

A Roadside Observation Study for Measuring Seat Belt & Child Restraint Use

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Chapter 1: Introduction

Many vehicle occupants wear seat belts and child restraints to minimize the risk involved in motor vehicle travel. Failure to use a seat belt or child restraint greatly increases a vehicle occupant's chance of injury in the event of a road accident. Safety experts advise all occupants to utilize these safety devices, even if not mandated by local law (Robertson, 1996). For organizations like police forces and auto insurance companies, keeping people safe depends on road safety behaviors practiced by the general population. Consequently, road safety organizations design and implement public education campaigns to improve safety behaviors, including seat belt and child restraint use.

Regardless of the country, it is very unlikely for an entire national population to comply with all laws or beneficial suggestions. In Namibia, as well as many other countries, drivers and passengers at times practice unsafe road behavior. The national police force in Namibia, NAMPOL, regulates traffic and driving laws. However, the division dedicated to traffic law enforcement is severely understaffed, with only 232 officers for the 269,000 vehicles in Namibia (Miyanicwe, 2013). In addition to shorthanded law enforcement, there are other causes of road safety issues. Speeding is a significant cause of vehicle accidents, especially on unpaved, gravel roads, which constitute the majority of roads in Namibia (Eggleston et. al, 2016). These driving habits and conditions contribute to the need to increase seat belt and child restraint usage throughout the country.

The Motor Vehicle Accident (MVA) Fund insures all people injured in motor vehicle accidents in Namibia. This organization aims to collect data on the usage rates of seat belts and child restraints of motor vehicle occupants in Namibia. With current and relevant data regarding these safety behaviors, the MVA Fund can better inform the public on the benefits of wearing seat belts and child restraints to decrease the severity of injuries from motor vehicle accidents.

Other organizations have collected seat belt and child restraint data across the globe. In 2001, researchers from Monash University Accident Research Centre in Victoria, Australia conducted a roadside observation study to collect data on road safety behaviors in Melbourne, Australia (Whelan, 2013). The survey spanned two months while the Australian team collected data at multiple intersections in the city. Each team member observed different aspects of the vehicle and occupants and recorded the data in a checklist-style survey. The Economic and Social Research Council of the United Kingdom conducted a similar study to assess the driving behaviors of citizens of fourteen different countries, including European countries and the United States, over a period of ten years (Steptoe et al., 2002). From 1990 to 2000, there was a noticeable increase in seat belt use among the countries. This study suggests that public awareness campaigns implemented during that period increased seat belt use (Steptoe et al., 2002). In Namibia, a 2009 **attitudinal survey** conducted by Mike Winnett of the Global Road Safety Partnership (GRSP) assessed motorists' attitudes and self-reported use of seat belts in Namibia. 64% of respondents reported that they always wear seat belts when traveling in a

vehicle (Winnett, 2009). However, an **observational study** by the National Road Safety Council of Namibia indicated that only 60.4% of drivers and 17% of passengers wear seat belts, less than the self-reported seat belt use (NRSC, 2012). The MVA Fund has previously endeavored to obtain data on seat belt use, but now they want to improve the resulting limited and outdated data. Each of these studies provides pertinent benchmark information for collecting useful data on seat belt use, assessing public opinion, and educating the public on the importance of seat belts and child restraints.

Despite previous studies about seat belt use in Namibia, much of the data collected is outdated and unrepresentative of the current driving habits in Namibia. Non-compliance regarding seat belts remains a prevalent issue. The data also does not include the effects of driver education on the driving habits and attitudes toward safety behaviors in Namibia. Recently, Namibia attempted to increase public awareness and education about the importance of seat belts and child restraints during the “Decade of Action for Road Safety” (LAC, 2016). New bills emphasize the teaching of safe driving practices, but with no set methods to obtain these goals, it is difficult to measure the effectiveness of the bills (Minister of Works and Transport, 2014). The likelihood of people complying with traffic laws immediately after education on the importance of driving safety still needs evaluation. Information regarding this topic could provide useful insight into whether being regularly exposed to safe driving behavior will increase compliance in the population. Most of the current data the MVA Fund has regarding seat belt and child restraint use comes from hospitals and police reports after an accident. The police file these reports after investigating the cause of injuries in an accident, in which cases many victims report not wearing their seat belts. For this reason, the data does not properly represent the driving habits of all drivers in Namibia.

This project will address these research gaps by assisting the MVA Fund in collecting useful data through the design and implementation of a **behavioral roadside observation study** and **attitudinal survey**. A behavioral study is a systematic analysis of human behavior. An attitudinal survey is an assessment of the feelings of a population toward a particular subject. If the results support the need to increase public awareness, the team will design a public education campaign to improve human safety behaviors for motor vehicle occupants traveling in Namibia. The team will first assess the current levels of vehicle occupant seat belt and child restraint use and analyze the data collected to quantify current usage. Next, the team will identify the most common reasons that people do not wear seat belts and evaluate the impact of driver education on the seat belt habits of college-age students. Finally, the team will design a method to encourage the public to use seat belts and child restraints properly. An increased awareness of the importance of seat belt and child restraint use will lead to fewer casualties and lower the MVA Fund’s cost of compensation.

Chapter 2: Background

This chapter first discusses the statistics and history of seat belt use in the United States to provide a baseline for comparison to later information about Namibia. The United States has experienced a transition from minimal seat belt use to widespread use largely through educational campaigns and law enforcement efforts. Some of these strategies for increasing seat belt use may also prove successful in Namibia. The background then gives information about driving in Namibia, ranging from road conditions to previous public education campaigns about driving and road safety. A discussion of previous studies with similar goals and methodologies relevant to the project composes the last portion of this chapter.

2.1 Driving & Road Safety in the United States

Over the last 60 years, the United States government worked to create safer driving practices across the country. During this time, the National Highway Traffic Safety Administration enacted new laws that required all drivers and passengers to wear a seat belt to reduce the number of fatalities associated with driving. As a result, seat belts and child restraints, when used properly, have saved countless lives in the United States. Not only do these laws increase safety, but they also benefit all motor vehicle users, whom law requires to have automobile insurance. The use of seat belts not only save lives, but their use may also save insurance holder money from reduced injury and fatality rates.

2.1.1 History

The invention of user-operated motor vehicles in the late 1800s forever changed how people travel. Long distance travel became faster and more convenient than ever before; however, people then faced the risks of injury or death due to motor vehicle accidents. In the 1930s, physicians created a device to combat the rapidly rising rate of injuries due to car crashes. Their solution was a belt that differed from the modern seat belts we use today; it consisted of a single strap of woven fabric that crossed one's lap as opposed to the three-point, cross-body seat belts used in most vehicles today. By the 1950s, car companies offered seat belts as an optional accessory for an additional cost. As shown in Figure 1, the Swedish car company Volvo became the first car manufacturer to utilize a three-point seat belt, a restraint that ran across the lap and chest by the end of the decade ("Seat Belts", 2015).

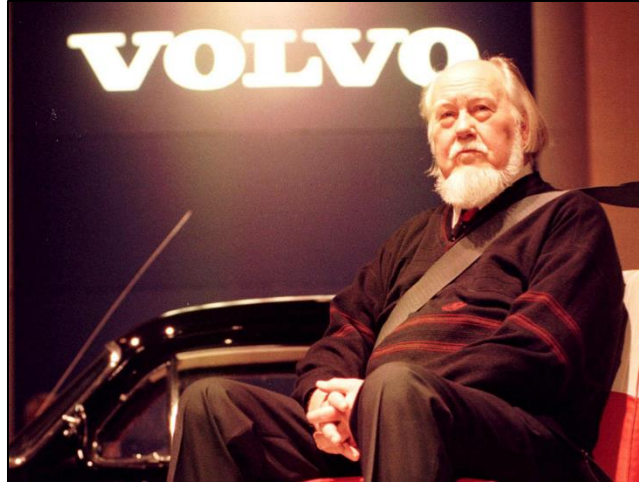


Figure 1: In 1959, Nils Bohlin invented the design for the three-point safety belt for Volvo.

Following the invention of seat belts, technicians moved on the safety of children in a vehicle. Automotive researchers originally developed child restraints to keep small children from moving around in a moving vehicle. By the 1960s, child restraints focused more on the protection of the child in the event of an accident. Ford Motor Company and General Motors developed the first crash protection child restraints. In 1973, General Motors went on to develop the first rear-facing child restraint for infants. In 1971, the National Highway Traffic Safety Administration (NHTSA) issued the first standard for child restraints. This standard required vehicle manufacturers to provide a means to secure a child restraint through a lap seat belt. Ten years later, the regulation expanded to include crash testing for all child restraints and buckle requirements. The NHTSA required seats to withstand a crash at 30 mph and buckles needed to be childproof. By 1985, all fifty states, as well as the District of Columbia and Puerto Rico had adopted a child passenger safety law (Stewart, 2009).

2.1.2 Usage Statistics

Using a seat belt while in the car can be the difference between life and death in the event of an accident. After the enactment of the Motor Vehicle Safety Act whereby the federal government set and enforced standards for road safety in the United States in 1966, the rate of deaths per hundred million vehicle miles decreased by 3.7% that year (Robertson, 1996).

A study conducted by Youth Risk Behavior Surveys in 2006 analyzed seat belt use in American high school students who were at least 16 years old. The survey found that 59% of students always used their seat belt as a driver, while only 42% always use a seat belt as a passenger in a vehicle. Further analysis of the almost 13,000 human subjects found that among young black men, those with poor grades in school used their seat belts least. Among young women, seat belt use as a driver and as a passenger were 14.6% and 7.8% higher than their male counterparts, respectively. One speculation for the discrepancies between seat belt uses in this age group concluded that socioeconomic status was a contributing factor (Lambert, Goldzweig, Levine, & Warren, 2016).

Crash data from the NHTSA found a correlation between proper child restraint use and crash survival. The data found a 28% reduction in passenger death for children ages 2 - 6 properly seated in a restraint. Additionally, the results suggested that even improperly using a child restraint resulted in a 21% reduction in passenger death. Researchers concluded that child restraints are necessary to protect children while in a vehicle. They urged that the efforts to promote child safety continue so that proper child restraint use will increase in the future (Elliott et al., 2006).

2.1.3 Accident Insurance and Taxes

Providing a baseline for the compensation methods insurance companies use in the United States will ensure that readers can make the necessary comparisons to how the MVA Fund operates in Namibia.

According to personal communication with Nicole Chretien, a vice president at MetLife Auto and Home Insurance, the law in the United States requires all drivers to have auto insurance. In the event of an accident, the at fault driver's auto insurance provides the primary source for medical coverage for the victim. Some drivers do not have auto insurance, generally due to financial instability. In the event of an accident in which the at-fault driver does not have auto insurance, the victim can sue. The victim's auto insurance can pay for some medical costs with the right coverage if the at fault driver is not financially stable enough to cover the costs of injuries to the victim. If the victim does not have adequate auto insurance, the victim's medical coverage would be secondary and can cover the cost of the injuries (see Figure 2). Auto insurance companies receive their premiums from the customers who buy the insurance policies, which is how insurance companies receive the income to pay for auto losses. All auto insurance policies have limits on coverage. In the event of an accident that goes beyond the limits of an auto insurance policy, some states have funds to pay for the excess medical costs. Funds can be obtained from taxes or fees charged to insurance companies.

Although all insurance companies in the United States are private companies, the government or public sector distributes flood insurance because private companies consider it too risky. In cases when the government is supplying a service such as flood insurance, the income comes from taxes. In the United States, state taxes cover the needs of that particular state. The government applies taxes to most goods with the exception of food in the United States, and approximately half of the price of gas is tax revenue.

Insurance companies generally support public education campaigns that attempt to educate people on matters that benefit the company, such as safety behaviors or public health. Insurance companies often fund public education campaigns or offer specific campaigns themselves. (N. Chretien, personal communication, February 5, 2017). For example, Nationwide Insurance has a "learning center" on their website to educate people on preventing specific disasters or accidents. They dedicate a page to informing drivers on the best safety tips to follow while driving (Nationwide, 2016). Similarly, Geico has a page titled "Why Should You Wear a Seat Belt," which gives multiple reasons why drivers should practice safe driving and wear a seat

belt (Cutruzzula, 2016). MetLife Auto and Home has a page dedicated to driving safety with children discussing child restraints (MetLife, 2017).

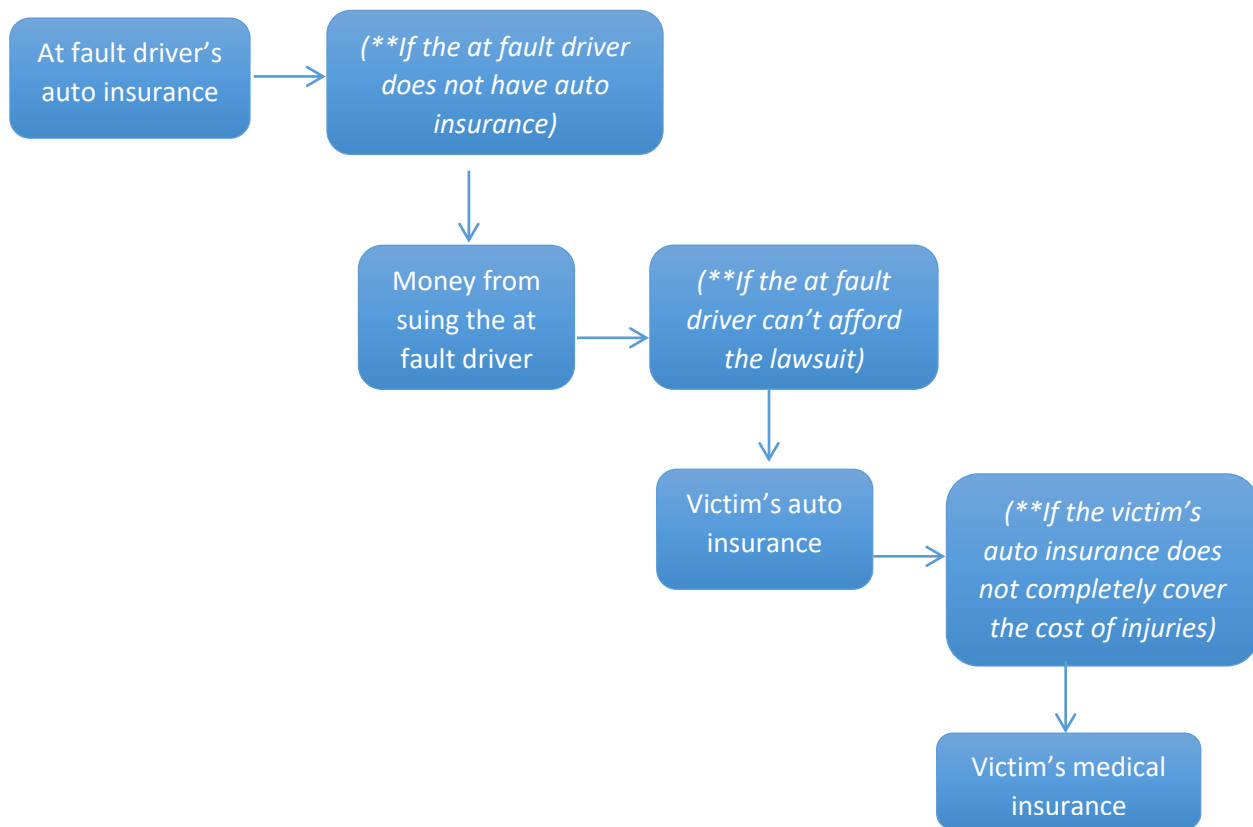


Figure 2: Flowchart of insurance coverage depicting the progress of the insurance coverage in the event of an automobile accident in the United States.

2.1.4 “Click it or Ticket” Campaign

In 1993, the United States National Highway Traffic Safety Administration, NHTSA, started the Click or Ticket road safety campaign. The campaign began at the state level, but spread nation-wide. Click it or Ticket aims to increase the proper use of seat belts across the country through “short-term, high-visibility” law enforcement (MMWR, 2016). Periodically, police will issue a high volume of seat belt non-compliance citations over a short period. In some states, the laws tied to the campaign allow police officers to pull over and fine any vehicle occupant who is not properly wearing a seat belt. In other states, officers can only administer a fine after pulling over the driver for a separate offense.

Experts have largely deemed the campaign a success based on its resulting increase in public awareness and seat belt wearing rates. Nationally, the seat belt use rate increased from 75% to 82% from 2002 to 2005 following substantial Click it or Ticket advertising on television, radio, and billboards (see Figure 3) (NHTSA, 2009).



Figure 3: Click it or Ticket campaign advertisement (Delaware.gov, 2014)

2.2 Driving in Namibia

To better understand and analyze driver and passenger motivations behind seat belt and child restraint use, it is important to investigate driving in Namibia first. Driving schools, manuals, and tests are the first driving educational opportunities for new operators. Through the various means of driver education, these new drivers learn the laws and regulations enforced in Namibia, including seat belt and child restraint laws. To improve vehicle occupant safety by increasing compliance with such laws, Namibia must first educate its drivers on the necessity of using seat belts and child restraints.

2.2.1 Driver Education

Namibia categorizes learners' licenses and driving licenses by codes (Hamata, 2011). Table 1 and Table 2 summarize the license codes and corresponding age restrictions for motor vehicle driver authorization.

Code	Vehicle Type	Age Restriction
1	motorcycles	over 16
2	small motor vehicles under 3500 kg	over 17
3	large motor vehicles exceeding 3500 kg	over 18

Table 1: Namibian Learner's Licenses

Code	Vehicle Type	Age Restriction
A1	motorcycles with engine cylinder capacities not exceeding 125 cubic cm	over 16
A	motorcycles with engine cylinder capacities exceeding 125 cubic cm	over 18
B	motor vehicles weighing less than 3500 kg	over 18
C	motor vehicles weighing more than 3500 kg	over 18

Table 2: Namibian Driving Licenses

To promote vehicle operator safety on the wide range of road conditions in Namibia, defensive driving is a key topic in driver education. Other important skills highlighted in driving schools are spatial awareness, steering control, decision-making, managing distractions, recognizing hazards, and quick reactions (South African Learner Driver Manual, 2012). To take the learners license test in Namibia, an applicant must show valid identification, complete an application, pass an eye exam, and pay any applicable fees at a local driving test center. The test covers rules of the road, traffic signs, traffic signals, road markings, and vehicle controls (South African Learner Driver Manual, 2012). Once the applicant passes the exam, the learner’s license is valid for 18 months while preparing for the driving test (Hamata, 2011). There are several published learners and drivers test manuals to help applicants prepare for both license tests. Additionally, various driver education companies offer instructed driving hours and scheduled road observation to increase the extent of a driver’s road experience in preparation for the driving test.

2.2.2 Laws, Regulations & Enforcement

Law enforcement plays an essential role in maintaining safety in all communities. In Namibia, the essential law enforcement is the national police force, NAMPOL. It dedicates a complete division to traffic law enforcement. Approximately 15 kilometers outside the country’s largest cities and towns, NAMPOL stations checkpoints on major highways and roadways. At these checkpoints, officers can monitor driver identification, vehicle registration, rental documentation, and driver licenses (Namibia 2016 Crime & Safety Report, 2016); however, inadequate staffing and limited funding undermine the division’s efficiency. With only 232 officers to serve 269,000 vehicles in the country, the division has one trained officer per 9,500 people and 12,000 vehicles. The traffic law enforcement division has insufficient equipment including breathalyzers, roadblock trailers, and speed traps (Miyanicwe, 2013). They also lack long-range communication devices, which makes communication impossible in remote areas.

Namibian traffic laws cover a variety of situations to encourage and enforce driver and passenger safety. As of 2001, the law requires seat belts in all new motor vehicles. Vehicle

owners can only remove these belts if they install a replacement. The seat belt must comply with the South African Bureau of Standards 1080:1983 and display a certification marker (The Road Traffic and Transport Regulations, 2002). However, drivers can legally operate motor vehicles made before 1984 that do not have seat belts in the country and do not need to install seat belts (Legal Assistance Centre, 2012).

Additionally, all children between the ages of 3 and 14 must use a child restraint (Sherwood et al. 2006). Child restraints must comply with South African Bureau of Standards 1340:1985 and display a certification marker (The Road Traffic and Transport Regulations, 2002). However, drivers can legally operate a vehicle without a child restraint if they secure the child in the car with a seat belt. If there are no child restraints or seat belts in the vehicle, the child must sit in the back seat of the car (Legal Assistance Centre, 2012). Failure to comply with any of these laws can result in a fine of up to N\$2000 (Self Drive Touring in Namibia: All You Need to Know, 2013).

2.3 Road Safety in Namibia

Understanding the level of safety surrounding the drivers and passengers in requires gaining knowledge on the road conditions and the efforts of the government to maintain these conditions. This information will help suggest whether the safety of drivers and passengers is due to the road conditions or driver behavior.

2.3.1 Road Conditions

The easiest way to travel in Namibia is by car (Murphy, 2013). The road conditions in Namibia vary widely, from paved to dirt roads. Paved roads are typically in the more populated, developed areas while the dirt roads connect rural areas (Country Reports, 2017). A system of paved roads runs through the country from the South African border to Botswana. This system of roads often runs for many miles between gas stations, requiring travelers to plan for fuel. Most areas in Namibia contain well-kept gravel roads (Murphy, 2013). Although road safety organizations, such as the Roads Authority, provide substantial maintenance for gravel roads (Roads Authority, 2011), they can often deteriorate during the rainy season, making them more dangerous than during the dry season. Additionally, tires often puncture on gravel roads due to the road texture (ASIRT, 2014). Many accidents occur when drivers exceed speed limits on poorly maintained dirt roads; therefore, the speed limit on gravel roads is about 80 km/h (45mph) (Country Reports, 2017). In cities and urban areas the speed limit is 60 km/h (36 mph) while on open paved roads, the speed limit ranges between 100-120 km/h (60-75 mph). In school zones, the speed limit is 40 km/h (24 mph) (ASIRT, 2014).



Figure 4: This figure pictures a typical B road in Namibia (Africa Geographic, 2014).

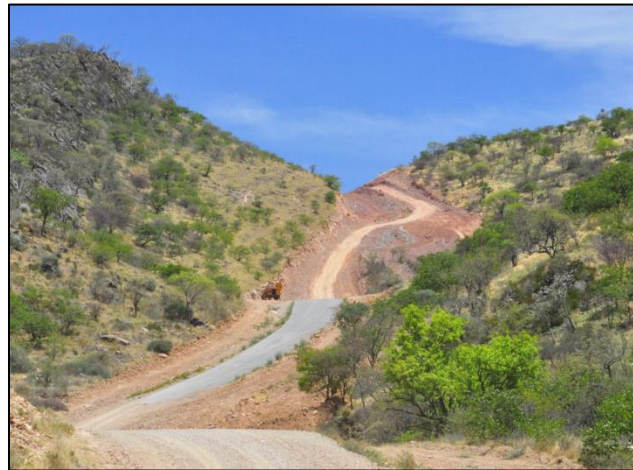


Figure 5: This figure pictures a typical D road in Namibia (Virtual Tourist, 2011).

Namibia uses the letters B, C, and D to label roads based on the conditions. B roads are national, paved roads (see Figure 4), C roads are wide, well-kept, gravel roads, and D roads have much rougher terrain (see Figure 5) (ASIRT, 2014). As described in section 2.4.2, road safety organizations provide thorough road maintenance to the roads in Namibia, including the majority of gravel roads. D-numbered roads are rough but can generally accommodate most vehicles; however, in Kaokoveld (see the circled region on Figure 7), only four-wheel drive vehicles can safely maneuver the D roads (Murphy, 2013). The paved roads generally consist of one lane in each direction, divided in the middle. Dirt roads make up the majority of roads in Namibia as seen in Figure 6 and Figure 7, but this percentage differs based on the classification of the purpose of the roads (Country Reports, 2017). 6,387 kilometers of the 45,387 kilometer road network are paved and very few roads have shoulders (ASIRT, 2014). Salt often covers the roads along the coast of Namibia, which makes them slippery during the morning and night mists.

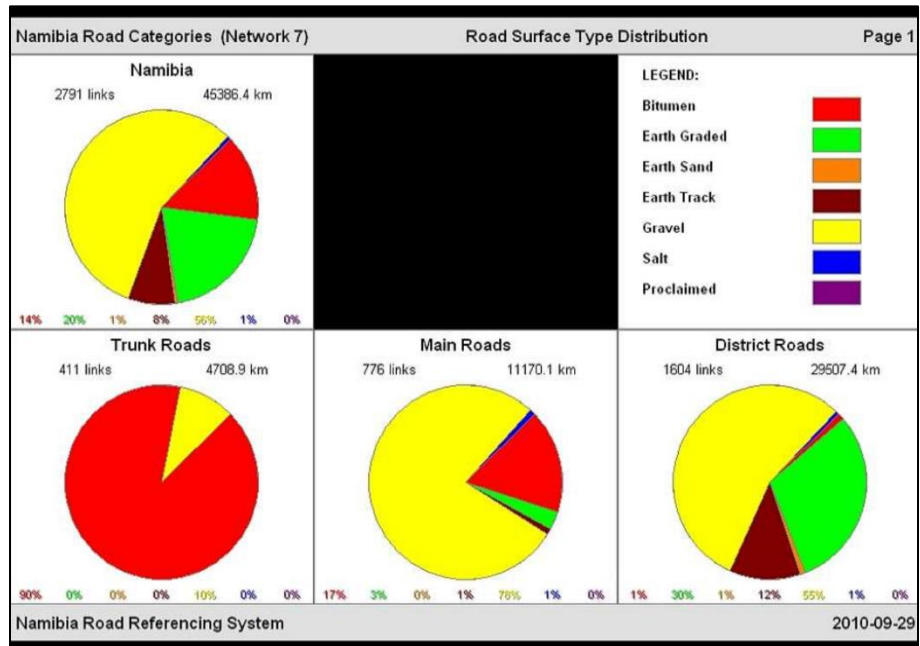


Figure 6: Road Surface Type Distribution, charts the distribution of various road surfaces in Namibia by road location (Roads Authority 2011)

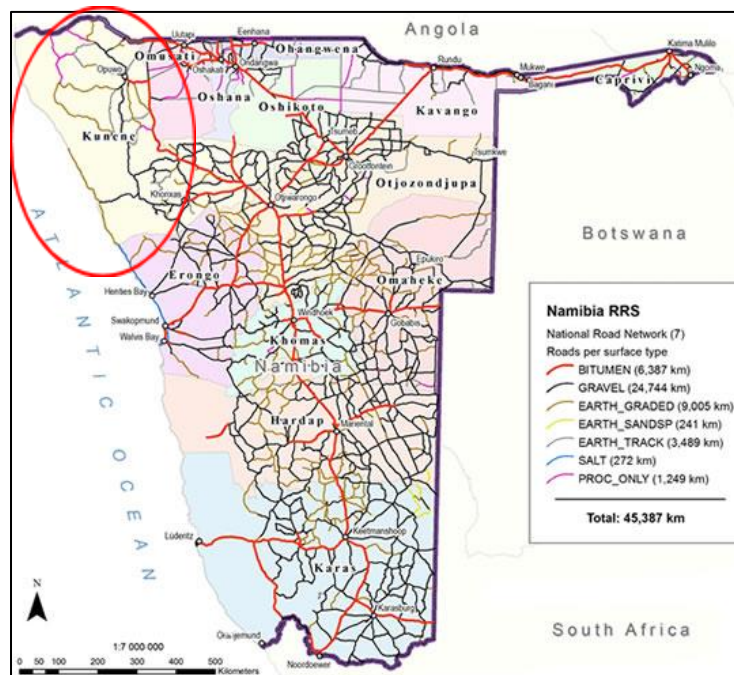


Figure 7: Road Surface Type Map (Roads Authority, 2011).

2.3.2 Road Maintenance

General road maintenance and well-kept roads ensure the safety of travelers. In Namibia, after its independence in 1990, the government set four goals: reduce inequalities in income distribution, eradicate poverty, create employment, and revive and sustain economic growth. While the main goal of road maintenance is to provide economic stimulation, a beneficial byproduct is safer driving conditions for drivers in Namibia. In order to sustain economic growth, the government must consider the physical infrastructure of Namibia, including roads. In August 1996, the South African Development Community Heads of State signed the protocol for the Transport Communications and Meteorology (J. Runji, 2003). The protocol discusses road infrastructure in Namibia in chapter 3 and states that maintenance and improvement to all roads is necessary to support economic growth in and around Namibia (Southern African Development Community, 1996).

Currently, the government pays contractors based on how much work they complete, but the new president of the Association of Southern National Road Agencies, Conrad Lutombi, would like this agreement to change. He states, “Because we want to bring efficiency and effectiveness into the management of the road network it is time now to move into long-term performance-based road management and maintenance contracts, which define minimum conditions of road assets that must be maintained by a contractor.” Lutombi believes that this change will maintain the roads at a higher standard, which will lead to road transport efficiency and lower transport costs to better stimulate the economy (New Era Newspaper, 2015).

The Roads Authority is a non-profit, mission-driven organization that is largely responsible for maintaining Namibian roads and keeping the Namibian road sector safe and efficient. They aim to have a road network by 2030 that is ahead of the economic needs in Namibia. This organization provides much of the road safety in Namibia (Roads Authority, 2011). The Roads Authority also works with the Motor Vehicle Accident Fund, MVA Fund, to improve roads in order to keep the roads accessible and safe (J. Lutombi, personal communication, February 3, 2017).

2.3.3 The MVA Fund

The Motor Vehicle Accident (MVA) Fund began in 1991, one year after Namibia gained independence from South Africa. The mission of the MVA Fund is to provide assistance and benefits to all people injured in road crashes, as well as the dependents of those killed. The organization relies on its core values of passion, excellence, teamwork, and integrity to implement crash and injury prevention measures (MVA Fund, n.d). The Ministry of Mines and Energy enforces a tax on gasoline, which provides funding to both the MVA Fund and the National Road Safety Council (NRSC). As of September 2013, MVA receives funds for each liter of gas and diesel sold at a rate of N\$0.477 per liter (Windhoek Observer, 2016).

The MVA Fund consists of the following business units: Operations, Corporate Affairs, Legal Services, Finance, Human Relations, and Business Strategy (see Figure 8). Of these units,

the Operations unit is most relevant to this project. It processes claims filed with the MVA and performs cost management in the wake of motor vehicle accidents. Additionally, this business unit is responsible for accident and injury prevention as well as rehabilitation for injured persons (MVA Fund, n.d).

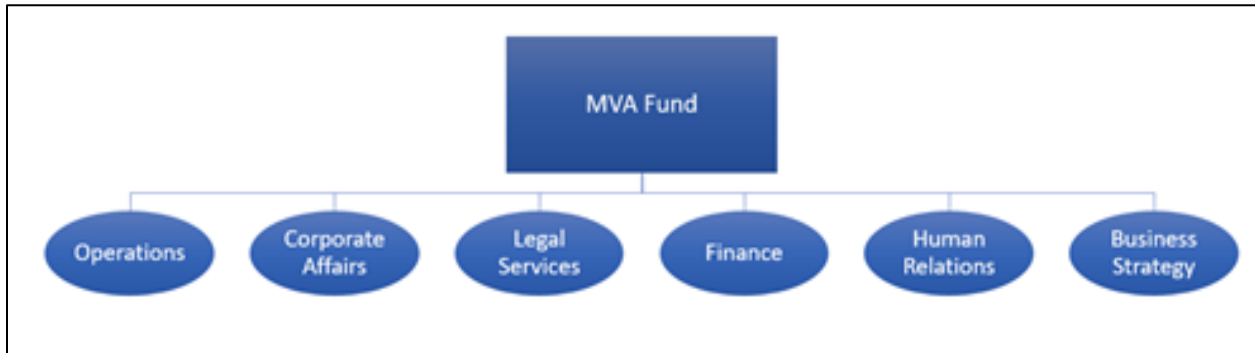


Figure 8: MVA Fund Business Units

2.4 Driver Education Campaigns in Namibia

This project will collect data on vehicle occupant behavior in Namibia. A baseline assessment of road safety practices will help stakeholders like the MVA Fund develop innovative methods for improving the habits of drivers. By understanding the environment and attitudes that led to such habits, these stakeholders can improve their impact on driver behavior and road safety. This section will discuss previous and ongoing efforts to educate drivers in Namibia, concluding with information on strategies for successful public education campaigns.

2.4.1 Driver Safety: Attitudes & Awareness

The government of Namibia has recently begun efforts to address the nation’s reputation as a dangerous driving destination. These efforts are concurrent with United Nations General Assembly resolution 64/255 (2010), which declared the 2010s as “the Decade of Action for Road Safety” (see Figure 9). The Legal Assistance Center in Namibia, LAC, reported the annual road injury fatality rate in Namibia as 31 per 100,000 inhabitants, more than three times that of Europe (LAC, 2016). In May 2016, the LAC released a report proposing strategies for enhancing road safety. The report responded to a February 2016 head-on collision between a truck and minibus in northern Namibia that resulted in 14 deaths.



Figure 9: Official tag for the Decade of Action for Road Safety (FIA Foundation, 2011).

The LAC's proposal references the 2014 Namibian Road Safety Management Bill; the intent of this bill is to provide for the establishment of a Road Safety Agency and Road Safety Fund. These institutions serve as the executing agency in relation to road safety education and promotion (Minister of Works and Transport, 2014). Though the bill sets goals for teaching safe driving practices to drivers in Namibia, it does not outline a methodology for implementing this goal. Without a concrete education plan in place or reliable data to assess over time, it is difficult to gauge improvement in this area.

One successful course of action involved road safety training as part of grade school education. This practice aims to change the long-standing inclination for reckless behavior among Namibian drivers. According to the Minister of Works and Transport, Mr. Erkki Nghimtina: "The purpose of education is to change mindsets, attitudes and behaviours and to create a deep-rooted culture of road safety among all road users" (World Health Organization, 2010). By addressing the importance of this issue at an early age, officials hope to encourage the next generation of Namibians to prioritize road safety.

2.4.2 Drinking and Driving

Authorities in Namibia recognize the dangers associated with drunk driving, both to the driver as well as to passengers and occupants of other vehicles on the road. Violators of drunk driving laws face arrests and mandatory court appearances (Menges, 2010). Despite progressive laws prohibiting intoxication behind the wheel, drunken driving remains a prevalent problem among Namibian vehicle operators. When the MVA Fund collaborated with Namibian police in October 2016 for a road safety campaign, vehicle inspections at the town of Rehoboth showed that for every 20 vehicles stopped, just four drivers were sober (Shapwanale, 2016).

In a study by the National Road Safety Council of Namibia, for more than two-thirds of drivers involved in road collisions, police failed to indicate whether they had tested for alcohol

intoxication on accident forms. Forms that did address this issue reported that the police only tested 30% of drivers (see Figure 10) (NRSC, 2012). The scattered nature of such testing renders an accurate statistical analysis of intoxication as a contributor to road collisions in Namibia impossible.

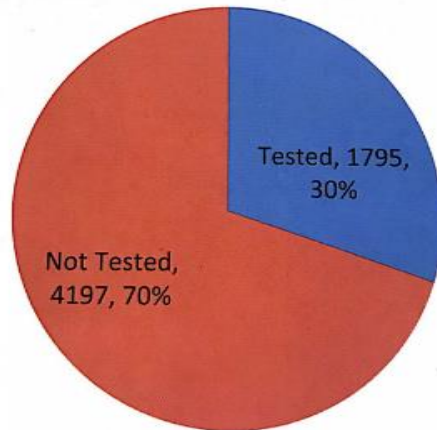


Figure 10: Collision percentage of drivers tested for alcohol use (NRSC, 2012).

2.4.3 Seat Belt and Child Restraint Use

Wearing seat belts is mandatory for all drivers in Namibia. Seat belts are also mandatory for passengers in the front and back seats of passenger vehicles. Despite these laws, non-compliance is common. Available data from crash survivors indicates a compliance rate of 60.4% among drivers, but only 17% among passengers (see Figure 11) (NRSC, 2012). By comparison, a 2001 study in Melbourne, Australia found that about 92% of all observed vehicle occupants in that city wore seat belts (see Section 2.5.1) (Whelan, 2001).

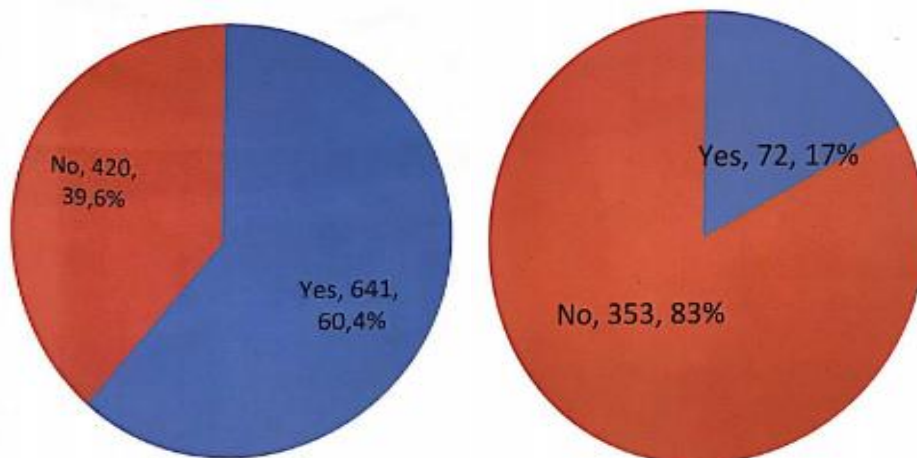


Figure 11: Comparison of seat belt use among drivers (left) and passengers (right) (NRSC, 2012).

Table 3, compiled using NRSC data, summarizes the likelihood of drivers and passengers suffering serious or fatal injuries in the event of a road accident (NRSC, 2012):

Injury Type	Drivers		Passengers	
	Number	%	Number	%
Fatal	121	34.8	74	50.0
Serious	442		406	
Minor	1054	65.2	480	50.0
All	1617	100.0	960	100.0

Table 3: Comparison of Injury Severity among Drivers and Passengers (NRSC, 2012).

As shown, 50.0% of injuries sustained by passengers classify as serious or fatal, compared to just 34.8% among injuries sustained by drivers. This statistic, coupled with the significantly higher rate of seat belt use among drivers compared to passengers, supports the claim that, “seat belt use is the most effective way to save lives and reduce injuries in crashes” (National Highway Traffic Safety Administration, 2015). An international study on seat belt use and attitudes provides evidence that informing the public about the importance of seat belt use can contribute to increased wearing rates (see Section 2.2.3) (Steptoe et al., 2002).

2.4.4 Successful Public Education Campaign Techniques

Successfully developing public education campaigns requires obtaining knowledge regarding the aspects of the campaigns that lead to success. Knowing and understanding this information will benefit development and implementation of a successful public education campaign in Namibia.

According to a study done on the effectiveness of mass media campaigns for reducing drinking and driving and alcohol involved crashes, message content and message delivery are important factors in making a public education (Elder, 2004). Common message content includes specific themes emphasized to motivate the public to change their behavior. In the study by Elder et. al., the campaign used themes such as fear of arrest and fear of harm to self to get the public to think about the implications of their actions when drunk driving. Similarly, the study also suggests creating a certain amount of anxiety in the viewers of the public education campaign. Too much anxiety is undesirable and can cause the subjects to ignore the encouraged behaviors. Some anxiety is beneficial when trying to change public behavior (Elder, 2004). Many driver education programs across the United States show the well-known driving video “Red Asphalt”.

This short film gives a vivid portrayal of what can occur if not following traffic laws, including wearing a seat belt. This video uses fear as the main motivator to reach the audience and frighten them into following traffic laws by showing them what can happen. At the beginning of the film, the host gives a disclaimer that the movie crew did not enjoy making the film and does not expect the viewers to enjoy it either (Smith, 2006). A multitude of commercials and awareness ads about seat belts and other laws surrounding operating a motor vehicle exist using fear or sadness as the primary motive to ensure a response from the public.

Although fear is the most effective motivators for this study, other motivators exist to get the public's attention. Any type of emotion-evoking message, whether fear, sadness, or hope, will catch the public's attention. The message simply must get the public into action. Even simple motivators, such as an insurance company informing the public that safe drivers get discounts, can work sufficiently. The average person would find this enticing in a positive way. A campaign executed in Costa Rica promoting the use of seat belts took a different approach. It attempted to educate the public via media but also through a more positive police enforcement. Instead of pulling vehicles over and giving tickets, police would simply attempt to educate drivers by offering campaign materials or safety advice (Por Amor, 2003). This campaign took a gentle approach and yielded promising results seeing as the percentage of population wearing seat belts jumped from 24% to 82% (Road Safety Toolkit, 2010).

The content of a public education campaign is important, but useless without an effective delivery strategy. The study also stresses the fact that the content must be comprehensible by the target audience in addition to simply reaching them. The appearance frequency of the campaign is another important aspect of an effective public education campaign. Increasing the population's exposure to the campaign helps the message register more thoroughly. Production quality and distribution location are crucial to the effectiveness of the public education campaign and eliciting the desired outcome and response by the target audience.

According to this study, pretesting the content and delivery is an important technique to consider when creating a public education campaign. Pretesting makes sure the audience perceives the campaign in the desired way. The study uses an example of a campaign to prevent alcohol-related problems by promoting drinking in moderation. This campaign was not pretested and the viewers thought that the campaign ads promoted alcohol consumption. Pretesting helps gauge audience reactions and identify needed improvements (Elder, 2004)



Figure 12: Flowchart of Public Education Campaigns

2.4.4.1 Addressing Common Reasons for Non-Compliance

A successful education campaign must first consider potential resistance from the public. The proposed campaign will anticipate this resistance and address it in a constructive manner to maximize the impact on the target audience.

Even though 98.4% of drivers in Namibia agree that it is beneficial to wear a seat belt while traveling in a vehicle, far fewer drivers do so in practice (Winnett, 2009). Those surveyed gave many reasons for not wearing a seat belt. The most common responses, shown in Table 4, include:

Reason for Not Wearing Seat Belt	% of Respondents
Many vehicles are not equipped with seat belts	31.0
It is safe to sit in the back seat without a seat belt	22.0
Seat belts are uncomfortable	19.0
It is safe to travel short distances without a seat belt	13.7

Table 4: Common Reasons for Not Wearing a Seat Belt (Winnett, 2009).

Other respondents said they do not wear seat belts: when no one else is doing so; while traveling at low speeds; while traveling in town; or due to the belief that wearing a seat belt actually increases the likelihood or severity of injury in the event of a crash (Winnett, 2009).

Despite overwhelming evidence that seat belts minimize the risks associated with vehicle operation, a large portion of drivers remain opposed to laws mandating their use. Opponents of seat belt legislation cite such laws as a violation of civil liberties. Among these opponents is Walter E. Williams, a libertarian economist from George Mason University. He believes that, “People have the right to take chances with their own lives. People do not have a right to take chances with the lives of others.” (Williams, 2016). He argues that since failure to wear a seat belt puts only that occupant in danger, each individual should have freedom in this choice. Williams also calls into question the government’s decision to obstruct certain liberties while allowing others: “The point is whether government has a right to coerce us into taking care of ourselves. If eating what we wish is our business and not that of government, then why should we accept government’s coercing us to wear seat belts?” (Williams, 2016).

Critics of seat belt laws have also cited that seat belts are medical devices designed to ensure health and safety. The government, then, has no more right to force seat belts on its citizens, as doctors have to force treatment on their patients (Holdorf, 2002). Another school of thought claims that, in a prohibited deal with the United States Department of Transportation, automakers pushed mandatory seat belt use into law in hopes of saving money on more expensive passive restraints, such as airbags (Holdorf, 2002).

Advocates for seat belt legislation will often counter these arguments by citing the government’s responsibility, “to pass laws that promote public health, safety, and welfare”

(Fazzalano, 1998). Supporters of the laws may also reject the assumption that failure to buckle up only affects the individual, suggesting that unrestrained vehicle occupants are more likely to lose control of the vehicle and inflict injury on other occupants. Some feel that government is also justified in its concern over the societal costs of those injured by preventable road accidents (Fazzalano, 1998).

2.5 Relevant Previous Research

Various institutions and organizations previously conducted studies relevant to the goals and methodologies of this project. The Accident Research Center of Monash University in Australia performed a roadside observation study in 2001 to establish a benchmark for road safety. This project will use the Monash survey as a model to design a successful roadside survey in Namibia. In 2002, the Economic and Social Research Council of the United Kingdom investigated the effectiveness of government efforts to inform the public of the importance of seat belts. The organization used results from a questionnaire to measure trends in seat belt use from 1990 to 2000. It sampled university students in fourteen European countries. These results will guide this project with suggestions for the implementation of public education measures aimed at improving road safety in Namibia. The Global Road Safety Partnership, GRSP, conducted their own questionnaire in 2009; this survey assessed public attitudes towards seat belt use and collected reported wearing rates from people in Namibia. The GRSP used a written survey to collect data similar to this project through roadside observation, and shared similar goals for the use of this data. The following sections describe these three important studies in detail.

2.5.1 Monash University Accident Research Center Roadside Observation Study (2001)

In 2001, researchers at Monash University Accident Research Centre in Victoria, Australia conducted a roadside observation study to establish a benchmark of safety on Melbourne roads. The study combatted the lack of data on driver and passenger behavior in Australia. It reported on several safety indicators, including seat belt and child restraint usage, by drivers, motorcyclists, and bicyclists. The benchmark study collected 4,665 observations at multiple intersections over a two-month span. The researchers selected five sites based on optimal visibility for recording observations. Each intersection needed a traffic light, a high traffic volume, and a speed limit of 60 kilometers per hour to allow for the most accurate data collection.

Before beginning the study, all involved researchers completed education and training on vehicle classification and age estimation to improve data quality. Then, the researchers designed a checklist-style survey to systematically evaluate each vehicle and its occupants for the needed data. They included all vehicles stopped in the left-hand lane of the intersection and completed a checklist for each one. They worked in pairs to assure safety and to increase data validity. They

also carried Explanatory Statements for anyone that initiated contact with questions or concerns about the study. The statement emphasized the importance of the data collection and assured anonymity for all subjects surveyed. It also included contact information for the University Standing Committee on Ethics in Research Involving Humans and a project worker for ethical concerns or survey results (Whelan, 2013).

As presented in the findings of the study, 7% of the 6,570 occupants surveyed failed to wear their seat belt or used it incorrectly. The report also quantified the most common errors of seat belt usage and correlated various subject demographics with seat belt use rates. The child restraint use statistics proved even more alarming; the study found that adult occupants incorrectly restrained or failed to restrain 21.6% of 637 child passengers (Whelan, 2013). In summary, the research team proposed that the traffic safety community should address these concerning low levels of seat belt and child restraint use with enforcement, education, and advertising campaigns.

2.5.2 Seat Belt Use, Attitudes, and Changes in Legislation: An International Study (2002)

In 2002, an international study conducted by the Economic and Social Research Council of the United Kingdom suggested steadily increasing seat belt use over a period of ten years. The analysis aimed to prove that change in legislation and attitudes toward motor vehicle safety translated to higher seat belt use. University students from fourteen countries participated in an anonymous questionnaire to assess their driving behavior. The study surveyed 10,576 people in 1990 and an additional 10,294 people in 2000. Figure 13 shows survey, results from fourteen countries that indicate an increase in seat belt over a course of ten years.

Country (n)	Men			Women		
	1990 % (95% CI)	2000 % (95% CI)	Change %	1990 % (95% CI)	2000 % (95% CI)	Change %
Belgium (1750)	77 (73–80)	69 (64–74)	–8	81 (78–84)	83 (78–88)	+2
England (1560)	88 (83–93)	83 (79–87)	–5	92 (88–96)	89 (85–93)	–3
France (1414)	88 (83–93)	88 (84–92)	0	88 (84–92)	95 (91–99)	+7
Germany (1518)	81 (77–85)	70 (66–75)	–11 ^b	89 (85–93)	83 (79–87)	–6
Greece (1462)	27 (22–32)	55 (51–59)	+28 ^b	28 (23–32)	60 (56–64)	+32 ^b
Hungary (1341)	64 (59–68)	74 (68–79)	+10 ^b	62 (58–67)	72 (68–77)	+10 ^b
Iceland (1476)	73 (69–77)	76 (72–81)	+3	85 (81–89)	92 (88–96)	+7
Ireland (1254)	75 (71–80)	85 (77–93)	+10	75 (72–79)	86 (81–90)	+11 ^b
Italy (2833)	46 (42–50)	53 (51–56)	+7 ^b	45 (41–49)	55 (52–57)	+10 ^b
Netherlands (1433)	83 (78–88)	83 (79–88)	0	92 (88–95)	89 (85–93)	–3
Poland (1554)	25 (20–29)	72 (68–77)	+47 ^b	24 (19–28)	81 (77–85)	+57 ^b
Portugal (1790)	31 (26–35)	92 (89–96)	+61 ^b	30 (26–34)	96 (92–99)	+66 ^b
Spain (1283)	55 (51–59)	81 (75–86)	+26 ^b	57 (53–61)	79 (74–84)	+22 ^b
USA (1672)		72 (68–75)			87 (84–89)	

Figure 13: Seat belt use in 1990 and 2000 (Steptoe et al., 2002).

A majority of the men and woman in the countries involved in the survey increased their seat belt use over the ten-year period (Steptoe et al., 2002). Between the two genders, women reported higher rates of seat belts use; they averaged about 3% higher usage. The study also

explored the notion that people thought wearing a seat belt was important to them. Over the duration of ten years, more and more people believed that wearing their seat belt was an important aspect of driving and that it would protect them from injury or even death. Participants assigned their level of belief with a number on a scale from 1-10 as seen in Figure 14. A level of 10 meant that a participant believed that wearing a seat belt was very important to them.

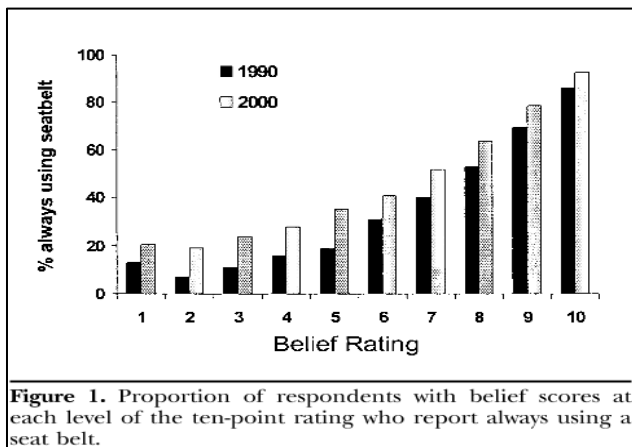


Figure 14: Belief scores between 1 and 10 vs. how often seat belts are worn (Steptoe et al., 2002).

This study concluded that government attempts to educate the public about seat belt use were responsible for the increase of use within the ten-year period. Three of the countries that experienced the highest growth in seat belt usage also faced new laws regarding seat belt use. Not only did the governments succeed in educating their citizens regarding the new jurisdiction, but they also succeeded in a shift in attitude toward seat belt use overall (Steptoe et al., 2002).

2.5.3 Global Road Safety Partnership: Seat Belt Wearing Baseline Situation Assessment (2009)

In 2009, Mike Winnett of the Global Road Safety Partnership (GRSP) authored a study on seat belt attitudes and compliance in Namibia. He collected data via a questionnaire handed out at various locations in eleven towns throughout the country. The results of the study suggest that in Namibia, awareness of the importance of using seat belts is extremely high; 98.4% of those surveyed answered “yes” when asked, “Do you believe that it is beneficial to always wear a seat belt when travelling in a vehicle?” (Winnett, 2009). Despite this, only 64.7% indicated that they always wear a seat belt when traveling in a vehicle, with 30.5% answering “sometimes”. Common reasons given by respondents for not wearing a seat belt include “a vehicle is not equipped with seat belts”, “It is safe to sit in the back seat - I do not need to wear my seat belt”, and “Wearing a seat belt is uncomfortable” (Winnett, 2009). The study also noted that self-reported wearing rates significantly exceeded the wearing rates observed by the National Road Safety Council (see Section 2.4.3 and Figure 15).

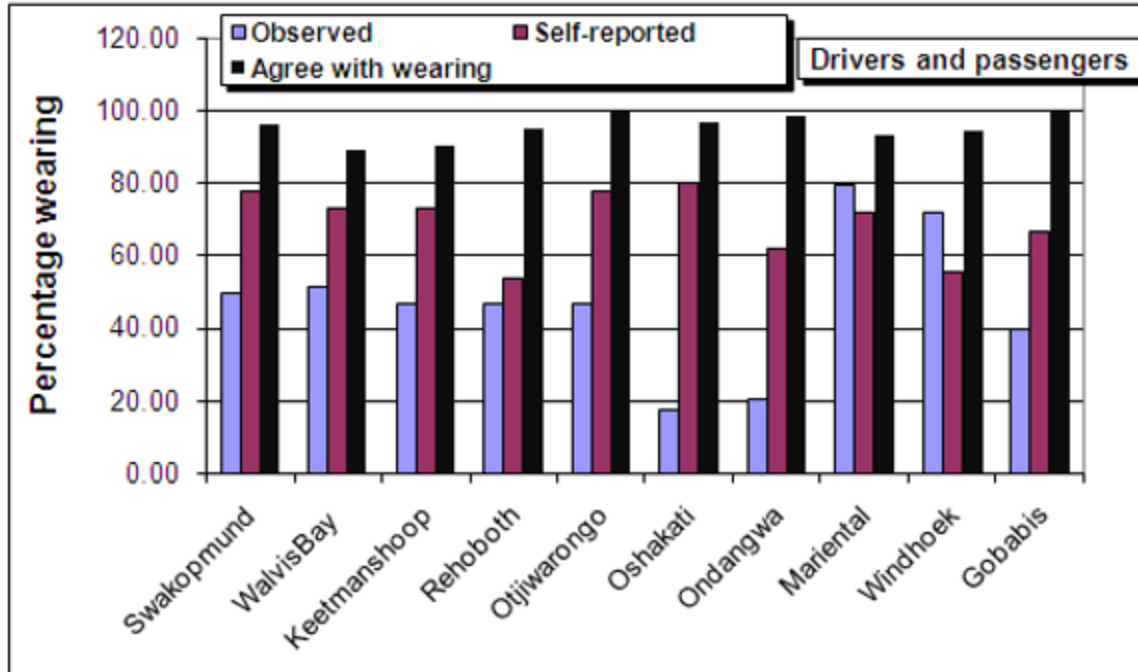


Figure 15: Comparison of observed and self-reported seat belt wearing rates by city/town (Winnett, 2009).

This GRSP study is of particular interest to this project because it shares many of the same objectives. Both projects aim to assess public attitude toward seat belt use in Namibia, collect baseline data on wearing rates, and determine potentially effective methods of public education to increase seat belt usage. The projects differ, however in methodology: the GRSP collected data via a written survey; this project will collect data via visual observation.

2.6 Summary

All over the world, people rely on motor vehicles as one of the fastest and most convenient modes of transportation; however, road accidents are among the top ten causes of death globally (The Top 10 Causes of Death, 2017). The correct use of seat belts and child restraints worldwide can significantly decrease the number of injuries and fatalities in traffic accidents, but to improve the safety of the drivers and passengers of motor vehicles, transportation associations and other related organizations must encourage the public to use seat belts. In Namibia, the MVA Fund will collect data on practiced safety behaviors and assess the motivations behind them to educate the public effectively on the need to use seat belts and child restraints.

Chapter 3: Methodology

This project will determine the level of seat belt and child restraint usage in Namibia through the design and implementation of a roadside observation study, in coordination with the Motor Vehicle Accident Fund. If the study results support the need to increase public awareness, the team will design an education campaign to improve human safety behavior for motor vehicle occupants traveling in Namibia. The team broke the project down into the following objectives:

1. Assess the current levels of vehicle occupant seat belt and child restraint use in Namibia
2. Analyze the collected data to quantify seat belt and child restraint usage levels
3. Identify the most common reasons people do not use a seat belt or child restraint
4. Evaluate the impact of driver education on the seat belt habits of college-age students in the United States and Namibia
5. Design a method to encourage the public to use seat belts and child restraints properly.

3.1 Assess Current Seat Belt and Child Restraint Use

To understand current seat belt and child restraint use across the country of Namibia, the team will conduct an observational study. An observational study collects data from a sample population. While there are many independent variables that researchers cannot control when performing an observational study, this method eliminates the potential bias of self-reported seat belt and child restraint use. Team members will run this study using web-based surveying software with offline capabilities. The result will be a sleek, easy to understand database of information for the MVA Fund's use and records.

3.1.1 Design an Observational Study

The design of this project's observational study emphasizes speed and efficiency to limit the time vehicles stop for observation. These observations will provide thorough and complete data on the subjects' driving behavior.

The team explored the possibility of implementing observational technology to assist in data collection. The Republic of Namibia enforces various privacy laws that protect citizens from unconsented surveillance (Privacy International, 2015). After discussing this technique with the sponsor, the team is confident that visual observation, without video technology, is legally and ethically acceptable because there will be no long-term surveillance taken and no personal information obtained. This method of data collection will not cost the sponsor additional funds for surveillance equipment such as cameras.

The initial observations for the study are purely demographical in regards to the driver. What is the age of the person driving? What is their gender? This kind of information is pertinent

to the public education campaign that may follow the observational study. If there is a correlation between a certain age group and a lower seat belt use percentage, the project can employ tailored methods to reach that target group specifically. The next question relates to seat belt use of the vehicle occupants. If there are no passengers in the car, the questions will end. If there are passengers in the car, the questions will continue regarding who is in the car and if they are using a seat belt or a child restraint. The team will conduct a test run of this software being used in the study and will make any necessary changes to increase speed and efficiency. Appendix A shows the data collection form.

3.1.2 Collect Survey Data

The team will control data collection through the private research software company Qualtrics. The software allows for offline use, so a location that lacks Wi-Fi access can still serve as a suitable site for the study. The offline services provided by Qualtrics enable the user to record data and subsequently upload the data online when an Internet connection becomes available. Each team member will download the Qualtrics Surveys application on his or her respective mobile devices (see Figure 16). The team members pre-downloaded the data collection form onto their devices using a single Qualtrics account.

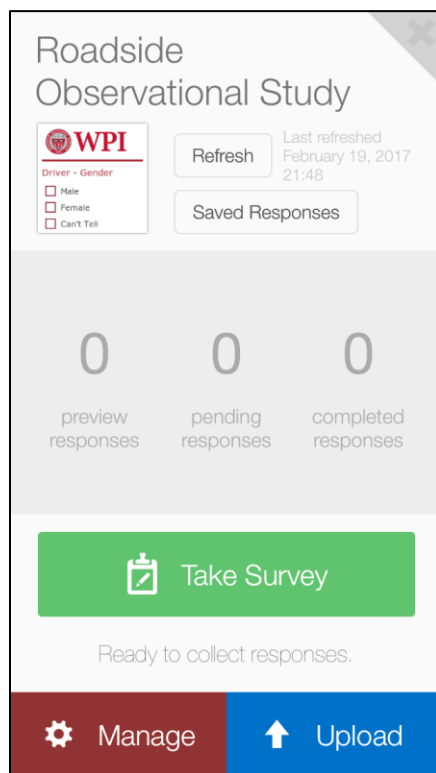


Figure 16: Image of downloaded survey on mobile application in offline mode.

Figure 17 shows the outline of our observational study. With proper coordination, the researchers can complete all information quickly so that the process does not stop the driver for

an extended period. Each team member will have designated observations regarding the driver and any passengers that are in the vehicle.

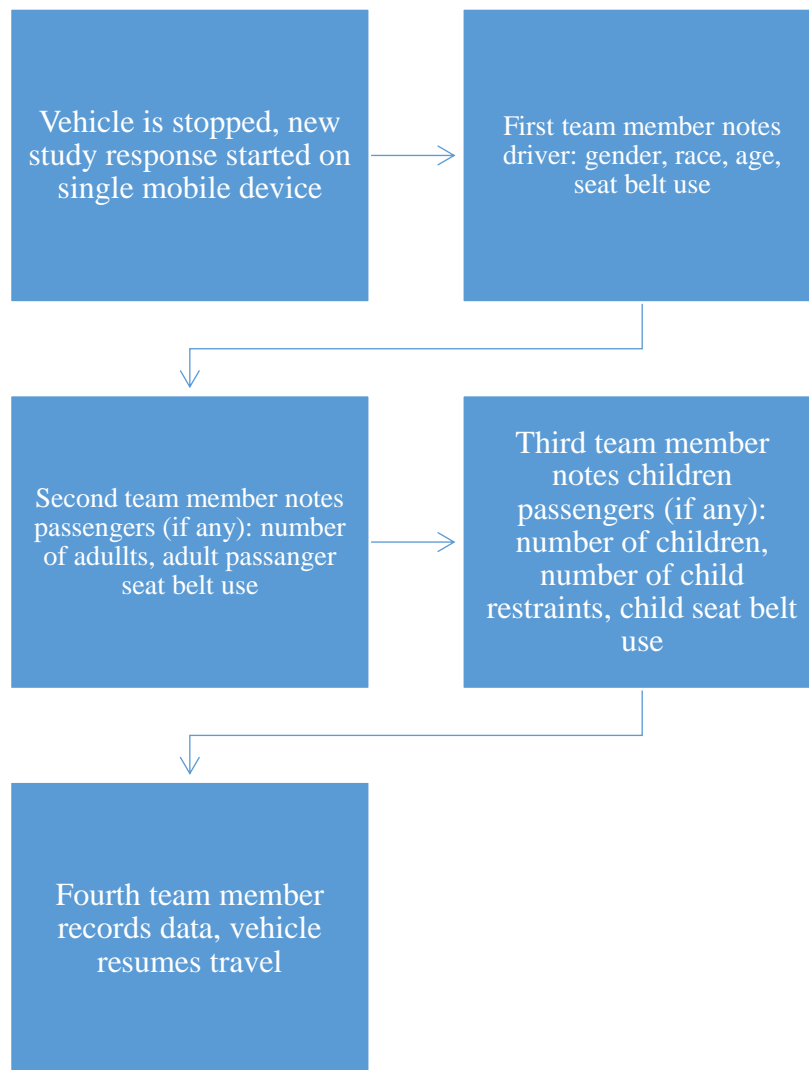


Figure 17: Observational study process.

After the researchers gather all pertinent information, the Qualtrics application stores all data for the vehicle in the mobile device as seen in Figure 18 and Figure 19. Once the team arrives at a location with Wi-Fi and Internet access, they can upload the results to a computer.

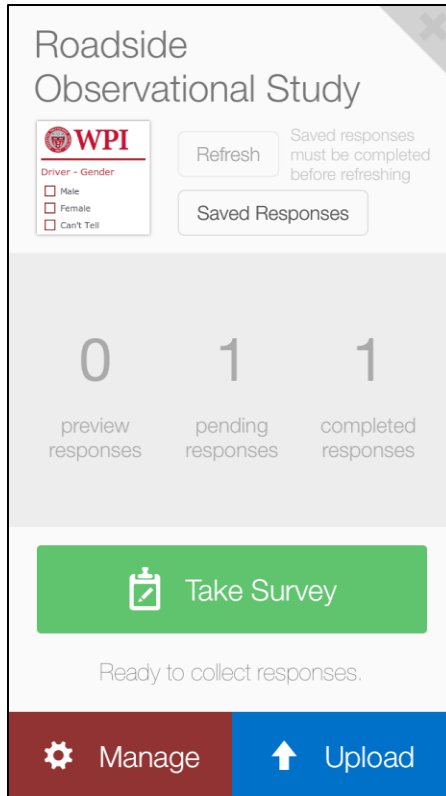


Figure 18: Offline mode surveying mobile application with one response pending upload and one response that has been uploaded.

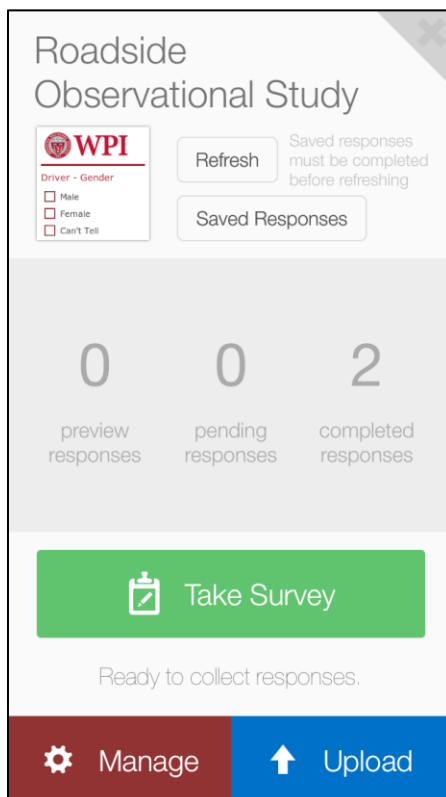


Figure 19: Offline mode surveying mobile application with both responses successfully uploaded via internet connection.

3.1.3 Select Sites

Namibia consists of multiple regions with varying populations and climates. The team will survey a variety of these regions to ensure that the data includes both urban and rural areas. The nation’s capital, Windhoek, is in the Khomas region and is the most populated area of the country’s fourteen regions.

The MVA Fund will coordinate the number of sites at which the researchers will conduct the study. The team will discuss the selection of these sites and the frequency of observation early in the seven-week project period. At the MVA Fund’s request, the team will work with NAMPOL at the selected observation locations to provide a safe and secure checkpoint area. Factors to consider when selecting locations include:

- Is it safe to set up a checkpoint at the selected location?
- Will a statistically significant number of vehicles pass the selected location?
- Does the study consider all road types?
- Does the study represent both urban and rural communities?

3.2 Analyze Collected Data

At the completion of the observational study, we will process the data collected. With the results, we will draw conclusions on seat belt and child restraint use in Namibia. The Qualtrics software will store all data for easy input and comparison. Within the software, the team can automatically tabulate the responses to the study with just a few simple settings. Figure 20 below is a sample table generated using three test survey responses. We isolated the question regarding driver gender and compared it to a subsequent observation on the driver’s use of a seat belt.

		Driver - Seat Bet			Total
		Yes	Maybe	No	
Driver - Gender	Male	2	0	0	2
	Female	1	0	0	1
	Can't Tell	0	0	0	0
	Total	3	0	0	3

Figure 20: Sample results tabulated by driver gender vs. seat belt use.

With the Qualtrics software, the team can create a database from the responses of the observational study. This method is time efficient because there is no transfer of collected data from paper to computer and requires no calculations by hand. The Qualtrics software allows the team to generate and export data and tables into common office formats such as Microsoft Excel files and Adobe PDF files.

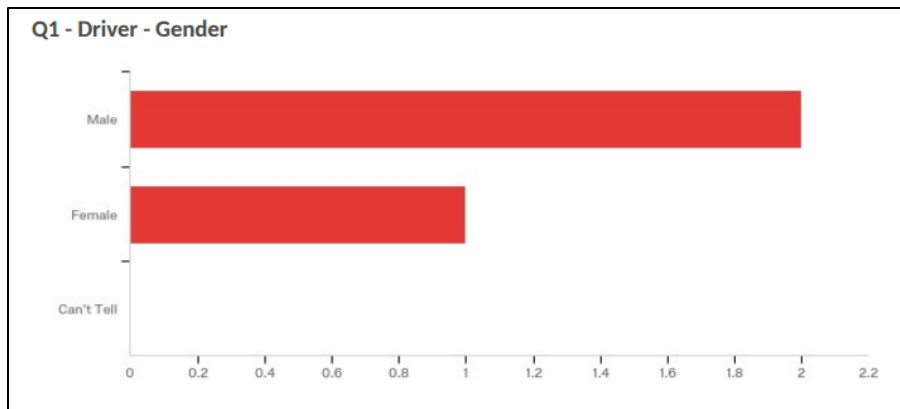


Figure 21: Exported bar graph exported from Qualtrics to show gender responses in the sample survey.

In addition to tabulating results, Qualtrics will also output data into graphics to visually aid in understanding the received responses (see Figure 21).

3.3 Identify Common Reasons for Not Using a Seat Belt

The roadside observation study analysis described in Sections 3.1 and 3.2 will provide information on current levels of seat belt and child restraint use in Namibia. However, this method does not explore the factors that influence an individual’s decision to wear a seat belt. To understand the factors that most significantly affect seat belt use, the team will design and implement an attitudinal survey. This attitudinal survey will assess the feelings of new drivers toward seat belt and child restraint use. The team will distribute the survey to college-age students in both the United States and Namibia to gauge the impact of recent driver education on seat belt use. Section 3.4 describes the education portion of the survey. Appendix B contains the complete survey form.

3.3.1 Design an Attitudinal Survey

Before designing the survey, the team researched successful survey techniques. The best surveys are simple while still collecting the required information. Long surveys often lose participation and/or record inaccurate responses (Smith, 2012). Effective surveys also use scales with a range of response options, such as “Strongly Agree” to “Strongly Disagree”. Including more than three options further qualifies intermediate responses such as “Sometimes”. Options for responses to similar questions should remain consistent to allow for easier analysis. Surveys should also include an explanatory statement at the beginning to inform the participants as to the goals of the survey and the applications of the data it collects. This may involve a disclaimer to address possible concerns the participants may have regarding liability and anonymity (Smith, 2012).

Survey designers must first decide which research questions they hope to answer with the survey, then they create survey questions that accurately address these questions. The survey addresses the following research questions:

- What is the impact of driver education on seat belt use?
- What is the impact of current seat belt advertising on seat belt use?
- How do self-reported rates of seat belt use in Namibia differ from observed rates?
- What are the common factors that would prevent someone from wearing a seat belt?
- What methods and motivations could increase seat belt usage in Namibia?

To address these questions, the team developed a series of questions based on a 2009 study authored by Mike Winnett of the Global Road Safety Partnership, GRSP. The GRSP distributed a questionnaire to passersby in twelve Namibian cities and towns as a baseline attitudinal assessment of seat belt use for drivers in the country. This questionnaire aimed to answer some of the same research questions listed above, such as addressing common factors and motivations that affect a person’s decision to use a seat belt (Winnett, 2009). Because of these similarities, some questions from this survey come directly from the GRSP questionnaire with only slight modifications.

Figure 22 summarizes general Do’s and Do Not’s for creating effective surveys:

Do:	Do Not:
<input checked="" type="checkbox"/> Give clear instructions <input checked="" type="checkbox"/> Keep question structure simple <input checked="" type="checkbox"/> Ask one question at a time <input checked="" type="checkbox"/> Maintain a parallel structure for all questions <input checked="" type="checkbox"/> Define terms before asking the question <input checked="" type="checkbox"/> Be explicit about the period of time being referenced by the question <input checked="" type="checkbox"/> Provide a list of acceptable responses to closed questions <input checked="" type="checkbox"/> Ensure that response categories are both exhaustive and mutually exclusive <input checked="" type="checkbox"/> Label response categories with words rather than numbers <input checked="" type="checkbox"/> Ask for number of occurrences, rather than providing response categories such as often, seldom, never <input checked="" type="checkbox"/> Save personal and demographic questions for the end of the survey	<input type="checkbox"/> Use jargon or complex phrases <input type="checkbox"/> Frame questions in the negative <input type="checkbox"/> Use abbreviations, contractions or symbols <input type="checkbox"/> Mix different words for the same concept <input type="checkbox"/> Use “loaded” words or phrases <input type="checkbox"/> Combine multiple response dimensions in the same question <input type="checkbox"/> Give the impression that you are expecting a certain response <input type="checkbox"/> Bounce around between topics or time periods <input type="checkbox"/> Insert unnecessary graphics or mix many font styles and sizes <input type="checkbox"/> Forget to provide instructions for returning the completed survey!

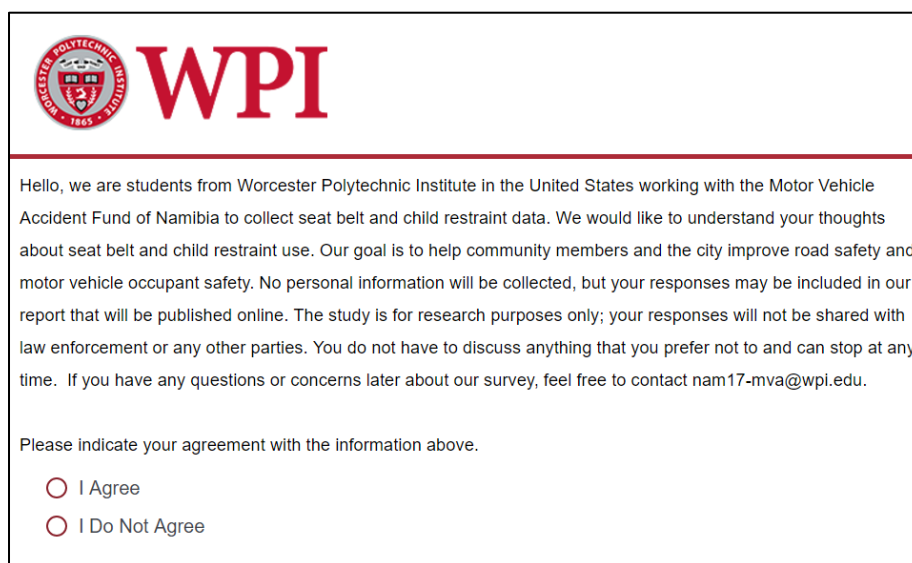
Figure 22: Do’s and Do Not’s for creating effective surveys (University of Wisconsin, 2010).


3.3.2 Implement the Attitudinal Survey

After designing the survey, the team must implement the survey to capture a random sampling of the two target populations: college students in the United States and college students in Namibia. Limited access to students from multiple universities in both countries limits the team's survey populations. Thus, the team will distribute the survey to students only from Worcester Polytechnic Institute (WPI) in Worcester, Massachusetts, USA and the National University of Science & Technology (NUST) in Windhoek, Namibia. The team chose these universities due to the ease of drawing samples of reasonable size. The students of WPI and NUST share a technical focus, which further strengthens the comparison. The team will execute the survey while acknowledging that WPI and NUST students do not fully constitute a random sampling of college students or college-age individuals.

The team will distribute a link to the survey via email using Qualtrics research software. If possible, the entire undergraduate student body of both universities will receive the link; otherwise, the team will send the link to as many students as possible. To increase the response rate, the team will also appeal to friends and contacts at both universities, including the NUST students working with another group of WPI students. Obtaining responses from NUST students in particular could prove challenging, so the team is open to recommendations from the sponsor for achieving this goal. These recommendations could include implementing a paper survey of NUST students rather than an online survey.

Upon opening the email link, the participant will see the following disclaimer statement shown in Figure 23 and will have to indicate their agreement with the terms of the survey before they proceed:



 **WPI**

Hello, we are students from Worcester Polytechnic Institute in the United States working with the Motor Vehicle Accident Fund of Namibia to collect seat belt and child restraint data. We would like to understand your thoughts about seat belt and child restraint use. Our goal is to help community members and the city improve road safety and motor vehicle occupant safety. No personal information will be collected, but your responses may be included in our report that will be published online. The study is for research purposes only; your responses will not be shared with law enforcement or any other parties. You do not have to discuss anything that you prefer not to and can stop at any time. If you have any questions or concerns later about our survey, feel free to contact nam17-mva@wpi.edu.

Please indicate your agreement with the information above.

I Agree

I Do Not Agree

Figure 23: Attitudinal survey disclaimer statement shown at the beginning of the survey.

After selecting “I Agree”, the participant will proceed to answer the survey questions, which include a variety of questions styles such as yes/no questions, 5-option ranking questions, and multiple response questions. Figures 24-26 show examples of these question styles and preview the mobile version of the survey:

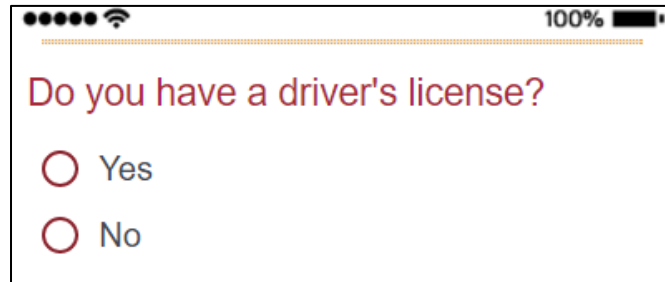


Figure 24: Example of a yes/no survey question.

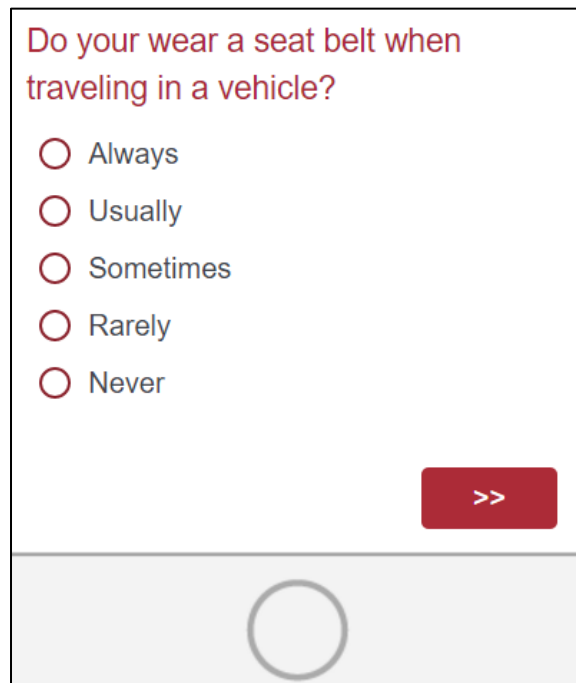


Figure 25: Example of a 5-option ranking survey question.

The image shows a mobile survey interface. At the top, there is a status bar with signal strength, Wi-Fi, and 100% battery. The main question is: "In what cases do you wear a seat belt? (choose all that apply)". Below this are seven options, each with a checkbox: "as a driver", "as a passenger (in the front seat)", "as a passenger (in the back seat)", "only on short trips", "only on long trips", "only when there is a threat to be stopped by police", and "other (please specify)". A text input field is provided for the "other" category. Below a horizontal separator, a second question asks: "Please explain when or why you do not use a seat belt. (choose all that apply)". One option is visible: "It is safe to sit in the back seat, so I do not need to wear my seat belt there".

Figure 26: Example of a multiple response survey question.

3.3.3 Analyze the Results

The research questions discussed in Section 3.3.1 will guide the team in analyzing the collected data. The Qualtrics software will collect the survey results. It has the capability to output all data the team may want to analyze, such as correlations between responses to multiple questions. The team will also use Qualtrics to create graphs and tables to document and report the results.

Based on participant response, the team will look for correlations between level of seat belt use and other factors, like extent of driver education and level of exposure to seat belt awareness advertising. We will also compare the seat belt wearing rate obtained by the survey to the wearing rate observed through roadside observation. The 2009 GRSP questionnaire found self-reported rates to be higher than rates observed in a 2007 observational study (see Figure 15), but the 2007 results varied widely (Winnett, 2009). The team will determine whether data collected in this project supports this finding.

The survey responses will also indicate the most common reasons for a person to choose not to wear a seat belt, as well as circumstances that could lead a person to buckle up. The analysis will identify these factors and use them as issues to target during the design of a public education campaign. Identifying potential strategies for educating the public on the importance of seat belts is the most critical outcome from the attitudinal survey.

3.4 Evaluate the Impact of Driver Education

The 2009 GRSP does not evaluate the impact of driver education on subsequent seat belt usage. For research questions not addressed by the GRSP questionnaire, the team created a series of original survey questions. To measure the effect of driver education on seat belt use, the survey will ask participants their age and the extent of driver education they received. The survey will also ask if the participants have been exposed to advertising about seat belt use. After collecting this data, the team will look for correlations between seat belt use versus driver education level and exposure to advertisements. Since this survey only targets college students, the participants will also indicate whether their parents or guardians wear seat belts. This data will shed light on the effect of parent's seat belt habits on their children, as well as indicate any progress made by recent driver education of young drivers in Namibia.

The portion of the survey focusing on driver education is the main reason to include respondents from both the United States and Namibia. The benefit of this stratified sample is to eliminate preconceived notions the team may have regarding seat belt use and driver education based on their experiences in the United States. The frequency of driver's licenses and driver education program participation may differ among students in the two countries, and the circumstances in which a Namibian student tends to wear a seat belt may not match the tendencies of an American student. After analyzing and understanding these differences, the team will design educational measures.

3.5 Educate the Public

To reach our target audience through an educational campaign, it is important to investigate what factors will increase the efficacy of our message. In order to accomplish this investigation, the team began by researching the techniques behind a successful public education campaign.

The two main components to consider when designing a public education effort are message content and message delivery (Elder, 2004). The most effective messages incite change in the behavior of the target audience. Once the survey analysis determines the most common motivations for not wearing a seat, we can tailor our message to address those concerns. In the design of our public education campaign, our message will encourage members of the community in Windhoek, NUST, and Namibia, to wear their seat belts whenever they travel in a motor vehicle. The incentive behind this behavioral change is simple; seat belts and child restraints save lives.

Message delivery is an equally important part of the campaign design. Examples of successful campaigns tie their message to a strong emotional response in the viewer. Television commercials to prevent drunk driving in the United States often pair fear or sadness with driving under the influence. Eliciting a strong emotional response often leaves a lasting impression on the viewer that motivates the desired change in behavior. By assessing public opinions and

attitudes towards seat belts, child restraints, and general road safety in surveys and interviews, described in Appendices B and C, we can determine the emotional response to target with our campaign.

Another aspect of message delivery includes the method of distribution. Once in Windhoek, Namibia, the team will investigate the most effective and most common modes of information distribution throughout the community by observation and discussion with local residents and our sponsor. Some of these methods may include television, radio, billboards, and flyers. The team also plans to discuss the current topics of road safety emphasized by driver education centers. Driver education classes are one of the first opportunities for new drivers to learn the best road safety practices. Incorporating a more effective educational campaign on seat belt and child restraint usage may be a critical step in distributing our message at the very beginning of driver training. Appendix C contains important questions to open this discussion to investigate the current driver education in Namibia.

Once the team identifies the best method of distribution, the design of the public education campaign for that source will begin. For example, if the radio is an effective source, we can design a written dialogue that effectively delivers our message. If a billboard is an advantageous method for information distribution, we will create a strong visual message for passing drivers and passengers. We plan to create a catchy slogan that emphasizes our message to buckle up in a memorable manner. This slogan may take the form of a local dialect, or parallel a common saying in the area. The campaign will then address the most common reasons for non-compliance, as determined by the surveys, and tie these motivations to a strong emotional response specifically geared towards public attitudes in Namibia. With message content and delivery designed to successfully reach and encourage change in a broad population of motor vehicle occupants in Namibia, the MVA Fund can distribute this campaign to improve road safety throughout the country.

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Appendix A: Roadside Observation Data Collection Form

Driver - Gender

- Male
- Female
- Can't Tell

Driver - Perceived Race

- White
- Black
- Other

Driver - Perceived Age

- 16-18
- 18-21
- 21-30
- 31-40
- 41-50
- 51+

Driver - Seat Belt

- Yes
- Maybe
- No

Passengers in Vehicle

- Yes
- No -> (end of survey if selected)

Passengers - How many?

- 1
- 2
- 3
- 4
- 5

Passengers - How many adults?

- 0
- 1
- 2
- 3

- 4

Passengers - How many kids?

- 0
- 1
- 2
- 3
- 4
- 5

Passengers - Adults wearing seat belts?

- 0
- 1
- 2
- 3
- 4
- 5

Passengers - Kids in car seats?

- 0
- 1
- 2
- 3
- 4
- 5

Passengers - Kids with seat belts?

- 0
- 1
- 2
- 3
- 4
- 5

Appendix B: Attitudinal Survey Questions

Hello, we are students from Worcester Polytechnic Institute working with the Motor Vehicle Accident Fund of Namibia to collect seat belt and child restraint data. Our goal is to help community members and the city of Windhoek, Namibia improve road safety and motor vehicle occupant safety. No personal information will be collected, but your responses may be included in our report published online. The study is for research purposes only; your responses will not be shared with law enforcement or any other parties. You do not have to discuss anything that you prefer not to and can stop at any time. If you have any questions or concerns later about our survey, feel free to contact nam17-mva@wpi.edu.

Please indicate your agreement with the information above.

- I agree.
- I do not agree

Age:

- 17
- 18
- 19
- 20
- 21
- 22
- 23
- Other (please specify): _____

Gender:

- Male
- Female
- Prefer not to say

Do you have a driver's license?

- Yes
- No

Did your driver education include a classroom-style program?

- Yes
- No
- I have not participated in any driver education program

Do you wear a seat belt when traveling in a vehicle?

- Always
- Usually
- Sometimes
- Rarely
- Never

If sometimes, in what cases do you wear a seat belt? (Choose all that apply):

- As a driver
- As a passenger (in the front seat)
- As a passenger (in the back seat)
- Only on short trips
- Only on long trips
- Only when there is a threat to be stopped by police
- Other (please specify): _____

If sometimes or never, please explain when or why you do not use a seat belt. (Choose all that apply):

- It is safe to sit in the back seat, I do not need to wear my seat belt there
- If no one else in the vehicle is wearing a seat belt
- When traveling only on short trips at low speeds
- Wearing a seat belt is uncomfortable
- Sometimes I travel in a vehicle that is not equipped with seat belts
- I am confident that I will not be stopped by police
- If I trust the driver's skills
- Other (please specify): _____

While driving, do you require your passengers to wear their seat belts?

- Always
- Usually
- Sometimes
- Rarely
- Never
- I do not drive

In general, do your parent(s)/guardian(s) wear a seat belt while driving?

- Yes, both of them
- Yes, one of them
- No, neither of them
- I do not know

Have you seen/heard any seat belt information/advertisements (TV, radio, billboards, etc.)?

- Yes
- No
- Not sure

We thank you for your time spent taking this survey.

Appendix C: Stakeholder Interview Questions

Driving Schools: Driving schools are one of the first educational opportunities for new drivers to learn safe road practices. To implement a successful public education campaign, we must understand what information these new drivers learn at the beginning of their training. We can investigate the topics covered in driving education programs through these questions:

- What are the main topics you cover in your lessons?
- Do you emphasize the importance of wearing a seat belt?
- Do you reference any public education campaigns in your lessons to emphasize a safety behavior?
- What methods do you think would be most effective to encourage people to wear seat belts and use child restraints?

Vehicle Occupants in Namibia & their Families (Community Members): The goal of our roadside observation study is to collect data on seat belt and child restraint usage levels by motor vehicle occupants in Namibia. With the data we collect, we can improve motor vehicle occupant safety behaviors through the design and implementation of a public education campaign. To run such a campaign successfully, we must gather information on the motivations behind seat belt and child restraint use with the following questions:

- Age?
- Gender?
- Do you have a Namibian driver's license?
- Have you completed a classroom-style driver's education program?
- When driving a car, do you wear a seat belt?
- When riding in the passenger seat, do you wear a seat belt?
- When riding in the back seat, do you wear a seat belt?
- While driving, do you require your passengers to wear their seat belts?
- In general, do your parent(s)/guardian(s) wear a seat belt while driving?
- What is your primary motivation for wearing a seat belt?
- Have you seen or heard any seat belt information/advertisements (TV, radio, billboards, etc.)?
- When travelling with children, do you require them to wear a child restraint?
- What is your primary motivation for using child restraints with child passengers?
- Have you seen or heard any child restraint information/advertisements (TV, radio, billboards, etc.)?

Hospital staff: Currently, most of the data that the MVA Fund has about seat belt use comes from police reports and hospital documents after an accident has occurred. These questions will

help the team gain more information on the efforts of the hospitals to collect information on and promote seat belt use.

- Do you record data on seat belt use among road accident victims?
- Do doctors and nursing staff encourage seat belt use to patients?
- Do you have any educational material on the importance of wearing a seat belt available to patients?

NAMPOL: NAMPOL is the national Namibian police force. They designate an entire division to traffic law enforcement. To enforce seat belt and child restraint laws better, we can investigate NAMPOL's current efforts to encourage these safety behaviors.

- In what capacity do police officers enforce seat belt laws?
- What resources could help the police force improve enforcement?
- Given the nature of drivers in Namibia, what methods do you feel would be effective in increasing seat belt use?

Road Safety Organizations (Global Road Safety Partnership, National Road Safety Council, Roads Authority, Automobile Association): Organizations that promote road safety, such as the GRSP, NRSC, RA, and AA, can all provide useful information on current efforts to increase road safety.

- What is the nature of your relationship with the MVA Fund?
- Has your organization ever collected data on motor vehicle occupant seat belt or child restraint usage? If so, is that data available to us for reference? What aspects of this data collection were successful? What aspects need improvement?
- Given the nature of drivers in Namibia, what methods do you feel would be effective in increasing seat belt use?
- Has your organization ever launched a public education campaign to encourage motor vehicle occupant seat belt or child restraint usage? Were you able to quantify the impact of this campaign? What were the results? What aspects of this campaign were successful? What aspects need improvement?