and crossing the road without following left, right, and left principle before crossing the road as that factor affect your judgement.

Changing behaviour need commitment from everyone who uses the road, firstly by respecting one another on the road to avoid road rage which causes many road traffic accidents and by respecting one another means that our conduct will be promoting road safety without influence of law enforcement officials, it is upon us as road users to change our behaviour and this can be done by ensuring that our people are more educated as Madiba said " Education is the most powerful weapon which you can use to change the world". Seven principles for sound road safety practice in schools, Dragutinovic and Twisk (2006:35):

- Road safety education should not result in increased exposure for high-risk categories.

- Road safety education should promote injury reduction measures that are known to be effective.
- Road safety education should provide children of every age with the skills and knowledge required to perform safely the road-related activities in which they are likely to be engaged.
- Scarce road safety education resources should not be devoted to programmes that are known to be ineffective in reducing crashes and casualties.
- Road safety education should not lead to students becoming over-confident about their ability to cope safely with hazardous driving situations.
- Road safety education should provide students not only with the knowledge and skills required to behave safely, but also with the motivation to do so.
- Road safety education should provide students with the knowledge that
- will help them to be safer road users throughout their lives

Scholar Patrol is an essential part of road safety education and essential to enhancing the safety of our scholars at their schools. Not only does it regulate traffic, improve speed calming, and facilitate safe crossing of the road but also instils in the minds of our young pedestrians an awareness of the importance of road safety, Arrive Alive (2018). They were also to set a good example and encourage all students to observe the rules of safety. They had to report for duty on time with the proper equipment and attire on. They had to report all infractions of the rules to their superiors. They had to aid other patrol members when necessary. Know and enforce all safety walking and crossing rules. Lastly, they had to attend regular meetings that would discuss problem areas of traffic and street crossings. As young people begin to mature and become more independent, they are exposed to increasing risks. Teenagers are an important group of road users as pedestrians, cyclists, motorcyclists, and newly qualified drivers. Many are unaware that road incidents are the biggest cause of accidental deaths and serious injuries amongst young people. There is a need for all those involved with young people to help teach clear road safety messages to equip them to understand and manage the risks they encounter as road users, North Yorkshire Road Safety Council (2015:9) and teachers could help in terms of teaching teenagers in life and orientation and physical science subject which covers the importance of road safety such as speeding. Young people are extremely vulnerable as road users, especially when they are learning to drive. Secondary schools can play an important role in improving road safety actions taken by their students. Secondary teachers are using curriculum resources provided by the Department of Education to unpack young people's mental models about road safety. They are using road safety as an authentic real-life context to help students deepen and apply their curriculum learning in all subjects. This way of learning encourages students to become active citizens with positive, socially connected road user identities, New Zealand Transport Agency (S.a:1).

Road Safety is an issue that affects all road users. We all need to use roads whether we are children or adults. Most of us use the roads everyday as pedestrians, cyclists, drivers, or passengers in cars. It is essential therefore to ensure that we can travel around as safely as possible. Good practice in Road Safety Education is developmental, progressive and relates to the stage of development of the child. The most effective

Road Safety Education is developed by partnerships between class teachers, parents, and Road Safety Officers, each supporting the others, North Yorkshire Road Safety council (2015:2). To effectively counteract pedestrian fatalities all major stakeholders, need to play their roles, for example, teachers should do their part by teaching learners all fundamentals issues of road safety and parents also do their part. Young drivers are in most cases involved in road traffic accidents as some of them are still learning to drive and the issue of alcohol come to effect especially during weekends where most of the accidents are happening in the province and to counteract it much should be done on building their behaviour in terms of respecting the rules of the road. Firstly, learners should learn about road safety and how it affects them and their community. Through high school competitions on road safety many of our leaners could learn a lot from other schools in the country. It should be supported by all major stakeholders, so that all schools can participate in this kind of competitions. one of the method which they can use to transfer information to road users is by using theatre and drama, for example (South African Broadcasting Corporation) SABC 1 launched a drama called ingozi (accident) to teach road users about the danger of not following the rules of the road. Drama and theatre are highly effective when it comes to engaging young people in road safety messages. Theatre-in-Education is particularly suited to tackling social pressures and alternative behaviours. For that reason, plays should be regarded as a key element of the curriculum as well to spread the road safety message, Dragutinovic and Twisk (2006:28).

Empowerment

Road users' pedestrians, cyclists and motorists needed to realise that the government could do only so much to improve road safety and prevent the number of fatalities on the roads. Unfortunately, too many South Africans have an extremely bad attitude towards safe road use, and all the education and enforcement in the world will not stop those intent on playing by their own rules. Without a change of attitude among road users and, importantly a respect for the law, efforts to prevent pedestrian fatalities and crashes will fall flat, Automobile Association (2017) as quoted by Business Day. Awareness of road safety messages is key in preventing pedestrian fatalities and it is important for Department of Transport as well as other major key stakeholders to work together in promoting road safety in Limpopo Province. Most of the people in Limpopo Province are living in rural areas and as a result it disadvantages them in terms of being informed about road safety. Some they didn't even go to school especially older road users, but they are using the road even if they do not have knowledge about the rules of the road and it put them at risk of being involved in road traffic accidents.

It is of paramount importance to bring services to the people regardless of where they live because they are part of the province. When you are informed about road safety, it is where you will be able to maneuver in traffic safely but if not, you could be compromised as a result thereof. The promotion of road safety in the province could be used to empower more road users about the rules of the road and how to conduct themselves whenever they are on the road. The aim of the empowerment is to cover as many road users as possible to ensure that they are aware of road

safety using all relevant platforms such as Radio, Television, Newspapers, Social networks etc. to provide messages to the masses on the ground. When communities are educated about their surroundings especially when it comes to their safety, they are more likely to be vigilant, alert and stay away from the dangerous areas and it is only through campaigns or use of media to ensure that road users are aware of the dangers of the road. For example, in the USA a campaign which combined education and enforcement techniques yielded results in terms of reduction in pedestrian fatalities. New data shows that efforts to increase public awareness paid off. Street Smart campaign successfully changed behaviours with results showing a 39 percent reduction in pedestrians crossing midblock (jaywalking) and an 11 percent reduction in pedestrians crossing against the traffic signal, Boonton New Jersey (2017). Public awareness of the Boonton Police Department's enforcement of pedestrian safety laws increased 56 percent, awareness of pedestrian safety-related advertising messages rose to 50 percent, and awareness of the Street-Smart campaign's presence in Boonton during the month of October 2017 increased to 63 percent, Boonton New Jersey (2017). It is important for South Africa to increase their awareness campaigns to ensure that road users are aware of the dangers of not following the rules of the road.

Road traffic accidents need all of us to work together in educating one another and therefore media, especially the South African Broadcasting Corporation need to play a starring role in providing more information on road safety through collaboration with Department of Transport and its agencies because SABC can cover the length and breadth of our country and many people have access to Radio and TV and that is where we can educate and change the behaviour of road users in terms of road safety. There are also limited space for advertisement in road safety and much should be done to create the space for road safety advertisements because that is where most of the road users could reflect on their conduct and change their behaviour whenever they are on the road. In most cases the advertisements of road safety are only visible in festive seasons and if we are serious about preventing road traffic accidents much should be done on advertising and it should be an ongoing event not a once off event. There are lot of road traffic accidents on the road involving pedestrians and by advertising constantly on Radio and TV and other media platforms we could overcome this problem. Media is a powerful tool to transfer information to the masses on the ground and it could be used to build the country especially on the issue of road safety and ensure that our people are aware of the importance of road safety and saves lives on the road. Government have a huge responsibility to drive those messages through both print and digital platforms, making sure we reach our readers through their preferred media. It is important for media to report positive issues about road safety, so that our people could learn from those advertisements or programmes on road safety.

It is high time where all businesses come together and support road safety because department alone will not make it in terms of budget involved in carrying these mandates of road safety. Businesses could help in road safety by funding for publicity of road safety through TV, Radio, billboards, newspapers, and other social networks because it is not easy for department of transport with its limited budget to cover promotion of road safety. Business Leadership South Africa, Business Unity

of South Africa, and all other business movement to collaborate with the department of Transport and ensure that road users are safe whenever they are on the road. Extensive nationwide pedestrian education campaigns are needed to counteract the pedestrian fatalities and to achieve that we need all role players to come on board because from business point of view without customers their means of production will be in a dire situation and as much as they need customers, they should do much in preventing road traffic accidents.

Cause Because Bureau (2017) stated that educating people is the right strategy choice, investing in one-off events is not. Much more should be done in terms of public campaigns, ads, social media speak, and even massive billboards on the perils of unsafe/drunken driving, etc. There is room to explore deeper and innovative partnerships with the government. It will also be worth their while to explore collaborations with other corporate entities to enhance scale and reach. Initiatives to promote road safety are of a continuous nature that speak to their audience. Companies would do well to sit back, take notice, and act accordingly, Cause Because Bureau (2017). It is important to ensure that South African companies do their best in terms of Corporate Social Responsibility and in this regard, much should be done to promote road safety and ensure that road users are well informed to make correct decisions on the road.

Benefits to businesses who choose to engage in road safety, National Transport Commission (S.a: 1)

- A reduction in fatalities and serious injuries;
- A significant reduction in Workcover claims and insurance premiums;
- A reduction in fleet maintenance and overall operating costs;
- An increased fleet life expectancy;
- A reduction in vehicle accidents and rollovers;
- A change in attitude, so that road safety becomes standard component of Toolbox Talk (safety team discussions at the start of the shift) for general workers on site;
- An increased staff retention and a desire to work for the business.

Provision of direct feedback to vehicle manufacturers to address safety concerns of a vehicle.

Ghaus-Pasha (2004:2) stated that Civil Society Organisations is formed by people who have common needs, interests and values like tolerance, inclusion, cooperation and equality and development through a fundamentally having an internal cause and autonomous process which cannot easily be controlled from outside. These organisations include traditional organizations, religious organizations, modern groups and organizations, mass movements and action groups, political parties, trade and professional associations, non-commercial organizations, and community-based organizations. It could have a positive influence on the state and the market. Civil society is therefore seen as an increasingly important agent for promoting good governance like transparency, effectiveness, openness, responsiveness and accountability by mobilizing constituencies, particularly the vulnerable and marginalized sections of masses, to participate more fully in politics and public affairs; and fifth, by development work to improve the well-being of their own and other communities, Ghaus-Pasha (2004:3). Commission for Global Road Safety (S.a:4) stated that road safety is a shared, multi-sectoral, responsibility of governments and

a range of civil society stakeholders. Successful road safety strategies in all countries depend on a broad base of support and common action. Beyond the sphere of government, civil society can make a huge contribution to road safety, Commission for Global Road Safety (S.a:4). Road traffic accidents is a collective responsibility, it is important for Civil Society Organisations to use their platforms to encourage their members to obey the rules of the road because if these organisations are losing their members through road traffic accidents, they will ultimately have collapsed because they will be no members. It should start from traditional leaders they have a positive influence on their communities and by working with traffic police in spreading the message of road safety and that could benefit the community in terms of saving lives on the road.

Road traffic injuries can be prevented; governments need to act to address road safety in a holistic manner. This requires involvement from multiple sectors such as transport, traffic police, health, education, and actions that address the safety of roads, vehicles, and road users, World Health Organisation (2018). In this chapter emphasis was on the model of holistic approach towards preventing pedestrian fatalities in Limpopo Province. Four E's of traffic calming were explained in detail in terms of how they could be used to prevent pedestrian fatalities. Enforcement of traffic rules is very crucial in restoring order on the road and ensuring that road users are following the rules of the road. It is important for department of transport as well as its agencies to work together and ensure rules are enforced consistently in the province. It is also important to encourage traffic police officials to always adhere to the code of conduct to send strong message to road users that we are serious about enforcement.

Traffic police officials should be discouraged to refrain from accepting bribes on the road as this kind of conduct contribute to the high number of road traffic accidents, as some of the vehicles on the road are unroadworthy and all other forms of factors contributing to high number of road traffic accidents. Local government (Municipalities) should improve road infrastructure to accommodate all road users as well as the design of the road should be able to accommodate all road users especially at rural areas. Sanral, Road construction companies as well as Municipalities should ensure roads which are being built for their communities are of quality and not compromise the safety of road users. Empowerment and education were highlighted in terms of how learners and students from primary, secondary, and higher institutions should conduct themselves in terms of knowledge, skills and attitude acquired from the highly skilled teachers and professionals in road safety. The model could be able to assist Limpopo Province Department of Transport and education to ensure road safety to all road users and would make a big difference because in most cases the stakeholders in the model are not working together and by working together road safety could be attained in Limpopo Province.

Physical research context/ setting analysis

Limpopo province is divided, for local government purposes, into five district municipalities, which are in turn divided into 25 local municipalities. Limpopo Province is situated on the northern side of South Africa and has the following district

municipalities: Capricorn District Municipality, Mopani District Municipality, Sekhukhune District Municipality, Vhembe District Municipality, and Waterberg District Municipality (www.localgovernment.co.za). Polokwane City (2018) noted that Limpopo is the northern most province of South Africa. It is named after the Limpopo River that flows through the province; the name "Limpopo" has its etymological origin from the Sepedi word (diphororo tša meetse) meaning strong gushing waterfalls. (The Sepedi language is spoken by a third of the people in the province.) The capital is Polokwane, formerly named *Pietersburg*. The province was formed from the northern region of Transvaal Province in 1994, and initially named Northern Transvaal. The following year, it was renamed Northern Province, which remained the name until 2003, when the name of the province was formally changed to the name of its most important river on the border with Zimbabwe and Botswana after deliberation by the provincial government and amendment of the Constitution. A notable consideration for the name was Mapungubwe, the area where the most ancient gold using civilisation of the province was discovered a few years earlier, Polokwane City (2018).

Polokwane City (2018) stated that the population of Limpopo consists of several ethnic groups distinguished by culture, language, and race. 97.3% of the population is Black, 2.4% is White, 0.2% is Coloured, and 0.1% is Indian/Asian. The province has the smallest percentage and second smallest by number of white South Africans in the country. It also has the highest Black percentage out of all the provinces. The Northern Sotho (of which the Bapedi are part of) make up the largest percentage of the Black population, being 52% of the province. The Tsonga (Shangaan) speakers comprise about 17.0% of the province, while the Venda make up about 16.7%. Afrikaners makes up most whites in Limpopo, about 95 000. English-speaking whites are just over 20 000. Vhembe district has the smallest share of white people in Limpopo, about 5 000 whites reside in the Vhembe district, while the Waterberg district has the largest share of whites, more than 60 000 whites reside there. Coloureds and Asians/Indians make up a small number, Polokwane City (2018). According to Statistics South Africa (2016) noted that Limpopo's population had an increase in terms of the people living in the province, from 5,4 million people in 2011 to 5,8 million in 2016, making it the fifth largest province in the country in terms of population size.

The area has four universities, namely the University of Limpopo (UL), Tshwane University of Technology (TUT) (Polokwane campus), the University of South Africa (UNISA) (Polokwane campus), and the University of Venda (Univen). The province also has public and private colleges such as FET (Further Education and Training) and TVET (Technical Vocational Education and Training) to empower young people with skills to participate in the economy. The area has established government departments to deliver services to the people in the area and those government departments work together where there is a need to tackle critical issues, for example the security cluster, which includes the Department of Police, Justice and Correctional Services, which deals with criminals or road traffic offenders to ensure that the safety of the road users is secured.



Map of Limpopo Province

Source: Capeinfo (2009)

Methodology

Study population

McBurney (2001:248) referred to a study population as the sampling frame. A population is the totality of persons, events, organisations, case records, or other sampling units with which the research problem is concerned. Wegman et al. (2007:52) noted that the population is the study of objects and consists of individuals, groups, and organisations, humans, products, and events or the conditions to which they are exposed. Bless et al. (2013:164) noted that a study population is the set of elements that the research focuses on. In the case of quantitative research, the results obtained by testing the sample should be able to be generalised to the entire population.

According to Statistics South Africa (2016) noted that Limpopo Province's population had an increase in terms of the people living in the province, from 5,4 million people in 2011 to 5,8 million in 2016, making it the fifth largest province in the country in terms of population size. It trails behind Gauteng (13,4 million), KwaZulu-Natal (11,1 million), Eastern Cape (7 million), and Western Cape (6,3 million). The number of households in the province has also increased to 1,6 million in 2016, from 1,4 million in 2011. The district municipality with the largest share of households in the province is Vhembe (382 346), followed by Capricorn (378 272), Mopani (338 385), Greater Sekhukhune (290 489), and Waterberg (211 452). Only participants who are above the age of 18 years formed part of the research study since most of them understand the issue of pedestrian fatalities.

In this research, the sample consisted of Community members, Municipal/ Traffic police officials, Civil society organisations (members), Road construction companies and Teachers were part of the population of this study since the research concerns

them regarding road safety to all road users, especially pedestrians. It is of great importance for them to be part of the study population, because without them, the targets of the study will not be attained. All participants from the province covered by this research formed part of the study population to obtain answers to the problem of pedestrian fatalities and to gain their views so that the study can contribute towards contributing to knowledge, attitude, skills and preventing pedestrian fatalities on the road.

Sample size

Bless et al. (2013:165) noted that a sample is a subset of the population, and to be useful in research it must have all the properties of the population to be representative of the whole. The research sample consisted of 54 Municipal/Traffic police officials, 51 Teachers, 23 Civil Society Organisations, 15 Road construction companies and 52 Community members. The total size of the sample was 195.

Methods of data collection

Survey/Questionnaire

De Vos et al. (2011:171) noted that quantitative data collection often employs measuring instruments. In the social and human sciences, measuring instruments refer to questionnaires, among others. Quantitative research aims to explain phenomena by collecting numerical data that are analysed using mathematically based methods (statistics). Therefore, as quantitative research is essentially about collecting numerical data to explain a phenomenon, questions seem immediately suited to being answered using quantitative methods. Data can be collected on a wide number of phenomena and made quantitative through data collection instruments such as questionnaires. The researcher constructed a questionnaire, which was distributed to all participants. Babbie (2007:246) defined a questionnaire as a document containing questions and/or other types of items designed to solicit information appropriate for analysis. Although the term "questionnaire" suggests a collection of questions, a typical questionnaire may contain as many statements as questions, especially if the researcher is interested in determining the extent to which respondents hold a perspective. Babbie and Mouton (2001:233) noted that the basic objective of a questionnaire is to obtain facts and opinions about a phenomenon from people who are informed on the issue.

Data analysis

Bless et al. (2013:21) noted that once data are collected, the data must be organised and checked for accuracy and completeness. When this process was completed, the researcher used a range of arithmetical and statistical tests to describe the sample data and to generalise from this data set to the population from which the sample was drawn. Data were collected by means of questionnaires from the following: community members, Civil Society Organisations, Teachers, municipal/traffic police members, and road construction companies. The data from these participants were collected, reviewed, and then analysed to form findings or conclusions. The data was received in questionnaire format, which were entered in Microsoft Excel. When the database was developed, it was made of rules with respect to the questionnaire and that set boundaries for different variables and Likert scale was used.

Findings and discussions

Test of Hypotheses

To test the four null hypotheses, latent variables were generated from factor analysis. Then, comparisons were carried out to see whether the different groups responded differently on the latent variables generated as a result of adding the variables that loaded on the 4 factors. These were done by using the Non-parametric Kruskal Wallis test for more than two independent samples or Wilcoxon Rank-Sum (Mann-Whitney U) tests for two independent samples to compare the groups (Age groups, Gender, Marital status and membership of traffic police/education departments).

The following were the hypotheses that were tested:

Hypothesis 1: Road safety education could prevent pedestrian fatalities in Limpopo Province.

Age group compared with respect to Road safety education factor

There was no statistically significant difference between age group for the latent variable "*Road safety education*". There was no difference in the response to the questions that made up this factor between the age groups (Kruskal-Wallis test statistic chi-square=6.518, Degrees of freedom=3, P-value=0.089). This means that no age group agreed more than the other that road safety education could prevent pedestrian fatalities in Limpopo province.

Gender compared with respect to Road safety education factor.

There was no statistically significant difference between genders for the latent variable "*Road safety education*". There was no difference in the response to the questions that made up this factor between gender (Wilcoxon Rank-Sum (Mann-Whitney U) $p=0.756$). This means that both male and female agreed the same way that road safety education could prevent pedestrian fatalities in Limpopo province.

Marital status compared with respect to Road safety education factor

Similar to other variables, there was no statistical significant difference between the marital status groups (Kruskal-Wallis test statistic chi-square=2.762, Degrees of freedom=2, P-value=0.251). No group agreed more than the others that road safety education could prevent pedestrian fatalities in Limpopo province.

Membership of traffic police/education departments with respect to Road safety education factor

Also, there was no statistical significant difference between the two groups (p -value=0.115). Being a member of traffic police/education department or not did not affect the responses of the respondents to road safety education. Both groups i.e. members and non-members agreed the same level to road safety education preventing pedestrian fatalities in Limpopo province.

Hypothesis 2: Road construction engineering could prevent pedestrian fatalities in Limpopo Province.

Age group compared with respect to Road construction engineering factor

There was a statistically significant difference between the age groups for the latent variable "*Road construction engineering*". The "36+" group's mean score is statistically higher than the other groups for this factor (Kruskal-Wallis test statistic chi-square=7.834, Degrees of freedom=3, P-value=0.050). This means that participants who were 36 years and above agreed more with the items in factor "*Road construction*

engineering" than the others that road safety education could prevent pedestrian fatalities in Limpopo province.

Gender compared with respect to Road construction engineering factor

There was no statistically significant difference between genders for the latent variable "*Road construction engineering*". There is no difference in the response to the questions that make up this factor between gender (Wilcoxon Rank-Sum (Mann-Whitney U) $p=0.058$). This means that both male and female agree the same way that road construction engineering could prevent pedestrian fatalities in Limpopo province.

Marital status compared with respect to Road construction engineering factor

There was a statistically significant difference between the marital status groups for the latent variable "*Road construction engineering*". The "Single" group's mean score was statistically higher than the other groups for this factor (Kruskal-Wallis test statistic chi-square= 7.712, Degrees of freedom=2, P-value= 0.0211). This means that the respondents who were single agreed more with the items in factor "*Road construction engineering*" than the married and divorced.

Membership of traffic police/education departments with respect to Road construction engineering factor

There was no statistical significant difference between the two groups (p -value= 0.211). Being a member of traffic police/education department or not did not affect the responses of the participant to road construction engineering. Both groups i.e. members and non-members agreed the same level to road construction engineering preventing pedestrian fatalities in Limpopo province.

Hypothesis 3: Empowerment could prevent pedestrian fatalities in Limpopo Province.

Age group compared with respect to Empowerment factor

There is no statistically significant difference between age group for the latent variable "*Empowerment*". There is no difference in the response to the questions that make up this factor between the age groups (Kruskal-Wallis test statistic chi-square=1.910, Degrees of freedom=3, P-value=0.569). This means that no age group agrees more than the other that empowerment could prevent pedestrian fatalities in Limpopo province.

Gender compared with respect to Empowerment factor

There was no statistically significant difference between genders for the latent variable "*Empowerment*". There is no difference in the response to the questions that make up this factor between gender (Wilcoxon Rank-Sum (Mann-Whitney U) $p=0.355$). This means that both male and female agree the same way that empowerment could prevent pedestrian fatalities in Limpopo province.

Marital status compared with respect to Empowerment factor

Similar to other variables, there was no statistical significant difference between the marital status groups (Kruskal-Wallis test statistic chi-square=0.887, Degrees of freedom=2, P-value=0.642). No group agreed more than the others that empowerment could prevent pedestrian fatalities in Limpopo province.

Membership of traffic police/education departments with respect to Empowerment factor

There was no statistical significant difference between the responses from the two

groups (p-value= 0.243). Being a member of traffic police/education department or not did not affect the responses of the respondents to empowerment. Both groups i.e. members and non-members agreed the same level to empowerment preventing pedestrian fatalities in Limpopo province.

Hypothesis 4: Enforcement is not emphasized at provincial level in preventing pedestrian fatalities.

Age group compared with respect to Enforcement factor

There was no statistically significant difference between age group for the latent variable "Enforcement". There is no difference in the response to the questions that make up this factor between the age groups (Kruskal-Wallis test statistic chi-square=5.147, Degrees of freedom=3, P-value=0.161). This means that no age group agrees more than the other that enforcement is not emphasized at provincial level in preventing pedestrian fatalities in Limpopo province.

Gender compared with respect to Enforcement factor

There was no statistically significant difference between genders for the latent variable "Enforcement". There is no difference in the response to the questions that make up this factor between gender (Wilcoxon Rank-Sum (Mann-Whitney U) p=0.736). This means that both male and female agree the same way that enforcement is not emphasized at provincial level in preventing pedestrian fatalities in Limpopo province.

Marital status compared with respect to Enforcement factor

There was no statistical significant difference between the marital status groups (Kruskal-Wallis test statistic chi-square=1.358, Degrees of freedom=2, P-value=0.507) and the items in factor "Enforcement". No group agreed more than the others that enforcement is not emphasized at provincial level in preventing pedestrian fatalities in Limpopo province.

Membership of traffic police/education departments with respect to Enforcement factor

There was no statistical significant difference between the responses from the two groups (p-value= 0.782). Being a member of traffic police/education department or not did not affect the responses of the respondents to the items in factor "Enforcement". No group agreed more than the other that enforcement is not emphasized at provincial level in preventing pedestrian fatalities in Limpopo province.

Discussion

With respect to the distribution of the respondents in this survey the following analogies can be drawn from the fieldwork of this research:

- Most of the respondents were Traffic police officers.
- Most of them were female
- Most of the respondents were 36 years above.
- There were more respondents from the traffic police/education department than those who were not.
- Most of the respondents were single at the time of this study.

With respect to the road safety education factors as measures of preventing pedestrian fatalities in Limpopo Province, the following analogies can be drawn from this study:

- Generally, most respondents believed that parents/guardians were not involved

in educating their children about road safety

- Limited resources in providing road safety education were one of the factors generally agreed to be affecting road safety education. More female respondents agreed that there were limited resources in providing road safety education than their male counterparts.
- Similarly, jaywalking was generally agreed to be a contributor to pedestrian fatalities. More male than female respondents agreed to this statement. Also, respondents who were 36 years and above agreed the most than all other age-groups.
- As for the results obtained through this study with respect to Road construction engineering factors preventing pedestrian fatalities in Limpopo Province, the following analogies were drawn from this study:
- Most of the respondents agreed equally irrespective of age, gender or marital status to all the statements under Road construction engineering factors.
- However, respondents who were either members of the traffic police or education departments strongly agree/agree that maintenance of road contributed to road safety than those who were not members
- As for the results obtained through this study with respect to the empowerment factors preventing pedestrian fatalities in Limpopo, the following analogies can be drawn from this study:
- All the study respondents irrespective of their ages, gender, marital status, membership of the traffic police/education department either strongly agreed or agreed that empowerment could prevent pedestrian fatalities in Limpopo Province.

With respect to enforcement factors not being emphasised at provincial level in preventing pedestrian fatalities, the following conclusions were drawn from the study:

- A whole lot of male respondents either strongly agreed or agreed that lack of support from law enforcement agencies in enforcing law than female participants.
- The highest number of respondents who either agreed or strongly agreed that traffic/municipal police officials were not enforcing the law consistently were those who were 36 years and above.
- The highest number of respondents who either strongly agreed or agreed that traffic police officials were not enforcing the law consistently was singles, i.e. not married.
- More non-members of the traffic police /education department either strongly agreed or agreed more than members that traffic police officials were not enforcing the law consistently.
- However, more members of the traffic police/education department than non-members either strongly agreed or agreed that there was lack of support from the law enforcement agencies in enforcing the law.
- Also, more members of the traffic police/education department than non-members either strongly agreed or agreed that there was lack of resources in enforcing the law.
- More members of the traffic police/education department strongly agreed or

agreed that unroadworthy vehicles contributed to pedestrian fatalities.

Based on the hypotheses of the study, the following results came out of the analysis

Hypothesis 1: Road safety education could prevent pedestrian fatalities in Limpopo Province.

Most of the participants (65.6%) in the study agreed or strongly agreed that this hypothesis was true irrespective of age, gender, marital status, and being a member of the traffic police/education department while 10.08% of the respondents indicated “don’t know” response to this hypothesis. 24.32% disagreed or strongly disagree to this hypothesis. Therefore, based on the responses of the study respondents, one can say that road safety education could prevent pedestrian fatalities in Limpopo Province

Hypothesis 2: Road construction engineering could prevent pedestrian fatalities in Limpopo Province.

Most of the study participants (72%) either strongly agreed or agreed with this hypothesis, however, those who were 36 years and above, and the singles strongly agreed or agreed the most. 9.40% indicated “don’t know” response to this hypothesis while 18.60% disagreed or strongly disagree that road construction engineering could prevent pedestrian fatalities in Limpopo Province. Therefore, based on the responses, road construction engineering could prevent pedestrian fatalities in Limpopo Province.

Hypothesis 3: Empowerment could prevent pedestrian fatalities in Limpopo Province.

Also, most of the study participants (64%) either agreed or strongly agreed that empowerment could prevent pedestrian fatalities in Limpopo Province irrespective of age, gender, marital status and being a member of the traffic police/education department while 9.4% of the respondents indicated “don’t know” response to the hypothesis. 26.6% of the respondents disagreed or strongly disagree with this hypothesis. Therefore, based on the responses, empowerment could prevent pedestrian fatalities in Limpopo Province from the response of the study participants.

Hypothesis 4: Enforcement is not emphasized at provincial level in preventing pedestrian fatalities.

Most of the study participants (62.9%) agreed or strongly agreed that enforcement was not emphasized at provincial level in preventing pedestrian fatalities while 11.45% of the respondents indicated “don’t know” response to this hypothesis. 25.65% of the respondents disagreed or strongly disagree with this hypothesis. Therefore, based on the responses, law enforcement is not emphasised at provincial level in preventing pedestrian fatalities.

Conclusion and recommendations

Pedestrian fatalities in Limpopo Province is a major problem to law enforcement agencies and other major stakeholders in road safety. Every year there is an increase in high number of pedestrian fatalities and according to the study most of the road users do not adhere to the rules of the road. Based on the findings of the study, it was proven that road safety education, road construction engineering and empowerment

could prevent pedestrian fatalities in Limpopo Province. It was also highlighted that crime contributes to pedestrian fatalities, meaning that law enforcement agencies need to deal decisively with the element of crime in Limpopo Province as this is a major concern to road safety.

Road safety education

Road safety education play a critical role in educating learners about the importance of following the rules of the road and how they should conduct themselves whenever they are on the road. Department of education and transport need to work together to formulate road safety curriculum from grade R to 12 to educate learners from younger age about the importance of road safety. Schools are in an ideal position to deliver road safety education and to promote and maintain the health of children and young people. Changing behaviour need commitment from everyone who uses the road, firstly by respecting one another on the road to avoid road rage which causes many road traffic accidents and by respecting one another means that our conduct will be promoting road safety without influence of law enforcement officials, it is upon us as road users to change our behaviour and this can be done by ensuring that our people are more educated as Madiba said " Education is the most powerful weapon which you can use to change the world".

Enforcement

Establish and enforce laws at national, provincial, and local level to create a meaningful deterrent threat to road users. To achieve this, the primary focus should be on increasing visibility of law enforcement officials on the road especially on weekends where many people are dying on the road as a result of not following the rules of the road and to ensure efficient administration of punishment which can further enhance deterrent effect because in most cases corrupt officials cancel infringements in the system and those corrupt officials in the law enforcement agencies must be removed to ensure that road users are served by officials who are ethical and law abiding officials. Enforcement interventions should focus on traffic measures that promote road user's adherence to traffic regulations such as regulating driver behaviour and the monitoring of pedestrian behaviour to counteract pedestrian fatalities. Road safety is a collective responsibility and law enforcement agencies need to work together to prevent pedestrian fatalities.

Road construction engineering

There is a need for road infrastructure improvements which include the separation of different types of traffic, better road markings and road signs, safer paths for pedestrians and the construction of sidewalks or pavements and more visible pedestrian crossings, and slower traffic speeds (with the use of road humps, rumble strips and roundabouts). On existing roads, these improvements should first be made at high-risk spots where many crashes occur, especially at the entry and exit of built-up areas and areas of high activity such as markets and schools. Improving the lighting at pedestrian crossings will help to make both the crossing and the pedestrians using the crossing, visible to approaching motorists. Government departments responsible

for road infrastructure must appoint companies with credible record to build roads in the country to ensure safety of road users, in most cases companies who get those tenders they do not have the necessary skills to embark on the work and end up leaving the work halfway and as a result it leaves traffic congestion and as well as road users frustrated. In most cases road rage is caused by unnecessary traffic congestion which was caused by these road construction engineering companies and government. Tenders for road construction should be transparent to all relevant stakeholders to get right companies to do the work and ensure road safety to all road users. Pedestrians are legitimate users of the street network, and they should therefore be able to use the network safely and without unreasonable delay.

Empowerment

Road users should be empowered with knowledge, skills, and attitude to conduct themselves in line with the rules of the road. Department of transport as well as their agencies need to work together with all other major stakeholders in road safety and empower road users about road safety and play their role in promoting road safety in Limpopo Province. It is important to cover as many road users as possible to ensure that they are aware of road safety using all relevant platforms such as Radio, TV, Newspapers, Social networks etc to provide messages to the masses on the ground. To increase public awareness of road safety laws and persuade the public to abide by them, governments complement legislation and enforcement with the broadcasting of mass media campaigns.

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