CHAPTER ONE

INTRODUCTION

1.1 Background

Road transportation provides obvious benefits to countries and individuals. It facilitates the movement of goods and people, creating employment, supporting economic growth, enhancing access to education and health care, and connecting people to families and entertainment.

The association between roads and human development is well-established. Data from low income countries consistently demonstrate that communities living furthest from roads experience higher levels of poverty, lower levels of school attendance and worse health outcome. But the benefits come with costs that have been widely overlooked (Watkins and Sridhar, 2009).

In Ghana, Road Transport accounts for 96-98% of over all national delivery of people and goods (MRT, 2002; as referenced by Salifu, 2008). The medium term programme of the Ministry of Roads and Transport does not envisage any substantial realignment of the overall transport modal mix (Salifu, 2008). Thus, road transport remains the backbone of the national economy. As a result, the performance of the transport system is of crucial importance for individual mobility, commerce and for the welfare and economic growth of the nation.

The road transport sector is however bedeviled with considerable safety problems which need to be addressed. Road traffic injuries are a major public health problem and a leading cause of death and injury around the world. Approximately 1.2 million people are killed each year in road crashes worldwide, with up to 50 million more injured. Over 95% of these deaths and injuries occur in the low- and middle-income countries of Africa, Asia, Latin America, the Caribbean and Eastern Europe of which Ghana is included .The cost to countries, many of which already struggle with economic development, may be as much as 1–2% of their gross national product (Peden et al., 2004).

The undesirably high levels of road traffic fatalities in low-and middle income countries may be partly attributed to the fact that, in low-income and middle-income countries, buses, minibuses and trucks are used for transporting passengers. These motor vehicles are frequently involved in crashes and often do not meet the standards of crashworthiness demanded in high-income countries. Typically, these passengers are not provided with seat-belts (Barss et al., 1998; Peden et al, 2004).

Several studies have documented the benefits of seat belt use, and have corroborated that seat belts are the most widespread and the single most effective feature in a vehicle that reduces the number and severity of injuries, and the number of deaths to the vehicle occupants that result from road traffic crashes (Cunill et al, 2004). It is also widely recognised that seat belts save lives (DGT, 1997; Huguenin, 1988; Letho and James, 1997; Li et al, 1999; as referenced by Cunill et al, 2004). Further more, in the event of a crash, a correctly used seat belt reduces the chance of death by 50% and has also been shown to reduce injuries in both high and low-speed crashes (DGT, 1999; as referenced by Cunill et al, 2004).

Quantitatively, it has been established that road accidents cost all developing and emerging countries combined approximately US$85 billion per annum (with about 40 per cent of economic costs being injury related). Thus with a saving of 15 percent of those killed and injured by greater use of seat belts, about US$5 billion could be saved each year (FIA Foundation, 2004).

Death as a result of ejection of unrestrained occupants from the vehicle is the major cause of fatalities in motor-vehicle crashes. Crash records indicate that in Ghana over 1600 persons are killed annually in road traffic crashes and that more than 40 percent of the road traffic fatalities are occupants of cars, buses and trucks (National Road Safety Commission, 2010). Most of these occupants would have not died if they had been wearing seat belts. This is because research has shown that, vehicle occupants who do not wear seat belts are likely to be injured or killed in a crash than seat belt wearers (Dee, 1998; Reinfurt et al, 1996; Stewart, 1993).

Road Traffic Crashes cost the nation 1.6% of GDP (i.e. US$ 165 Million). Cost associated with deaths, serious and slight injuries make up 91% of the total cost (BRRI, 2006).

The use of seat belts in Ghana has been legally compulsory on all roads and for all passengers since 2004 (Act 683, 2004). Despite these seat belt laws, and the relentless efforts of the National Road Safety Commission (NRSC) to increase compliance level or wearing rates, anecdotal evidence suggests that restraint use by vehicle occupants is extremely low. This is worrying, especially with the present spate of accidents on our roads and its attendant carnage. Nonetheless, there is a need to verify the veracity of this assertion by methodically determining the level of seat belt use among vehicle occupants as well as the attitudes of vehicle occupants towards the use of seat belts. The results of this study would be of great value in developing strategies to increase the rate of seat belt usage in motor-vehicles. In particular, the findings would help to make decisions regarding education and enforcement campaigns.

Seat belts, of course, do not prevent an accident taking place. They do, however, play a crucial role in reducing the severity of injury to vehicle occupants involved in an accident (FIA Foundation, 2004). Thus, the wearing of seat belts could prevent most of these deaths and serious injuries associated with road traffic crashes.

1.2 Problem Statement

Ever since seat-belt law (Act 683, 2004) was introduced in the country, lots of efforts (i.e. by the National Road Safety Commission and other stake holders) have been directed at ensuring that all vehicle occupants belt-up. In spite of these efforts over 1600 persons are killed annually in road traffic crashes in Ghana and that more than 40 percent of the road traffic fatalities are occupants of cars, buses and trucks (National Road Safety Commission, 2010). This trend in road traffic fatalities is unquestionably unacceptable.

With the present spate of accidents on our roads and its attendant carnage, it is essential to know the effectiveness of enforcement efforts and public education and information programs, since

the seat belt is the single most effective feature in a vehicle that reduces the severity of injuries to vehicle occupants that result from traffic crashes.

1.3 Objectives

The main objectives of this work among other things were:

i. To determine the extent of seat belt use in the Kumasi Metropolitan Area,
ii. To ascertain reasons for non-compliance
iii. To determine risk perception in relation to seat belt use
iv. To ascertain perception of seat belt law enforcement.

1.4.1 Justification

Findings of this study have important practical implications for seat belt use interventions. Among others, the findings will help the various stake holders (i.e. NRSC, DVLA, Police service, et cetera) develop more effective and successful belt use interventions and also enable them to embark on data-led vehicle occupant safety campaigns.

CHAPTER TWO

LITERATURE REVIEW

2.1 Road traffic death and injury as a worldwide public health problem

2.1.1 Worldwide trends in road traffic death and injury

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In today's society, travelling by car is a common and a necessary activity (Montoro, 1997; as cited by Cunill et al, 2004). The benefits of motor vehicles are well known and include: rapid movement of people and merchandise, convenience, relatively low cost, etc. However, motor vehicle use also has a number of undesirable consequences, such as pollution, noise and traffic accidents (Munoz, 1995; as cited by Cunill et al, 2004). Traffic accidents are one of the main public health problems facing modern society (Parada et al, 2001; Cunill et al, 2004).

Road traffic injuries are a major public health challenge and a leading cause of death and injury around the world. Of all the systems with which people have to deal every day, road traffic systems are the most complex and the most dangerous. Approximately 1.2 million people are killed each year in road crashes worldwide, with up to 50 million more injured. Over 95% of these deaths and injuries occur in the low- and middle-income countries. Projections indicate that these figures will increase by about 65% over the next 20 years unless there is new commitment to prevention. Every month a silent tsunami wave of road traffic crashes sweeps away 100,000 lives (Peden et al, 2004). Most of these deaths and injuries are preventable.

2.1.2 A public health concern

Available data suggest that approximately 1.2 million people die annually and with up to 50 million people more injured in road traffic crashes world wide. This costs the global community about US$518 billion (Peden et al, 2004). Projections show that, between 2000 and 2020 road traffic deaths will increase substantially in low-income and middle-income countries (Peden et

al, 2004). This underscores the fact that road traffic death and injuries are a major public-health burden, especially in low and middle income countries. Without appropriate action, by 2020, road traffic injuries are predicted to be the third leading contributor to the global burden of disease and injury (Murray and Lopez, 1996).

The use of seat-belts could prevent many of these deaths and serious injuries that occur among four-wheeled vehicle occupants.

2.1.3 Types of injuries sustained by vehicle occupants

There are three "collisions" that occur in every crash where occupants are unrestrained. The first collision involves the vehicle and another object, e.g. another vehicle(s), a stationary object (tree, signpost, ditch) or a human or animal. The second collision occurs between the unbelted occupant and the vehicle interior, e.g. the driver hits his chest on the steering wheel or his head on the window. Finally, the third collision occurs when the internal organs of the body hit against the chest wall or the skeletal structure. It is the second collision that is most responsible for injuries, and can be reduced significantly by the use of seat-belts and child restraints (FIA Foundation, 2009).

The most frequent and most serious injuries occurring in frontal impacts to occupants unrestrained by seat-belts are to the head, followed in importance by the chest and then the abdomen. Among disabling injuries, those to the leg and neck occur most frequently (Mackay, 1997; Hobbs, 2001).

2.1.4 The social and economic costs of road traffic injuries

Although of paramount concern, there is more than just the human suffering associated with non-use of seat-belts. The financial burden of increased death and injury severity can have a major impact on the finances of the government and local communities who are paying for the resources that are required to deal with road crash victims and their families in the aftermath of a crash.

Everyone killed, injured or disabled by a road traffic crash has a network of others, including family and friends, who are deeply affected. Globally, millions of people are coping with the death or disability of family members from road traffic injury. It would be impossible to attach a value to each case of human sacrifice and suffering, add up the values and produce a figure that captures the global social cost of road crashes and injuries (Peden et al., 2004).

The economic cost of road crashes and injuries is estimated to be 1% of gross national product (GNP) in low-income countries, 1.5% in middle-income countries and 2% in high-income countries. The global cost is estimated to be US$ 518 billion per year. Low-income and middle-income countries account for US$ 65 billion, more than they receive in development assistance (Jacobs et al, 2000; Peden et al, 2004). Thus road traffic deaths and injuries (RTIs) impose a huge economic burden on developing economies. These estimates take account only of the direct economic costs – mainly lost productivity – rather than the full social costs often recognized by industrialised countries. There is also the direct impact on health services, with road traffic victims accounting for almost half the hospital bed occupancy in surgical wards in some low income and middle income countries (Commission for Global Road Safety, 2004).

Road traffic injuries place a heavy burden, not only on global and national economies but also household finances. Many families are driven deeply into poverty by the loss of breadwinners and the added burden of caring for members disabled by road traffic injuries (Peden et al., 2004).

Studies show that motor vehicle crashes have a disproportionate impact on the poor and vulnerable in society (Nantulya and Reich, 2003; Laflamme and Diderichsen, 2000; Peden et al, 2004). Poorer people comprise the majority of casualties and lack ongoing support in the event of long-term injury. They also have limited access to post-crash emergency care (Mock et al, 1997; as cited by Peden et al, 2004).

In addition, in many developing countries, the costs of prolonged medical care, the loss of the family bread winner, the cost of a funeral, and the loss of income due to disability can push families into poverty (Hijar et al, 2003; Peden et al. 2004).

2.2 How Seat belts Prevent or Minimize Injury

2.2.1 What Happens During a Road Traffic Crash

When a road traffic crash occurs, a car occupant without a seat-belt will continue to move at the same speed at which the vehicle was travelling before the collision and will be catapulted or propelled forward into the structure of the vehicle. This is as a result of the objects resistance (inertia) in changing its speed and direction of travel. The unbelted occupant is most likely to be propelled into the steering wheel if s/he is driving or into the back of the front seats if they are rear seat passengers. Alternatively, they can be ejected from the vehicle completely. Being ejected from a vehicle drastically increases the probability of sustaining severe serious personal injury or being killed (Elvik and Vaa, 2000).

2.2.2 How Seat belts Work

Vehicle safety features are distinguished by two categories; 'Primary Safety' and 'Secondary Safety'. Primary safety features aim to prevent an accident taking place, e.g. good brakes, tyres. Secondary safety features aim to prevent or minimise injury to a vehicle occupant once the accident has occurred, e.g. side impact protection systems, airbags (FIA Foundation, 2004).
Seat belts are a secondary safety device and are primarily designed to prevent or minimise injury to a vehicle occupant when a crash has occurred. Seat belts as secondary safety devices are thus designed for the following primary objectives:

i. Preventing ejection from the vehicle in an impact;
ii. Reducing the risk of contact with the interior of the vehicle or reduce the severity of injuries if this occurs;
iii. Preventing injury to other occupants (for example in a frontal crash, unbelted rear-seated passengers can be catapulted forward and hit other occupants);
iv. Providing a distributed force of a crash over the strongest parts of the wearer, to give the necessary support in an accident, restraining the vehicle occupant before guiding them back into their seat;

A belted occupant will be kept in their seat and thus will reduce speed at the same rate as the car, so that the mechanical energy to which the body is exposed will be greatly reduced (FIA Foundation 2004, 2009).

2.3 Recommended Types of Seat belts

2.3.1 Three-point lap and diagonal seat belt

Rated highly for effectiveness and ease of use, the three-point lap and diagonal seat-belt is the most commonly used in cars, vans, minibuses and trucks and in the driver's seat of buses and coaches. A typical lay layout of a three- point lap is shown in Figure2. 1. The seat belt tongue clips into the buckle, which in the front seats of cars is usually placed on the end of a stiff stalk or directly attached to the seat. A retractor device is included as part of the belt system as this ensures unnecessary slack is taken up automatically. This system allows the occupant to connect the tongue and buckle using one hand, preventing ejection after maintaining the seating position of the occupant (FIA Foundation, 2009).

Figure2. 1: Three-point lap and diagonal seat belt

2.3.2 Two-point lap belt

The two-point lap belt (sometimes called a "single lap belt") is most commonly used in buses and coaches.

A two-point lap belt using a retractor device is inferior to the three-point lap and diagonal seat-belt described above but can be sufficient to maintain the seating position of the occupant, particularly in coaches or buses.

Crash studies have shown that although the lap belt does fulfils the task of reducing ejection, it fails to prevent the occupant's head and upper body moving forward and hitting the vehicle interior. For the driver, this could result in serious head injuries from contact with the steering wheel. However, because of the size and mass of coaches, the severity of injury when involved in a collision with another vehicle is often minor compared to that other vehicle if it is a car or van (FIA Foundation, 2009). Figure 2.2 shows a typical layout of a two point lap belt.

Figure 2.2: Two point lap belt

2.3.3 Single diagonal belt

The single diagonal design does provide better restraint for the upper body of the wearer than the two-point lap belt, but has been shown to be poorer at preventing ejection and submarining (FIA Foundation, 2009). Figure 2.3 shows a typical layout of a single diagonal belt.

Figure 2.3: Single-diagonal belt

2.3.4 Full harness

The full harness is made of a double shoulder, lap and thigh straps with central buckle devices. Thus, the full harness gives very good protection both from ejection and from interior contact. However, it is somewhat cumbersome to put on, and cannot be easily operated with one hand. This is an important factor in achieving a high wearing rate, and thus the harness only tends to be installed in vehicles used for motor sport, where drivers and co-drivers perceive high risk (FIA Foundation, 2009). A typical full harness seat belt is shown in Figure 2.4.

Figure 2.4: Full harness

2.4 Effectiveness of Seat belts

2.4.1 Effectiveness of Seat belts in preventing death and reducing injury

Since the 1960s after the introduction of seat belts as optional safety features in new cars, extensive researches carried out the world over have shown conclusively that really seat belts

when worn and fitted correctly reduce injury severities, reduce fatalities and reduce risk. This literally has led to a significant reduction in economic losses and lost productivity in the high income countries, where seat belt wearing rates are high.

Several studies have shown that, seat belts save lives and significantly decrease motorists' injury severity in crashes (Kim et al, 2009; Elvik and Vaa, 2004). In particular, it is estimated that three-point seat belts reduce the likelihood of driver fatality in a crash by 45 percent and reduce the likelihood of moderate to serious injury by 60 percent. (NHTSA, 2001)

According to Cummings et al. (2002) and the European Transport Safety council (1996), the use of seat belts by drivers and front-seat passenger can reduce the risk of all injuries by 40-50%; of serious injuries by 43-65%; and of fatal injuries by 40-60%. Elvik and Vaa (2004) also found out that seat belts can reduce the probability of rear seat passengers being killed by 25%.

Evidence suggest that seat belts are highly effective in frontal crashes and in run-off-the-road crashes, which are the most common kind of crashes and often result in serious head injury and the probability of being ejected is high if seat belts are not worn (Evans, 1996; Mackay, 1997). However, their effectiveness for people in front seats is reduced if passengers in rear seats are not also wearing seat-belts (Peden et al., 2004). This is because according to Broughton (2003), an unrestrained rear seat passenger poses a serious threat to any restrained person seated directly ahead of them.

Krull et al (2000) used data on single–vehicle crashes to reveal that restraint use has the largest marginal effect on the probability of severe injury for single–vehicle crashes. It was estimated that, restraint use decreases the chance of a severe injury by 15.6%.

Tourin and Garrett (1960) conducted a major study comparing 9,717 road crash victims (933 belt wearers and 8784 non-belt wearers). They concluded that ‘users of safety belts sustained approximately 35 per cent less ‘major-fatal’ grade injuries than did non-users’.

Evidence suggested that, use of seat belts would reduce the risk of fatal motor–vehicle crash injuries to front–seat occupants by 45% and the risk of moderate–to–critical injuries by 50% (Lee and Schofer, 2003). Blincoe et al (2002) also showed that the chance of surviving a potential fatal crash can increase by 45% to 73% depending on the type of vehicle and seating position if seat belts were used.

Steptoe et al (2002) illustrated seat belt usage as one of the most effective means of reducing injury in motor–vehicle crashes. Larsen (2004) analyzed details of crashes for different types of crashes (e.g., head–on collisions, crashes with left–turning vehicles, truck crashes, and single–vehicle crashes) and concluded that for all these types of crashes, seat belt usage by drivers/occupants proved to be a critical factor in the severity of injuries from these crashes. Bendak (2005) also corroborated that the probability of certain types of injuries decreases considerably with increases in seat belt usage rates.

Evans (1987) shed light on the fact that, unbelted driver involvement rates in fatal crashes were 28% to 86% higher than those for belted drivers for seven types of traffic accidents/crashes. Additionally, McCartt and Northrup (2004), Koushki, Ali et al (1996), and Laflamme et al (2005) demonstrated that the probabilities of injury or fatal crashes are higher when the drivers and/or passengers do not wear seat belts.

Hitosugi and Takatsu (2000) illustrated from forensic autopsies of 50 persons who had died in motor–vehicle crashes that seat belt usage significantly decreased the severity of drivers' chest and abdominal injuries.

The American College of Emergency Physicians (ACEP, 2002a) suggest that seat belts are the most effective means of reducing deaths and serious injuries in traffic accidents. They also calculate that 75% of all vehicle occupants ejected from a vehicle in an accident die as a result. Thus, seat belts provide the greatest protection against ejection in a crash.

Air bags have been estimated to reduce driver and front passenger deaths by 8–14% in all types of crashes (Cummings et al., 2002; Ferguson et al, 1995; NHTSA, 2001) and by 22–29% in

frontal crashes (Cummings et al., 2002; Ferguson et al, 1995; NHTSA, 2001; Crandall et al, 2001). The combination of seat-belts plus air bags has reduced driver and front passenger deaths by an estimated 68% (Cummings et al., 2002).The American College of Emergency physicians (2002b) have also confirmed that nearly all the people who have died from air bag related injuries in the United States, were either unrestrained or improperly restrained.

Blincoe, et al. (2002) found that, 'the simple act of buckling a safety belt can improve an occupant's chance of surviving a potentially fatal crash by 45 to 73 per cent'.

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2.4.2 Cost Savings through Seat belt use

It is a truism that there are economic losses and lost productivity as a result of fatalities and injuries involving unrestrained occupants (Nambisan and Vasudevan, 2007). It has also been established that there are always economic gains and increase in productivity when there is a significant reduction in road traffic fatalities and injuries through seat belt use.

Mandatory seat-belt use has been one of the greatest success stories of road injury prevention and cost savings in high-income countries. For example between 1975 and 2000, the United States saved US$588 billion in casualty costs due to seat belt use. (Blincoe et al, 2002).

This shows that, the simple act of buckling up a seat belt could go a long way to help low- and-middle income countries make some savings to aid in developmental projects if policy and decision makers will be willing.

2.4.3 Seat belt wearing rates

Rates of seat belt use vary significantly from country to country. This is primarily governed by the existence of laws requiring seat belt to be fitted in vehicles and cars and laws requiring them

to be worn. Rates are also dependant on the extent to which these laws are enforced (Peden et al, 2004).

In many low-income countries there is no requirement for belts to be fitted or used, and rates of use are therefore correspondingly low (FIA Foundation, 2009). For example, a survey in Kenya (Nantulya and Muli-Musiime, 2001, as referenced by Peden et al., 2004) found that only 1% of car occupants injured in crashes were wearing seatbelts. In Argentina, a study by Silveira (2003) found that 26% of drivers and front-seat passengers used seatbelts in Buenos Aires and 58% on national highways.

Analysis by the European Transport Safety Council (2007), estimated that, wearing rates in European countries vary widely from around 70% to over 95%, and in the United States, use of seatbelts in front seats rose from 58% in 1994 to 75% in 2002 (Glassbrenner, 2002).

Finally, in the Republic of South Korea, following a national campaign of police enforcement and increased fines , rates of seatbelt use among drivers rose to 98% in 2001 (Yang and Kim, 2003).

2.5 Raising Compliance

2.5.1 Publicity and Education (Public education and information)

Public education and information have proven to be effective tools in improving knowledge about the rules of the road and increasing compliance. They can create a climate of concern about road safety and increase public acceptance of effective interventions (Peden et al, 2004). A Jordanian awareness raising campaign chose to blanket the whole country through television, radio, newspapers, mosques and churches. This was particularly effective, increasing wearing rates by 47% (Tarawneh et al, 2001).

In isolation, public education and information campaigns do not deliver tangible, sustained increases in compliance level among vehicle occupants and hence no sustained reductions in

road traffic deaths and serious injuries (Trinca, 1998; Duperrex et al, 2002; Zuza et al, 2001; O'Neil et al, 2002; Ker et al, 2003). Publicity campaigns in the UK between 1970 and 1982, for example, raised seat belt wearing rates to 40%, a significant increase on pre-publicity rates (Broughton, 1990). But it took the introduction of seat belt legislation (in 1983) combined with enforcement of the law by the police and supporting publicity and education campaigns to raise compliance to the current rate of 91%.

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2.5.2 Legislation

The installation of seat-belts is arguably one of the most important safety measures with the potential to facilitate reductions in occupant injuries, in high-income and low income countries alike. This can be achieved if there is legislation.

Most high-income countries require cars and light trucks to have seat-belts that meet certain technical standards and, increasingly, to have audible alarms to remind drivers and passengers to use them (Peden et al, 2004). Thus the high wearing rates of seat belt in these countries.

Sadly, in low-income and middle-income countries, motor- vehicles such as buses, minibuses and trucks-that are frequently used for transporting passengers, typically do not provide passengers with seat belts (Barss et al, 1998). Also, anecdotal evidence suggests that half or more of the motor vehicles in low-income and middle-income countries may lack functioning seat-belts (Forjuoh, 2003).

The overall objective of a law is to make seat-belt use universal. Hence, in low -and middle income countries, this can be achieved by targeted and appropriate legislation on seat-belt fitting and wearing that is consistently enforced and well understood by the public. All three components are needed for success but clearly the first task is to develop and implement appropriate legislation.

Thus for legislation to be effective, it should be preceded by publicity campaigns. Publicity campaigns create an environment whereby the benefits of seat belt use are known and accepted by vehicle occupants. Publicity campaigns also help to increase seat belt rates prior to seat belt legislation.

A review of the impact of legislation in the United Kingdom by Mackay (1985) showed a stable wearing rate of around 30% before the introduction of legislation. Within the first year of legislation and enforcement, wearing rates had risen to 90%.

Reinfurt, et al. (1988) calculated that seat belt wearing, as a result of legislation has reduced the percentage of fatalities by 6-21% in Australia, 10-12% in Sweden, 15-21% in the United Kingdom, 7-10% in the United States, and 25-30% in Germany.

Experience has also shown that, the introduction of legislation alone is not enough to increase compliance. However, a combination of legislation and enforcement will achieve the desired goal. For example, in Argentina (in July 1992) seat-belt use became a legal requirement in both front and rear seats and usage rose to 32% without any enforcement. The impact of the legislation was short lived due to the complete absence of enforcement. By July 1995 only 13% of drivers and 11% of front seat passengers were wearing seatbelts. A new law and campaign raised rates again to 32% for drivers and 30% for front seat passengers in April 1996, but again without enforcement rates declined to well below 20% (Silveira, 2005).

Primary seat belt legislation has proven to be effective in raising wearing rates as oppose to the Secondary one. This might primarily due to the fact that, Primary legislation allows the enforcement officers to stop and prosecute a driver/vehicle at any time if they believe that the driver and/or its passengers are not properly restrained. However with Secondary legislation, the enforcement officers can only prosecute for this offence, if the driver of a vehicle has been stopped for primary road traffic offence, (such as failure to stop at red traffic lights). Thus, the Police cannot stop and prosecute the occupants of a vehicle if no primary offence has been committed.

Evans and Graham (1991) stated that 'average increases in belt use are greater in states with primary as opposed to secondary enforcement laws'. On this evaluation, states or countries wishing to increase seat belt use will find it more effective to introduce primary legislation.

From the above to ensure compliance especially in low-and middle countries, there should be a legislation that will ensure a combined action of, seat belt installation in all vehicles and mandatory use of seat belts by all vehicle occupants when en route.

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2.5.3 Enforcement

Publicity, education and incentive campaigns have all been proven to raise seat belt wearing rates to a point. However, the most effective tool for increasing compliance is enforcement. Campaigns that have been supported by enforcement have tended to achieve the most significant increases in wearing rates.

It is essential that, prior to the commencement of enforcement campaign, government and other agencies particularly, the transportation, health and police departments, take the lead and make seat belt use compulsory for their own staff and they should be seen to wear them at all times. Also motorists and the general public should be informed in plenty of time about new laws, changes in enforcement and the penalties for non-compliance through appropriate media.

It has been proven that, a combination of enforcement and fines or penalties for non-compliant vehicle occupants are effective tools for increasing wearing rates. In Hungary for example, seat belt wearing legislation was introduced in 1976 for front seat vehicle occupants and rear seat passengers travelling in urban areas since 1993(CDC, 1993). Non-compliant drivers were subject to fines and potential suspension of driving privileges which helped to bring about a 61% compliance rate by the mid 1990s. Also following a national campaign of police enforcement and increased fines in the Republic of Korea, rates of seatbelt use among drivers rose to 98% in 2001 (Yang and Kim, 2003).

Obviously the penalty for non-compliance must be perceived as sufficiently serious to deter would-be law-breakers. The penalties should be set in line with penalties for other traffic law violations and they can be linked to a penalty points system that leads to more serious penalties, such as the cancellation of the driving licence when accumulated points pass predetermined limits. Similarly the law could specify a more serious penalty for repeat offenders. In general it is simpler to specify a fixed fine for non-compliance with wearing laws to make sure that the enforcement and administration procedures are straightforward. In France, increased enforcement led to the number of fines for non-use of seat-belts rising by 15% from 2002 to 2003, and in July 2003 there was also an increase from one to three penalty points added to a driver's licence for not wearing a seat-belt. As a result of these measures, the use of seat-belts by front seat occupants went up to 90% in urban areas and to 97% outside urban areas. Wearing rates continued to rise and by 2006 the urban rate was 94%, and outside urban areas 98% of front seat occupants were wearing seat-belts (ETSC, 2006).

Enforcement must be intelligence led if it is to gain credibility. Detailed performance indicators should highlight specific demographic groups where non-compliance is high. Casualty statistics will also provide information that identifies those groups or occupants most at risk of injury.
Road traffic accidents were the leading cause of death for people between 1 and 44 years of age in Spain (CDC, 1995). Spain introduced seat belt wearing law for front seat passengers travelling 'outside city limits' in 1975. In 1992, this was expanded to include all front seat passengers travelling within city limits, and also rear seat passengers travelling in vehicles with 'manufacturer-installed safety belts'. A sustained enforcement campaign achieved an increase in wearing rates from 25% to 86% in 2002.

Experience has shown that selective traffic enforcement programmes also work best to increase compliance with seat-belt laws. These involve well-publicized, highly visible and intensive enforcement over particular periods, several times per year (Jonah and Grant, 1985; Solomon et al, 2002). In provinces in France and the Netherlands, compliance with seat-belt laws increased by about 10–15% within one year of implementing such a programme (Hagenzieker, 1997). In Saskatchewan, Canada, 72% of drivers and 67% of passengers complied with seat-belt laws in

1987. Implementation of a selective traffic enforcement programme had produced 90% compliance by 1993 (Dussault, 1990; Koch et al, 1995).

2.5.4. Incentives

Another effective approach for increasing compliance involves incentives, in which people found wearing seat-belts are eligible for prizes in much the same way they might be in a lottery (Hagenzieker, 1997; Morrison et al, 2003).

As with all campaigns, the greatest results are achieved through a co-ordination of combined countermeasures. A study by Mortimer, et al. (1990) in the United States concluded that although there were significant increases in wearing rates using incentives alone, 'maximum increase in safety belt use occurred with a program that combined both incentive and enforcement strategies'.

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CHAPTER THREE

METHODOLOGY

3.1 Introduction

With huge capital invested in safety belt campaigns, the best way to measure compliance with a safety belt law is to conduct a direct observation survey of motor vehicle occupants. This method yields much more accurate belt use information, hence provides a less biased source of belt use information, than other types of surveys, such as ones that simply ask drivers to report how frequently they use a safety belt or police-reported seat belt use on traffic crash (Eby and Streff, 1994, 1999; Eby et al., 2001; Streff and Wagenaar, 1989; O'Day, 1993; Stewart, 1993; Reinfurt et al, 1996; Li et al, 1999).

Though, road side direct observation survey of motor vehicle occupants provide unbiased information, it conceals more complicated patterns of behaviour, attitudes and motivations with respect to seat belts (Christmas et al, 2008).

In view of this, attitudinal survey was also conducted through questionnaire administration. Attitudinal survey was also necessary because, studies have shown that it supports the observational survey in a number of ways and also enables the collection of more detailed background information than could be gathered through observational surveys (Kim and Yamashita, 2007).

3.2 The Study area: The Kumasi Metropolitan Area

The research was undertaken in the Kumasi Metropolitan Area (KMA) in the Ashanti region of Ghana. Ashanti region is one of the ten regions in Ghana. The region is located in the central part of Ghana, bounded to the north by the Brong-Ahafo Region, to the east by the Eastern region and to the south by the Western and Central regions, with Kumasi as its capital. It has a land area of 24,395 square kilometers with a population of 3,612,950 inhabitants (Dickson and Benneh, 2004; Ghana Statistical Services, 2002). The geographic location of the region and particularly

Kumasi, its regional capital as a nodal city, like all nodal cities in developing countries, has made it prosperous in trade, cash crop production, commerce and education. The region is also well served with trunk roads which connect Kumasi to Accra, Tema and Takoradi in the south, Yeji, Tamale and Wa in the North, and Bibiani and Sunyani in the west (Afukaar and Agyemang, 2006). Figure 3.1 gives a vivid description of the location of Kumasi with respect to the abutting regions in Ghana.

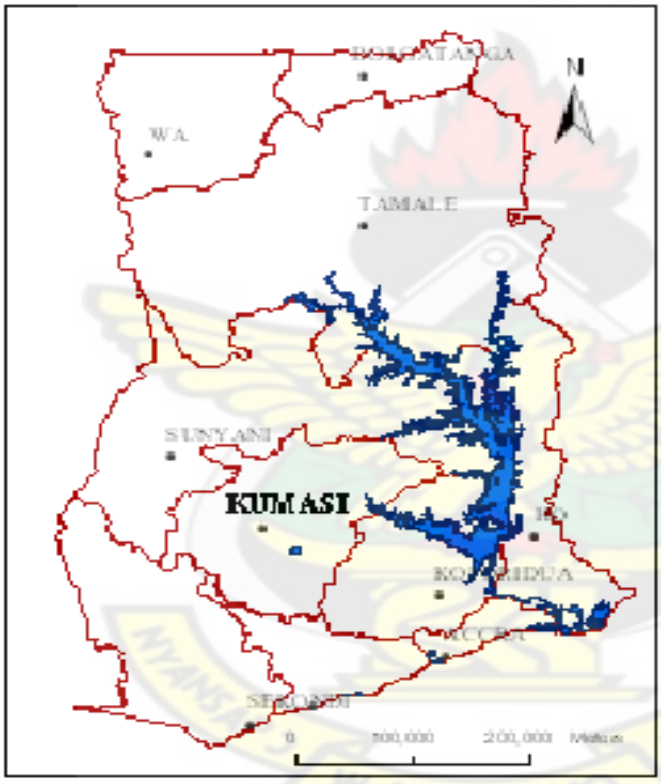

Figure 3.1: Map of Ghana showing Kumasi

The Ashanti region is among five regions in the country (Eastern, Greater Accra, Central and Western) that have consistently experienced road traffic crashes in recent times and account for 80% of all the national road traffic fatalities (National Road Safety Commission, 2010). The Kumasi Metropolitan Area (KMA) in the Ashanti region has not been spared of the horrid effects

of road traffic crashes and hence its choice as the study area. For instance, from 2008-2009, out of 18 districts which constitute the Ashanti region, KMA alone accounted for 22.6% of the 188 fatalities that occurred through road traffic crashes. This was followed in order by the Offinso District Area and the Atwima District Area with 16.2% and 13.8% fatalities respectively (Road Traffic Crashes in Ghana, Statistics 2010. CSIR-BRRI, Appendix E)

Available data also indicate that the fatalities recorded in the KMA, a considerable number are vehicle occupants. For example in 2009, out of a total of 102 fatalities, 22.6% are vehicle occupants. Among these deaths, 9.8% are car occupants; 3.9%, Goods vehicle occupants; 6.9% Bus/Minibus occupants and 2.0% occupants of pick-up (Table 3.1).

Table 3.1: **Class of People Killed or Injured in Road Accidents in 2009 (KMA)**

Road User Class	Casualty severity						Total
	Fatal	%Fatal	Serious	%Serious	Slight	%Slight	
Pedestrian	72	70.6%	130	52.2%	131	27.2%	333
Car	10	9.8%	36	14.5%	130	27.0%	176
HGV	4	3.9%	14	5.6%	24	5.0%	42
Bus/Minibus	7	6.9%	39	15.7%	152	31.6%	198
Motor Cycle	4	3.9%	25	10.0%	26	5.4%	55
Pickup	2	2.0%	2	0.8%	13	2.7%	17
Bicycle	3	2.9%	3	1.2%	5	1.0%	11
Other	0	0.0%	0	0.0%	0	0.0%	0
Total	**102**	**100.0%**	**249**	**100.0%**	**481**	**100.0%**	**832**

Source: Road Traffic Crashes in Ghana, Statistics 2010. CSIR-BRRI

Most of these vehicle occupants also experienced various degrees of injury. These results reinforce how vulnerable vehicle occupants are in the event of a road traffic crash. Additionally, the results underscore the seriousness of vehicle occupant casualty in the Kumasi Metropolitan Area.

3.2.1 Study Area Stratification

A map of the study area was obtained and stratified into three layers. The strata are made of the CBD (Central Business District), areas abutting the CBD and the last stratum is the region outskirts of town. The stratification was necessitated by the need to determine the seat belt wearing characteristics in these different strata.

3.2.2 Selection of Observation Sites

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Observational sites were the locations where occupants of target vehicles were observed to determine seat belt use. Target vehicles denote the vehicle types that are included in the survey.

A detailed map containing roads within the study area was obtained. Observation sites within each stratum were road intersections and toll booths. The majority of these intersections are equipped with traffic control devices such as traffic signals or stop signs. At these locations vehicular velocities are substantially low and thus allow for sufficient time for more detailed target vehicle, driver and occupant accurate information to be recorded, while vehicles are momentarily stopped (Seufert et al., 2008; Eby and Streff, 1994).

Eby et al (1996) have shown through detailed studies that, there is no discernible difference in the accuracy and reliability of seat belt use estimate obtained through stopped-vehicle direct observation (SVDO) compared to moving-vehicle direct observation (MVDO). Appendix A contains the observation sites.

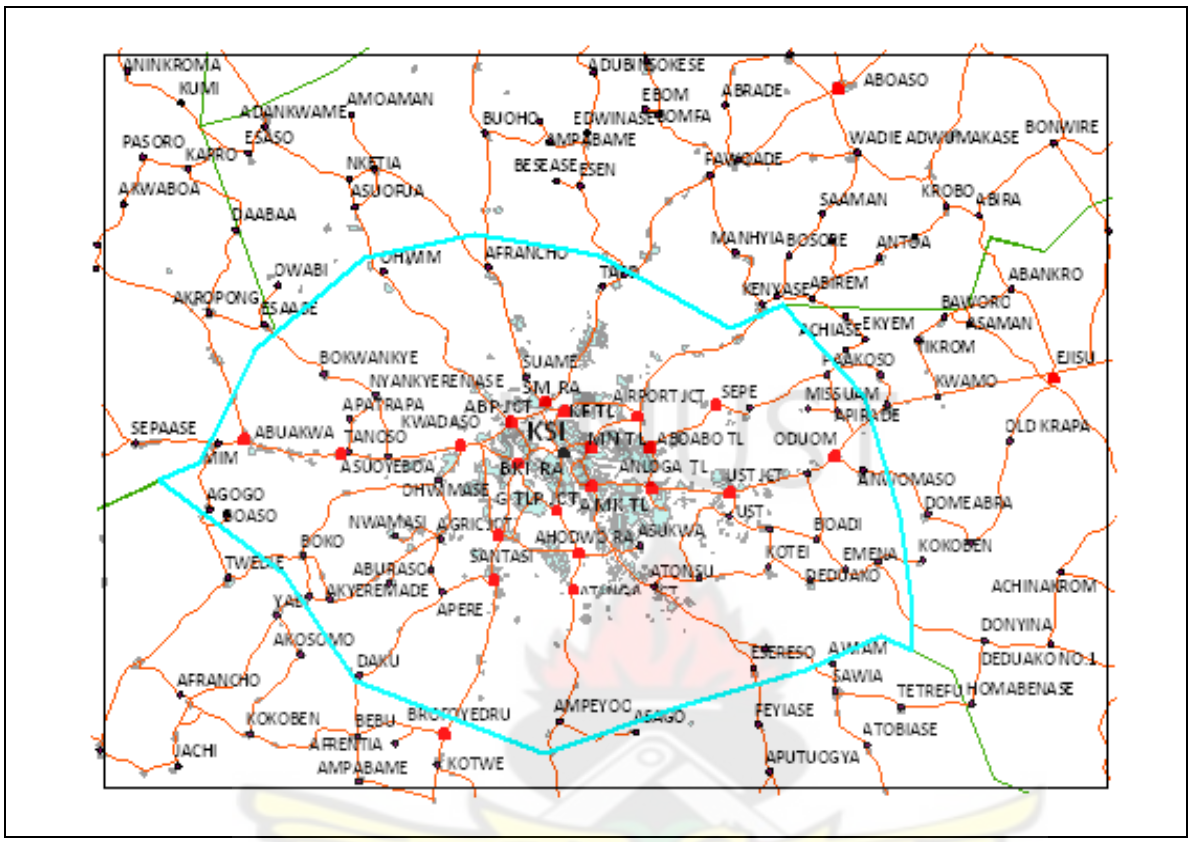

Figure3.2: A map of KMA and its environs showing data collection locations

LEGEND

▲……. Data collection locations

……..Towns

……..Roads

……KMA boundary

3.3 Data Collection

3.3.1 Observational Survey

Eligible vehicles included in the survey were taxis, minibuses, trucks, buses and private cars. For all eligible vehicles, seat belt use and demographic information were recorded for front occupants (i.e. drivers and front seat-passengers).

Observations were made in all weather conditions unless the weather obscures views into vehicles in the designated lane of traffic where observations were being carried out and during rains. Since good lighting is required to observe belt use reliably, the survey was carried out between 7:30 am and 5:30 pm. Observations were made only during the weekdays, which were from Monday to Friday. If unexpected conditions made observations difficult or impossible in the field such as, no vehicle travelling on the traffic lane observation was schedule to be undertaken or non-availability of shoulders to aid in safe observations, the site in question was then abandoned and observations made at the next closest observable site.

Data were collected at each selected observation site for 60 minutes, recording as many observations as possible during that time. Seat belts use and demographic information, both while vehicles were temporarily at rest in the designated lane at the traffic control device, and while traffic was moving through the intersection were collected. In the same vein, at roundabouts and toll booths data were gathered both while vehicles were temporarily stopped and while in motion. Safety belt use was determined by looking at whether or not the driver and, if present, the front, window seat passenger were using a shoulder belt. If they were using a shoulder belt then they were marked as "Belted." If they were not using a shoulder belt then they were marked as "Not Belted. The option "None" was selected if there was no passenger present. Passengers sitting in any position other than the front, window seat were ignored. Typical data collection procedures in the observation survey are as shown in Figures 3.3 and 3.4 (i.e. Aboaso toll booth and Bekwai roundabout). The data sheet for the observation survey is also shown in Table 3.2

Figure3.3: observation survey at Aboaso toll booth **Figure3.4: Observation survey at Bekwai roundabout**

Table 3.2: Data sheet for observation survey

SITE LOCATION							START TIME						
DATE							ENDTIME						
DAY OF THE WEEK													
VEHICLE TYPE					**DRIVER**				**FRONT WINDOW PASSENGER**				
TAXI	BUS	MINIBUS	PRIVATE CAR	TRUCK	MALE	FEM	BELTED	UN BELTED	MALE	FEM	BELTED	UN BELTED	NONE
Total No. of target vehicles													
Total No. of target vehicle occupants													
Total No. of belted target vehicle occupants													

Observations were made only for front seat occupants, but not rear seat occupants because the front seat of most vehicles on our roads are equipped with the three-point lap and diagonal seat belts which are highly conspicuous at the road side when in use. The backseats of these vehicles, (typically commercial vehicles), are however equipped with the two-point lap seat belts which are unnoticeable when in use, and hence makes observation extremely difficult.

During this 60-minute seat belt observation period, observations were made solely on a single lane of traffic, regardless of the number of traffic lanes that are present. The 60-minute survey of belt use was conducted on only target vehicles traveling in the designated traffic lane.

For each eligible vehicle observed, the following information was recorded:

i) Vehicle type (private car, minibus/minivan, taxis, truck, bus)

ii) Driver and front passenger seat belt usage (belted, unbelted)

iii) Driver and front seat passenger sex (Male, Female)

3.3.2 Attitudinal Survey

3.3.2.1 Questionnaire Design

The data used in this analysis come from a four-page questionnaire that was developed and implemented in the month April (2010). The questionnaire was designed, guided by the objectives of the study as well as the study population. Preliminary interviews were conducted to identify issues relating to restraint use. These were particularly valuable for examining people's attitudes and perceptions, and gave insight into some of the reasons behind their behaviour towards restraint use. A series of questions were then developed to ascertain basic attitudes towards seat belt use as well as background information on driver and passenger demographics. The survey instrument contained questions about the frequency of seat belt use, reasons why

vehicle occupants do not use seat belts, perception of risk and enforcement. In addition, personal details such as, gender and occupation were included.

3.3.2.2 Sample Size Determination

The sample size of the survey was obtained from the relation (Adom Asamoah, 2008)

$$n = \frac{N}{[1+N(\theta)^2]}$$

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where:

n = sample size

N = the population size

$\theta = 1-\lambda$, where λ is the confidence level

The population of Kumasi = 1,171,311 (Population Census Reports, 2000. Ghana Statistical Service).

Using a confidence level, $\lambda = 93\%$, thus $\theta = 7\%$

$$n = \frac{1,171,311}{[1+1,171,311*(0.07)^2]}$$

$$n = 204$$

3.3.2.3 Pilot Survey

The questionnaire was piloted after its design, to ensure that the data collected was meaningful. The questionnaire was piloted by means of face to face interview on chosen sample similar to the actual sample to determine its adequacy. According to Adom Asamoah (2008), the sample size for the pilot survey should not be big, normally between 1% and 10% of the sample size. In view

of this, a sample size of forty (40) was used in the pilot survey. The pilot survey aided the expunging of vague and unneeded questions and the inclusion of relevant ones.

3.3.2.4 Questionnaire Administration

The questionnaires were then administered through face to face interviews in the Kumasi Metropolis Area, over a seven day period at bus terminals (e.g. Kejetia bus terminal), taxi ranks and parking lots. A total of 203 completed questionnaires were completed and used in the analysis. A copy of the questionnaire is shown in Appendix B.

3.4 Data Analysis of Survey results

The results of both the observational and attitudinal surveys were analysed using a combination of Microsoft Excel spreadsheet and SPSS.

Upon receiving the completed questionnaires, a coding scheme was developed and each questionnaire was reviewed and coded and then entered into a computerized database using Microsoft Excel spreadsheet. A database was also created for the results of the observational survey in Microsoft Excel spreadsheet. These databases were then imported into SPSS for cleaning. The data cleaning is very important as it helps to identify inconsistencies and outliers. This was quickly done by producing frequency figures for each question or each of the columns (variables) and examining the outliers. The data set cleaning process was also supported with cross- tabulation as it has the potential of uncovering more subtle errors. Then, using SPSS, statistical analysis package, various statistical procedures and reports (i.e. frequencies, cross tabulations and charts) were generated for analysis and discussion.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1 Characteristics of observation survey

4.1.1 Vehicle classes in sample

From the roadside observation survey, a total of 7,399 vehicles, comprising 121 buses, 1,485 minibuses, 3,669 private cars, 1,803 taxis and 321 trucks were observed in the Kumasi Metropolis and its environs in the road side survey. Figure 4.1 shows the distribution of the eligible vehicles that were observed in the road side survey.

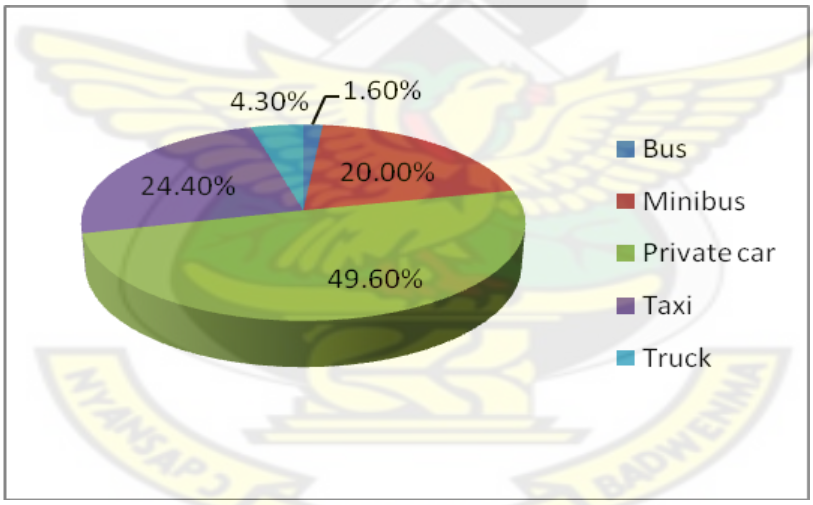

Figure 4.1: Distribution of vehicle types in sample

As a whole, there were 11,756front seat occupants, for whom seat belt wearing was clearly observed. Drivers were predominant 7,399 (62.9%) among the vehicle occupants with 4,356(37.1%) for front-right passengers. Male occupants (86.6%) were significantly higher than the female occupants (13.4%). Table 4.1 shows the detailed results.

Table 4.1 Characteristics of observation survey

Vehicle type	No. observed	Percent
Bus	121	1.6%
Minibus	1485	20.0%
Private car	3669	49.6%
Taxi	1803	24.4%
Truck	321	4.3%
Total	**7399**	**100.0%**
Driver and vehicle type		
Bus driver	121	1.6%
Minibus driver	1485	20.0%
Private car Driver	3669	49.6%
Taxi driver	1803	24.4%
Truck driver	321	4.3%
Total	**7399**	**100.0%**
Passenger and vehicle type		
Bus passenger	25	0.6%
Minibus passenger	1226	28.1%
Private passenger	1747	40.1%
Taxi passengers	1129	26.0%
Truck passengers	229	5.3%
Total	**4356**	**100.0%**

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4.1.2 Characteristics of respondents to Attitudinal survey

As regards the Attitudinal survey, respondents were 203 in number, sampled from the Kumasi Metropolis and its environs. The majority of the respondents were males (81.8%). The respondents included both drivers and passengers. However, commercial drivers were the predominant respondents (55.7%). Similarly, majority of the respondents reported to be holders of driving license. Sample characteristics of the respondents are displayed in Table 4.2

Table 4.2: Sample characteristics of Attitudinal Survey

Sex	**Frequency(N)**	**Percent (%)**
Male	166	81.8
Female	37	18.2
Occupant status		
Passenger	30	14.8
Private driver	60	29.6
Commercial driver	113	55.7

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4.2 Seat belt usage rates

4.2.1 Overall wearing rates in the Kumasi Metropolitan Area

The direct road side observation survey indicates that the overall seat belt usage rate for front seat occupants in the Kumasi Metropolitan Area was 18.6%. The wearing rates for drivers and passengers were 24.6% and 8.2% respectively, as shown in Table 4.3.

Table 4.3: Seat belt usage rate in the KMA

Occupant Group	No. observed	No. belted	Usage Rate
All occupants	11756	2181	18.6%
Drivers	7399	1822	24.6%
Front-right passengers	4356	359	8.2%

The seat belt wearing rates in the Kumasi Metropolitan Area is very low. Low compliance rates have been enormous challenge that most countries the world over are grappling with (Williams and Lund, 1986). Seat belt usage rates of drivers in the Kumasi Metropolitan Area (24.4%) compares poorly with drivers wearing rates of, 52.3% in Benin City, Nigeria (Iribhogbe and Osime, 2008). In the same vein, the wearing rates for front seat occupants in Benin City, 18.4% (Iribhogbe, 2008) is more than twice the wearing rates for front seat passengers in the KMA.

The low wearing rates in the Kumasi Metropolitan Area may due to ignorance and laxity in enforcement (Williams and Wells, 2004).

The low compliance rates in the Kumasi Metropolitan Area suggest that the current road safety programme is not having the desired effects in the metropolis, and that a more holistic approach requiring resources and concerted efforts by key actors to increase seat belt wearing rates in the metropolis. This is very essential because, countries that have achieved high seat belt usage rates have experienced significant reduction in fatalities and injuries in road traffic crashes. The corollaries of these reductions in fatalities and injuries have always been economic gains and increase productivity (Blincoe et al, 2002).

4.2.2 Relationship between Driver and Passenger Seat belt use

The observation survey revealed that, the usage rate for drivers (24.6%) as a whole was significantly higher than that of front-right passengers (8.2%) as depicted in Table 4.3

In general drivers were approximately 3 times likely to wear seat belts compared to front- right passengers. The difference in seat belt use between drivers and front–right passengers was statistically significant (p=0.008). The disparities in usage rates between drivers and passengers were also realized across the three different strata (i.e. CBD, outside CBD and outskirts of town). This is vividly depicted in Table 4.4. The seat belt use disparity between drivers and passengers rates was greatest in areas outskirts of town, with approximately 23 percent points and lowest in the Central Business District (CBD), with approximately 10 percent points. Driver and passenger usage rates were highest in areas outskirts of town. (Table 4.4)

Table 4.4: Driver and Passenger usage rates with respect to Location

Location	Occupant Group	No. observed	No. belted	Usage rate
CBD	Driver	1415	277	19.6%
	Passenger	813	78	9.6%
Outside CBD	Driver	4504	1058	23.5%
	Passenger	2589	183	7.1%
Outskirts of town	Driver	1486	487	32.9%
	Passenger	954	98	10.3%

The low usage rates among drivers may be due to the fact that, most commercial vehicle operators, especially in the CBD and outside the CBD, by virtue of the commercial intra-urban transport services they offer encounter frequent stops. These frequent stops make it inconvenient for these drivers to belt up. Kim and Yamashita (2007) realized that those who make frequent stops are less likely to belt up. Additionally, the low rates among vehicle occupants (i.e. drivers and front seat passengers) may be due to the fact that, most vehicles in these areas of the metropolis were almost approaching their termini, and hence drivers and front seat passengers in readiness to alight from their respective vehicles, get unbelted (Markey et al, 1998).

In view of these challenges, it is imperative that the Police should be step up their enforcement efforts in the metropolis to increase usage rates, since it has been established that police enforcement belt encourages belt use (Kim and Yamashita, 2007).

4.2.3 Sex of vehicle occupants and Seat belt use

Detailed information was collected on occupants' sex; overall and separate estimates were generated for male and female front seat occupants. Female occupants were observed to have higher use rate (19.8%) than their male counter parts (18.4%) as shown in Table 4.5. The difference is however marginal.

Table 4.5: Seat belt use rate as function of Gender

Occupant Group	No. observed	No. belted	Usage rates
Male occupants	10175	1868	**18.4%**
Female occupants	1581	313	**19.8%**
Male drivers	6973	1618	**23.2%**
Female drivers	426	204	**47.9%**
Male front seat passengers	2935	250	**8.5%**
Female front seat passengers	1156	109	**9.4%**

A comparison of male and female driver and passenger seat belt use rates depicted in Appendix D reveals that, regardless of location or road type, male drivers and passengers are less likely than female drivers and passengers to wear seat belts. However male and female drivers were more likely to wear seat belts than passengers. The results also indicate that female drivers were more likely to wear seat belts (47.9%) than male divers (23.2%) and the observed differences was highly statistically significant (p=0.002). Also, female front-right passengers were somewhat likely to use seat belt(9.4%) than male front-right passengers (8.5%), but the observed difference was not statistically significant (p=0.403).

This finding is in consonance with earlier studies (Presser et al., 1991; Calisir and Lehto, 2002; Kim and Yamashita, 2007; Christmas et al, 2008). The difference in usage rates between male and female drivers may due to their divergent risk perceptions. Risk perception has been observed to be a very important determinant in seat belt use, and people with higher risk perceptions are more likely use seat belt (Cunill et al, 2003). Thus, the higher usage rates, particularly of female drivers in comparison to male drivers are due their higher risk perceptions.

4.2.4 Vehicle type and Seat belt use

In the observation survey, among the five target vehicles observed, private car occupants were more likely to use seat belt compared with occupants of the other four vehicle types as shown in Table 4.6.

Table 4.6: Vehicle type and Seat belt usage rate

Occupant Group	No. observed	No. belted	Usage Rate
Bus	146	33	**22.6%**
Minibus	2711	316	**11.7%**
Private car	5416	1524	**28.1%**
Taxi	2932	235	**8.0%**
Truck	550	73	**13.3%**

Thus regardless of location, occupants of private cars had a significantly higher seat belt use rates in comparison to occupants to occupants in all other vehicle types.

Detailed analyses of the results , shown in Appendix D, reveals that private car drivers were more likely to use seat belts (33.5%) compared with taxi drivers (12.2%, $p<0.0005$), truck drivers (19.3%, $p=0.042$) and minibus drivers (19.5%, $p=0.007$). Additionally, the results show that drivers of private cars were more likely to use seat belts compared with drivers of buses. Drivers of minibuses were also observed to have lower wearing rates (19.5%) compared with drivers of buses (26.4%) and trucks (19.3%). The observed difference in seat belts use between minibus drivers and bus drivers was statistically significant ($p=0.050$), but between minibus and truck drivers the difference was not statistically significant ($p=0.524$). However, minibus drivers(19.5%) were more likely to use seat belts compared with taxi drivers (11.6%) and the observed difference was marginally statistically significant ($p=0.089$).

As regards seat belts use among front-seat passengers, passengers of private cars (16.8%) were more likely to use seat belts more than passengers of taxis (2.3%, $p=0.006$) and passengers of minibus (2.2%, $p=0.007$). In the same vein, patrons (i.e. passengers) of buses have a lower usage rates compared with private cars. So based on the analyses above, it can be inferred that patrons of commercial vehicles such as buses, minibuses and taxis are less likely to use seat belt compared with private car occupants.

The results of seat belt use by each vehicle type by location or road type are also presented in Appendix D. From these results, occupants of private cars and buses had significantly higher seat belt use rates than occupants in all vehicle types in all locations as shown in Figure 4.2.

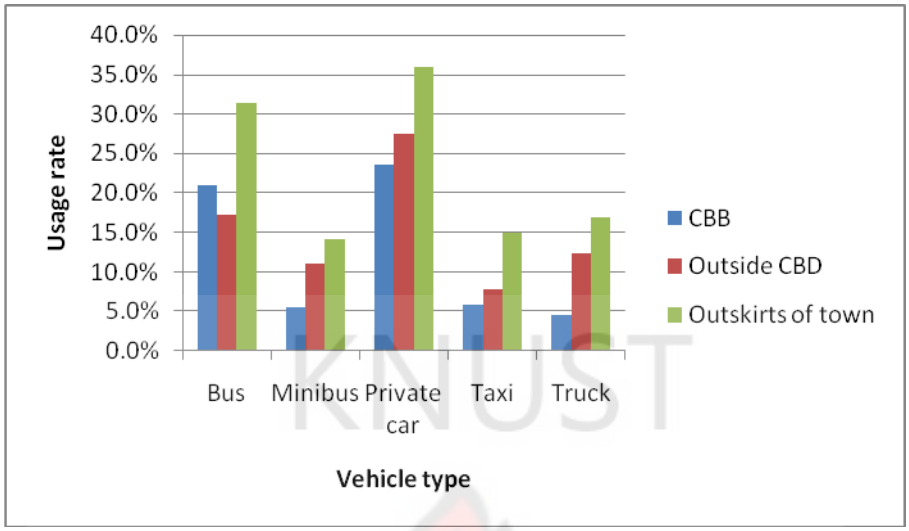

Figure4.2: Vehicle type and Seat belt usage rate

Thus occupants of minibuses, taxis and trucks realised the lowest seat belt rate in all the three locations. The lower seat belt use rates among occupants of these vehicle types present an opportunity to increase seat belt use among patrons of these vehicles.

What may have accounted for these variations in seat belt use is a result of the fact that, most private cars are new and hence they are fitted with well functioning seat belts, coupled with enhanced seat belt alarm system. Seat belt enhanced alarm system greatly increases seat belt use of both drivers and passengers (Williams et al, 2002; Ferguson et al, 2007; Freedman et al, 2009; Lie et al, 2008). Additionally some of these private cars are fitted with intelligent seat belts, which automatically strap in any person who gets on board. Drivers of private vehicles were more likely to use seat belts because they are better educated, and some even see the use of seat belts as a status symbol (Iribhogbe and Osime, 2008).

The use of seat belt by commercial drivers was low. Drivers of taxis in particular, by virtue of the intra-urban transport services they offer, encounter frequent stops. They even sometimes have to assist patrons on board with their luggage. For convenience, many taxi drivers do not wear their seat belts (Iribhogbe and Osime, 2008).The frequent stops and inconvenience

associated with buckling up are reasons for the relative low belt usage rates among taxi drivers (Kim and Yamashita, 2007).

Seat belt usage rates among passengers of minibuses, taxis, buses and trucks were particularly low. This may due to the fact that most of these vehicles are not equipped with seat belts. It has been observed that in low and middle income countries buses, minibuses and truck are used for transporting passengers, and typically, these passengers are not provided seat belts (Barss et al, 1988; as cited by Peden et al, 2004). So it is crucial that, those mandated to ensure safety on our roads put in measures to ensure that these vehicles are equipped with seat belts. While ensuring that vehicles are equipped with seat belts may be an important component of an overall programme to increase compliance, education and enforcement should be neglected as they may be more important.

4.2.5 Seat belt use as a function of Location

The study area was stratified into three layers and roadside observations were carried out in each of these stratum. These are the Central Business District (CBD), area outside of the CBD (Town) and outskirts of town (Highways). In general, the results of the observation survey (Table 4.7) revealed that, regardless of gender, seat belt use by front seat occupants increased with distance away from the Central Business District.

Table 4.7 Seat belt usage rate by Location

Occupant Group	No. observed	No. belted	Usage Rate
CBD	2228	354	**15.90%**
Outside CBD	7094	1242	**17.50%**
Outskirts of town	2434	585	**24.0%**

The CBD and areas outside the CBD in the Kumasi Metropolis are associated with low speed roads (intra-urban roads), while areas outskirts of town are associated with high-speeds (inter-city roads). From Figure 4.3 drivers were more likely to wear seat belts than passengers when travelling on the high speed inter-city roads in the outskirts of town than on the intra-urban

roads. More important, female drivers were more likely to wear seat belts than their male counter parts across these road types.

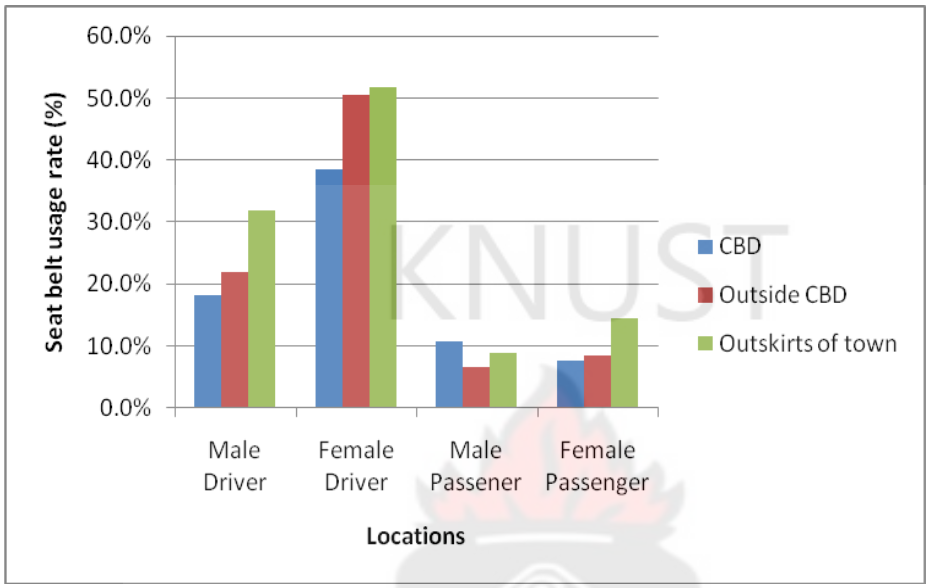

Figure4.3: Drivers and passengers Seat belt use by gender with respect to Location

Lower seat belt use on intra–urban roads (i.e. CBD and areas outside the CBD), compared with areas outskirts of town (highways) are consistent with previous studies. For example, in America a research conducted by Eby et al (2000) realised that seat belt use on highways was higher than seat belt use on urban roads. What may have accounted for the differences in seat belt use in these different settings or road types may primarily be governed by risk and safety perceptions. Cunill et al (2004) found out that, not wearing a seat belt on urban roads was perceived to be less of an injury risk than not wearing a seat belt on the highway. Eby et al (2000) also noted that, drivers perceived a lower level of risk while travelling on urban roads.

This selective use of seat belt use with respect to locations is very worrying because, the forces that are at play in the event of urban traffic crashes could be as devastating as intercity road traffic. Cunill et al (2004) realized that in Spain, 1146 fatalities were recorded on Spain's urban roads. In view of this, in order to increase compliance, it is essential that publicity and education campaigns be targeted at increasing the perception of crash severity and to reduce passengers and drivers feel safe not wearing seat belts on urban roads.

4.3 Attitudes towards Seat belts

4.3.1 Seat belt use in different seating positions

Respondents were asked how often, in general, they would wear a seat belt when travelling in different seating positions in a vehicle (Question 1). The results are shown in Table 4.8.

Table 4.8 How often respondents claimed to wear seat belt in different seating positions.

	Never	Rarely	Sometimes	Often	Always
Front-seat passenger (n=203)	24.1%	37.4%	27.6%	2.5%	8.4%
Rear-seat passenger (n=203)	47.8%	31.5%	15.8%	2.0%	3.0%
Driver (n=143)	4.2%	4.9%	65.0%	5.6%	20.3%

In general, respondents who claimed that they "Always" or "Often" wear seat belts as front seat occupants were higher than rear seat occupants. Grouping respondents who answered "Always" or "Often", drivers have higher wearing rates (25.9%) than both front-right passengers (10.9%) and rear seat passengers (5.0%). Also a statistically significant direct relationship was found between drivers and front seat passengers and between drivers and rear seat passengers. The correlation between drivers and front-seat passengers was r=0.555, p=0.01 and between drivers and rear seat passengers was r=0.315, p=0.01.

The wearing rates of drivers (25.9%) and front-seat passengers (10.9%) obtained from the attitudinal survey support the rates obtained from the observation survey. The results of the observation survey indicated wearing rates of 24.4% and 8.1% for drivers and front-seat passengers respectively (Table 4.3). It is obvious that there are marginal differences in wearing rates from the two surveys. Previous studies have shown that direct observation results in lower rates of usage than self-reported measures (Eby et al, 2001; Cunill et al, 1999).

The results indicate that wearing rates are influenced by seating positions, as front seat occupants have higher usage rates compared with rear seat occupants. The differences in seat belt use in relation to different seating positions were primarily governed by risk perceptions.

In the front seat, vehicle occupants feel exposed, vulnerable and insecure because of the perception that in the event of traffic crash they are likely to be involved if unbelted. That is, they may sustain varying degrees of injuries or death through ejection. These high risk perceptions motivate front seat passengers to use belt. However rear seat occupants, feel save and secure because of the perception that they are not likely to be involved in frontal traffic crashes (head-on collisions) by virtue of their separation from the point of collision. This low level of risk perception among rear seat occupants discourages them from using seat belt often. These varying perceptions have created a lot of inconsistent wearers and this is unhealthy for occupant safety.
This assertion is corroborated by Broughton (2003), he noted that in the event of a road traffic crash, an unrestrained rear seat passenger is not only exposed to severe injuries and may be death, but also poses a serious threat to any restrained person seated a head of them. Several studies have also shown that, there is lack of awareness as regards the risk rear passengers in cars are exposed to, and this contributes to lower seat belt wearing rates (Ressler, 1997). It is therefore important that publicity and education campaigns should aim at reigniting a feeling of risk awareness among vehicle occupants when travelling in the back of a car unbelted.

Another revelation from this attitudinal survey was the positive linear relationship between driver seat belt use and front-seat passenger seat belt use (r =0.555, p=0.01). The import of this result suggests that the driver has an influence on the seat belt wearing rates of the passengers on board his or her vehicle. That is passengers are more likely to belt up when drivers were belted. Conversely, if drivers do not use seat belts, their passengers are also not likely to use seat belts.

4.3.2 Seat belt use on different road types

The attitudes of the respondents were further explored, by asking the subjects in the questionnaire survey, to indicate seat belt use on different road types (Question 2). The results are shown in Table 4.9

Table 4.9: Reported Seat belt use on different road types-Attitudinal Survey

Road type	Never	Rarely	Sometimes	Often	Always
Residential area (n=203)	42.9%	33.0%	13.3%	6.9%	3.9%
Town (n=203)	20.2%	49.8%	12.8%	6.4%	10.8%
Highway(n=203)	6.4%	3.4%	24.1%	8.9%	57.1%

More respondents reported that they always use (or often) seat belt on highways (66.0%) than on intra- urban roads (28.0%). This suggests that seat belt use is influenced by the particular type of road.

The higher reported seat belt use rates on highways as oppose to the lower wearing rates on intra-urban roads (i.e. residential and town settings) are consistent with earlier studies (Chliaoutakis et al., 2000; Fockler and Copper, 1990 ;as referenced by Simsekoglu and Lajunen, 2008). This is perhaps due the fact that, short journeys in the residential and town settings are perceived to be less risky compared with long journeys on highways. The high risk perceptions associated with highway travels may be attributed to the high vehicular speeds on highways compared with that on intra-urban roads. Hence vehicle occupants feel and secure without seat belts on urban roads than on highways. This then resulted in the high reported wearing rates on highways than in the residential and town settings. These results indicate that, there are a lot of inconsistent seat belt wearers, since it will be practically impossible for a consistent wearer to make separate decisions as regards when to use a seat belt. It is therefore imperative that, education and publicity must aim at behavioural modification, so that seat belt use becomes the norm in the Kumasi Metropolis in particular and in Ghana as a whole.

4.3.3 Reasons for non-use of Seat belts

4.3.3.1 Perceived seat belt use by other vehicle occupants

In Question 3, respondents were asked to indicate how often they see other vehicle occupants using seat belts and the results are shown in Table 4.10

Table 4.10 Perceived Seat belt usage rates as reported by other occupants

	Never	Rarely	Sometimes	Often	Always
Vehicle occupants (n=203)	6.9%	66.4%	20.6%	2.8%	3.0%

The result shown as shown in Table 4.11, depicts that substantial differences exists between the results of Question 1, where respondents were asked to indicate how often they wear seat belts (Table 4.9). Only 5.8 % of the respondents believed that others use seat belts "always" or "often", with 20.9% responding that others "sometimes" use seat belt. Majority of the respondents (73.4%) believed that other vehicle occupants "rarely" or "never" use seat belts.

Comparing these two results revealed that, there is a strong perception that a lot of vehicle occupants do not wear seat belts. The perception that other vehicle occupants do not use seat belts, has the potential of discouraging others from using seat belts, since research has shown that people are easily influenced by the behaviour of others (Markey et al, 1998). Kim and Yamashita (2007) found a high correlation between those who used seat belts and those who believed that others use seat belts while driving. That is those who believed that others always use seat belts are more likely use seat belts. This suggests that, the perceived behaviour of others might influence belt use.

A high perception of seat belt use can be created if companies and institutions incessantly remind their employees to belt up. This perception will be reinforced especially if the Police personnel

are always seen belted up. This may serve as an incentive for non-users to begin using their seat belts.

4.3.3.2 No/Faulty seat belts and Easy to forget

Respondents to the attitudinal survey were presented with a list of suggested reasons for not wearing a seat belt (Question 4) that had been identified in a prior study and asked to rank each statement from 'important' to 'not at all important'. Table 4.11 shows the results of the response.

Table 4.11: Reasons for non-use of seat belts

	Important	Moderately Important	Of little importance	Unimportant
They are dangerous (n=203)	7.5%	2.0%	1.0%	89.6%
They are uncomfortable (n=203)	40.9%	12.3%	14.3%	32.5%
They are unnecessary for short trips (n=203)	66.0%	6.4%	13.3%	14.3%
They are likely to mess up my clothes (n=203)	14.3%	17.7%	28.1%	39.9%
They are easy to forget (n=203)	73.9%	1.5%	12.8%	11.8%
No/Faulty seat belts (n=203)	81.3%	3.4%	5.9%	9.4%
Frequent stops (n=203)	48.3%	0.0%	0.0%	0.0%

The results revealed that, for all categories of respondents, the most important reasons as regards non-use of seat belts in the Kumasi Metropolis were "No/Faulty seat belts (81.1%)", "Easy to

forget (73.9%)" and "Unnecessary for short trips (66.0%)". These were followed by "Frequent stops (48.3%)" and "Discomfort (40.9%)".

Respondents, who claimed that "No/Faulty seat belts" as reasons for non-use of seat belts were predominantly passengers (93.3%), followed by commercial motor vehicle drivers (86.7%) and private motor vehicle drivers (36.7%). Detail results are in Appendix C. This result indicates that most motor vehicles on our roads are without seat belts and is consistent with earlier studies. For instance, Forjuoh (2003) observed that vehicles in many low-income and middle-income countries do not have functioning seat belts, even if they are installed.

With the present spate of road traffic fatalities and injuries on our roads, of which vehicle occupants are significant proportions, it is imperative that, mandatory retrofitting of seat belts in vehicles be carried out, preferably free of charge. The installation of seat belts is one of the most important safety measures with the potential to facilitate reductions in occupant fatalities and injuries in high- income and low income countries (Ameratunga et al, 2006), and this will invariably results in economic gains and increase productivity. Research has shown that huge financial savings can be derived through mandatory retrofitting of seat belts in vehicles. For example, the United Kingdom's Department for Transport conducted an analysis of the financial savings made through mandatory retrofitting and 90% usage of seat belts in coaches, minibuses and vans. Installation costs were compared to casualty costs Installation costs were compared to casualty costs. The result was impressive. The result highlighted a casualty saving of US$ 5250 000 in coach crashes alone, giving a net benefit of US$ 1 725 000, taking into account installation costs (Department for Transport, 1994). Additionally, according to Markey et al (1998), full compliance with the law on the wearing of rear restraints in the UK, could save approximately 100 fatalities, 1100 serious casualties and 3700 slight casualties. This would result in casualty savings in the region of £210 million.

These analyses shed light on what the country stands to gain economically if mandatory installation of seat belts in vehicles programme is implemented.

Approximately 74 percent of the respondents stated forgetfulness as reason for non-use of seat belt, of which passengers (80%) were in the majority, followed by commercial motor vehicle drivers (77.9%) and 46.8% by private motor vehicle drivers (Appendix C). This reinforces the need for sustained education and publicity campaign that will constantly remind vehicle occupants to belt up.

Forgetfulness as a reason for non-use of seat belt may be the cumulative effect of non-use of seat belt over the years, as a result of travelling in vehicles that are rarely fitted with one. As a result they have become accustomed to non-use of seat belts to the extent that, even if there are seat belts, they are unaware of them. This acquired habit can be broken by incorporating drivers as co-partners in ensuring compliance. Drivers could be educated to remind all occupants on board their vehicles to belt up before embarking on any journey.

From Table 4.11, a significant proportion of the respondents (66.0%) claimed that seat belts were unnecessary for short trips. Detail results from Appendix C indicate that, amongst these respondents, commercial vehicle drivers (77%) were the majority, followed by passengers (68.3%) and finally private motor vehicle drivers (20.0%). In terms of gender, 71.1% of men indicated that seat belts were unnecessary for short journeys than women as oppose to 43.2% of women (Appendix C). This accounts for the low usage rate among men particularly on intra-urban roads. This may be due to the perception that short trips are most often associated with low vehicular velocities, and that safety is a corollary of low vehicular speeds. This perception discourages vehicle occupants from using seat belts on short trips. Several studies have however established that, the forces that are at play when road traffic crashes occur during short trips are enough to cause severe injuries and even fatalities (Cunill et al, 2004). It is imperative that, vehicle occupants are educated to increase their perception of crash severity particularly on short journeys, so that they will feel insecure and vulnerable without seat belts when going on such journeys.

Discomfort also came up as one of the reasons of non-use of seat belt, with approximately 41% of the respondents citing discomfort as reasons for non-use of seat belts. This discomfort may stem from the high level of traffic jams on intra-urban roads in the Kumasi Metropolis,

exacerbated by the warm tropical climate. These two factors make vehicle occupants uncomfortable since most commercial vehicles in the metropolis are not equipped with air conditioners. This assertion is corroborated by the degree of discomfort reported by commercial vehicle drivers as oppose to private car drivers. Commercial vehicle drivers (54.9%) were majority of respondents who stated discomfort as reason for non-use of belt, followed in order by passengers (30%) and private vehicle drivers, 10% (Appendix C). This level of discomfort makes it a disincentive to use seat belts especially in the urban settings. This explains why usage rates are lower on urban roads compared with that on highways. So it is important that, an effective traffic management system is put in place in the Kumasi metropolis to ensure free flow of traffic in the urban settings, to relieve occupants of discomforts associated with the use of seat belts in the urban settings.

4.4 The Law and Seat belts

4.4.1 Knowledge of Seat belt Laws

According to the seat belt law (Act 683):

"1. A person of 18 years or above who

a) Drives a motor vehicle on a road, or

b) Sits on the front or rear seat of a motor vehicle being driven on a road without wearing a seat belt commits an offence and is liable on summary conviction to a fine not exceeding 100 penalty units or to a term of imprisonment not exceeding 6 months or both.

2. A person who drives a motor a motor vehicle on a road when a child between the ages of five and eighteen years who is sitting on the front seat of the vehicle is not wearing a seat belt commits an offence and is liable on summary conviction to fine not exceeding 100 penalty units or to term of imprisonment not exceeding 6 months or both.

3. A person commits an offence if that person drives a motor vehicle on road when

a) A child under the age of 18 years is in the rear of the motor vehicle; and

b) The child is not wearing the seat belt."

In the attitudinal survey respondents were asked to indicate whether or not it is a requirement of the seat belt law for both adult and child vehicle occupants in various seating position positions to wear seat belts (Question 5). The result is shown in Table 4.12

Table 4.12: Reported Knowledge of the seat belt law

Of the following, who do you think are required by law to wear seat belt?	Yes	No
The driver (n=203)	99.0%	1.0%
Adult front seat passenger (n=203)	75.9%	24.1%
Child (under 18) front seat passenger (n=203)	61.1%	38.9%
Adult back seat passenger (n=203)	40.4%	59.6%
Child (under 18) back seat passenger (n=203)	28.1%	71.9%

In general, the respondents exhibited good knowledge of the law in relation to drivers and front seat passengers. Virtually 100 per cent selected the correct answer for drivers and 75.9% for adult front seat passengers and for, child front seat passengers, 61.1% selected the correct answer. Unfortunately, this level of knowledge did not transcend that of front seat occupants when respondents were asked to consider the law concerning rear passengers. Very few of the respondents (40.4%) answered correctly that adult rear passengers were required to wear seat belts. Similarly, only 28.1% of respondents answered correctly that a child in the front seat wears a seat belt. This is an indication that most people are of the view that only drivers are required by law to wear seat belts, an evidence of the respondents ignorance.

The picture was not different when respondents were asked to indicate what the penalty was if a car was stopped by the police with an unrestrained adult passenger (Question 6). This is because only a handful of respondents (31%) answered partially correctly that "a fine for the passenger". These are incomplete correct responses because, the seat belt law, Act 683 stipulates that, "an unrestrained adult passenger commits an offence and is liable on summary conviction to a fine

not exceeding 100 penalty points or to a term of imprisonment term not exceeding 6 months or both". Detailed results are shown in Table 4.13.

Table 4.13 Penalty for an unrestrained adult passenger

If an adult passenger is found unrestrained by the police, what do you think would be the penalty if the car is stopped by the police?	
A fine for the driver	15.3%
A fine for the passenger	31.0%
A fine for the passenger and driver	52.2%
A fine for the driver and prison sentence for the driver	0.5%

Obviously in both instances, majority of these respondents were not clear on the details of the law. A gamut of reasons may be assigned for these divergent and inconsistent responses. First, some of these responses were purely based on a sense of vulnerability and insecurity while travelling in the front seat (Christmas et al, 2008), but not on the knowledge of the law, else the disparities in the responses would have been marginal. This sense of vulnerability and insecurity has been exacerbated over the years by the piecemeal, and periodic education and publicity campaigns of the National Road Commission(NRSC) that, have focused mainly on occupant safety (NRSC, 2008), to the neglect of the details of the law. It is important that the former is carried out judiciously without neglecting the latter. Earlier research acknowledged that, a seat belt law is an important component of an overall programme to increase compliance. However, the success of the seat belt law is dependent on comprehensive education programmes to provide detailed information on the requirements of the law (FIA Foundation, 2009). This approach of the NRSC towards occupant safety which is obviously bereft of detailed requirements of the law has made the general public oblivious of their responsibilities in relation to the seat belt law. The obliviousness of the public as regards the details of the law has made the public insensitive to the call of the National Road Safety Commission per its publicity programmes, and this has accounted for the flagrant violation of seat belt laws in the Kumasi Metropolitan Area (KMA), and the resulting low seat belt usage rates in the metropolis.

It is very important that, a comprehensive education and publicity programmes are fashioned out and targeted at educating the general public concerning their responsibilities vis-à-vis the seat law. This exercise will make vehicle occupants aware of their responsibilities and more receptive to the call of the NRSC concerning road safety in the Kumasi metropolis.

4.4.2 Comparison with other traffic offences

Respondents were asked to compare the offence of not wearing a seat belt with other traffic offences and consider how *serious* and how *dangerous* they thought the offences were (Questions 6 and 7). Figures 4.4 and 4.5 show the various responses.

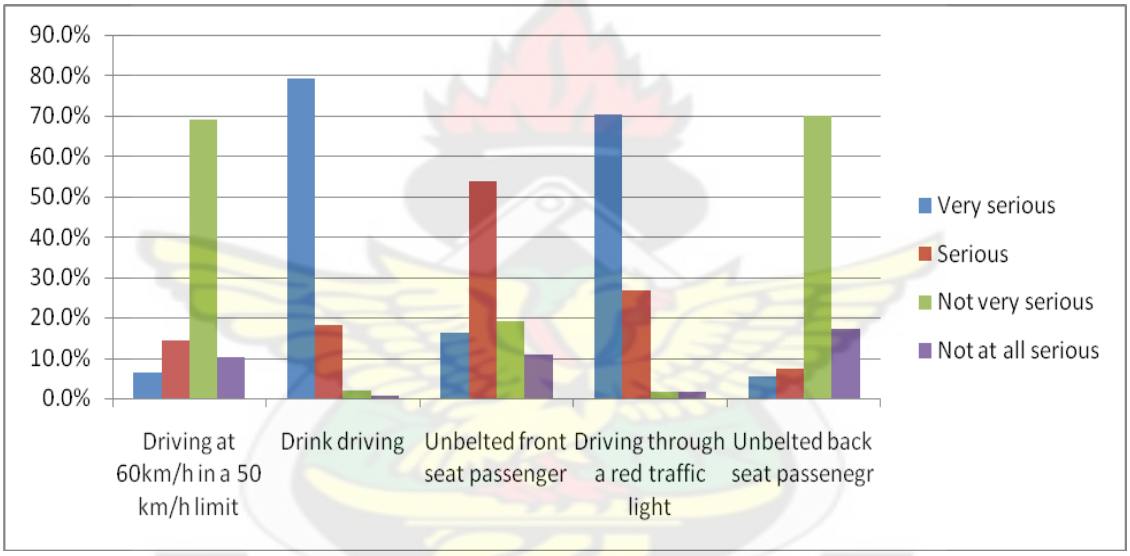

Figure4. 4: Comparison of Traffic offences (Seriousness of an offence)

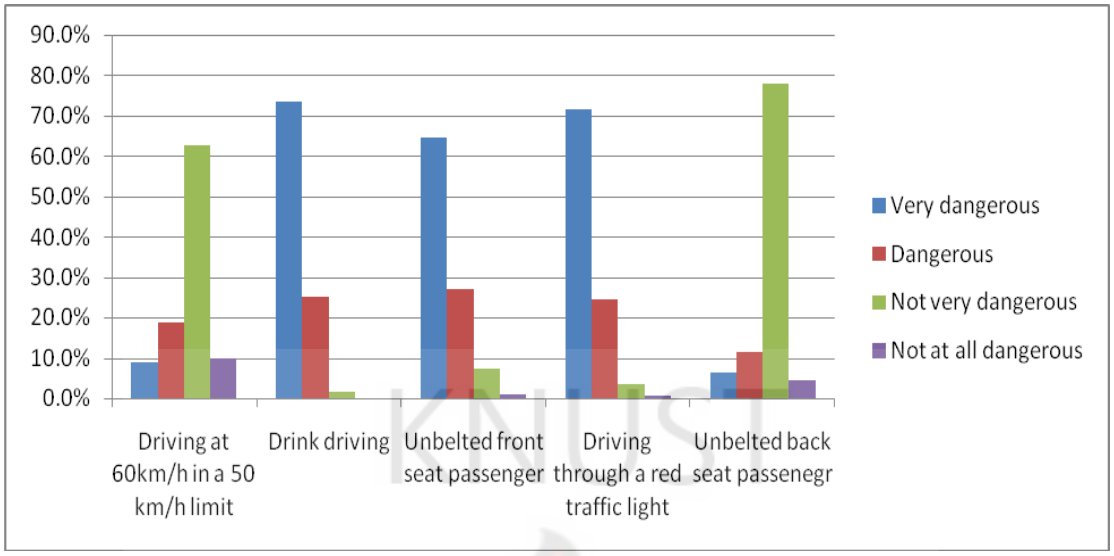

Figure 4.5: Comparison with other Traffic offences (Dangerousness of an offence)

They were also to indicate how often they thought people were fined or punished by the police for violating these traffic laws (Question 8). The results are depicted in Figure 4.6

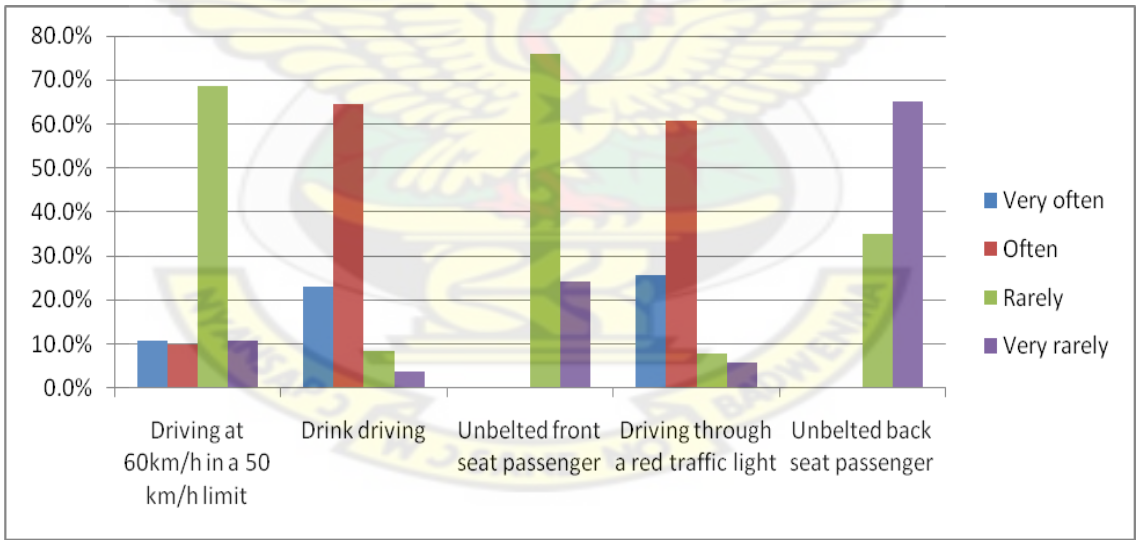

Figure4. 6: Comparison of fine/punishment for some Traffic offences

Figures 4.4 and 4.5 show that, a correlation exists between the seriousness and dangerousness of an offence. Drink driving and driving through a red traffic light were considered very serious and dangerous offences. Similarly, the respondents thought that travelling in the back seat of a vehicle and driving at 60km/h in a 50km/h limit were not very serious and dangerous offences.

However, there is an exception to this pattern. This is because it was realised that approximately 31 percent of females thought that driving at 60 km/h in 50km/h limit was slightly more dangerous (Appendix C). The results also show that, the respondents were of the view that, travelling in the back of a vehicle unbelted was less serious an offence compared with travelling in the front seat unbelted.

The results of the survey also revealed that unbelted back seat and front seat occupants are very rarely and rarely punished/fined respectively (Figure 4.6).

This survey suggests that, there may be need for more enforcement of seat belt use among vehicle occupants. This is because, all respondents were unanimous in stating that, seat belt laws are either "rarely" or "very rarely" enforced in the Kumasi Metropolitan Area (KMA). In considering front seat passengers, approximately 76% stated that offenders are rarely fined or punished for violating seat belt laws or for non-use of seat belts. In the same vein, 65% stated that rear seat passengers are "very rarely" punished for non-use of seat belts. Really, it is imperative that, this culture of impunity in relation to seat belt use among vehicle occupants is brought to an end by strict enforcement of seat belt laws on the part of Police personnel. Several studies have shown that the enforcement of seat belt laws can greatly increase seat belt use (Dee, 1998; Eby et al., 2000; Hagenzieker, 1991).

It is a truism that enforcement of seat belt laws increases the use of seat belts, one should not lose sight of the fact the Police personnel are handicapped in this regard. This is because most of the vehicles that have flooded the Kumasi metropolis are without seat belts. Hence it is practically impossible for the Police personnel to seriously enforce the seat belt law. This may have demotivated the Police personnel and thus has accounted for the low enforcement of seat belt law in the Kumasi metropolis. So the NRSC must strengthen their legal muscle, by reviewing the existing seat belt law to compel all vehicles without seat belts in the metropolis to be fitted with one. If this is not done, education, publicity and enforcement programmes will yield no fruit and the envisaged road safety in the metropolis will be a mirage.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Based on the information gathered from the literature review as well as the observation and attitudinal surveys data the following conclusions may be drawn.

5.1.1 Seat belt usage rate in the Kumasi Metropolitan Area

The road side observation survey of seat belt use revealed that, wearing rates in Kumasi Metropolitan Area is very low. The overall wearing rates for the Kumasi metropolis was 18.3%, with 24.4% for drivers and 8.1% for passengers.

Overall wearing rates were consistently higher for drivers than for front seat passengers for all locations or road types. Rates were highest in areas outskirts of town (32.9%) and lowest in the CBD (19.6%) for drivers. Wearing rates were higher for female drivers than for male drivers, and higher on high-speed roads than on slower roads. Concerning vehicle types also, wearing rates were also consistently higher for drivers of private cars than other vehicle types such as taxis, minibuses, trucks and buses.

5.1.2 Reasons for non-use of seat belts

Majority of the respondents were ignorant of the seat belt law since most of them thought that only drivers were by law to wear seat belt, but not passengers. More important, most were not clear on the details of the law, as regards who is responsible for ensuring that an adult passenger uses a seat belt and what the penalty was applicable if found unbelted by the police. The obliviousness of the public as regards the details of the law may have made the public insensitive to the call of the National Road Safety Commission per its publicity programmes, and this has

accounted for the flagrant violation of seat belt laws in the Kumasi Metropolitan Area (KMA), and possibly nationwide.

No/Faulty seat belt was the commonest reason for non-use of seat belts in the Kumasi metropolis with 81.1 percent of the respondents stating it as reasons for non-use of seat belts. This shows that, a significant proportion of vehicle population are not fitted with seat belts. Hence, it is critical that, vehicles without seat belts are retrofitted with one, preferably free of charge.

Forgetfulness was the second reason for non-use of sea t belt, with 74% of the respondent stating selecting it. Majority of the population were passengers (80%), followed by commercial vehicle drivers (77.9%) and the least, private drivers (46.75%). Drivers then ought to be educated to remind all occupants on-board their vehicles to belt up. A law should also be enacted to make both the passenger and the driver are culpable if a passenger is found unbelted. This will ensure responsible attitudes towards seatbelt use.

Discomfort was also identified as one of the factors militating against the use of seat belt in the Kumasi metropolis. This may be due to the high traffic jams in the Kumasi metropolis coupled with the warm tropical climate.

5.1.3 Risk perception and seat belt use

The observation survey as well as the attitudinal survey revealed that seat belt usage rates were higher on highways (32.9%) than on urban roads (19.5%). This is because high risk perceptions are associated with high speed roads than with slow speed roads. Also from the attitudinal survey the usage rates for front seat occupants (18.4%) were higher compared with that of rear seat occupants (5.0%). Front seat occupants feel more insecure and vulnerable than rear seat occupants, thus the former have high risk perceptions than the latter. The high the sense of vulnerability, the more one feels the need for protection and hence the high usage rates associated with high perceptions. The above is an indication that high risk perceptions are related to high seat belt usage rates and the converse is also true.

5.1.4 Enforcement perception of the seat belt law

It was also evident from the survey that, there is serious laxity in the enforcement of seat belt laws in the Kumasi metropolis, as the respondents were unanimous in stating that seat belt laws are either "rarely" or "very rarely" enforced.

5.2 Recommendations

KNUST

1. There should be mandatory retrofitting of seat belts in vehicles that do not have, preferably free of charge in the Kumasi Metropolitan Area.

2. Drivers must be educated and drafted in as co-partners (of road safety), to constantly remind vehicle occupants to belt up before any trip for the purpose addressing the problem of forgetfulness associated with seat belt use.

3. An effective traffic management system must be instituted in the Kumasi metropolis to ensure free flow of vehicular traffic in order to relieve vehicle occupants of the discomforts associated with the use of seat belts in the urban settings due to the incessant high traffic jams exacerbated by the warm tropical climate.

4. There should be a comprehensive and sustained education and enforcement programme in the metropolis to increase compliance.

5. For further research, an in-depth study should be carried out to unearth factors militating against the enforcement efforts of the Ghana Police.

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APPENDICES

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APPENDIX A

Observation Sites in the Study Area: Kumasi Metropolitan Area

Location	Observation sites
CBD	Kama Plaza T/Lights
	Melcom T/Lights
	KMA T/Lights
	SG-SSB Round About
	GCB/BoG/Museum T/Lights
	A'life –Prempeh I St. T/Lights
	A'life-T/Lights II
Outside CBD	Asafo roundabout
	Amakom T/Lights
	Anloga Junction T/Lights
	Zoo T/Lights
	Bekwai roundabout
	Golden Tulip Junction
	Ahodwo round About
	Abrepo Junction T/Lights
	Suame roundabout
	Krofrom T/Lights
	Airport roundabout
	Aboabo Post office
	Kwadaso- Silom Junction
	Danyame T/Lights
	Stadium T/Lights
	Manhyia T/Lights
Outskirts of town	Santasi roundabout
	Ahenema Kokoben Junction
	Tech Junction T/Lights
	Oduom roundabout
	Aboaso Toll booth
	Abuakwa Junction
	Atinga Junction

APPENDIX B: QUESTIONNAIRE

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

DEPARTMENT OF CIVIL ENGINEERING

MSc. ROAD AND TRANSPORTATION ENGINEERING

RESEARCH ON SEAT BELT USE IN THE KUMASI METROPOLITAN AREA

KNUST

General Information

Questionnaire Number:…….. Date:……. Name of Researcher……

SECTION 1: SEAT BELT WEARING

1. **In general, when you travel in a car, how often do you wear a seat belt when you are:**

	Never	Rarely	Sometimes	Often	Always
the front-seat passenger	□	□	□	□	□
a rear-seat passenger	□	□	□	□	□
the driver (if applicable)	□	□	□	□	□

2. **When you travel in a car, how often do you wear a seat belt when the journey is:**

`

	Never	Rarely	Sometimes	Often	Always
in a residential area	□	□	□	□	□
in town	□	□	□	□	□
on a highway	□	□	□	□	□

3. In general, how often do you think that most adults (over the age of 18) wear seat belts when travelling in a car that is fitted with seat belts? (Tick one box only)

Never	Rarely	Sometimes	Often	Always
□	□	□	□	□

4. Please indicate how important each of the following statements are to you as reasons for NOT WEARING a seat belt in a car.

	Important	**Moderately** important	**Of little** importance	**Not at all** important
	1	2	3	4
They are dangerous	□	□	□	□
They are uncomfortable	□	□	□	□
They are unnecessary for short trips	□	□	□	□
They are likely to mess up my clothes	□	□	□	□
They are easy to forget	□	□	□	□
No or faulty seat belts	□	□	□	□

Other reasons for **NOT WEARING** a seat belt, please specify

.....

.....

.....

.....

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SECTION 2: REGULATIONS CONCERNING SEAT BELT USE

5. Of the following, who do you think are required BY LAW to wear a seat belt.

(Please tick either the Yes or No box)

	Yes	No
The driver	□	□
Adult front seat passenger	□	□
Child (under 18) front seat passenger	□	□
Adult back seat passenger	□	□
Child (under 18) passenger in the back seat	□	□

6. If an adult passenger is not wearing a seat belt, what do you think the penalty would be if the car was stopped by the police?

(You may tick more than one statement)

A fine for the driver □

A fine for the passenger □

Prison sentence for the driver □

Prison sentence for the passenger □

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SECTION 3: OPINIONS

7. **How SERIOUS do you think the following driving offences are?**

	Very serious	Serious	Not very serious	Not at all serious
Driving at 60 kph in a 50 kph limit	□	□	□	□
Drink driving	□	□	□	□
Not wearing a seat belt as a front seat passenger	□	□	□	□
Driving through a red traffic light	□	□	□	□
Not wearing a seat belt as a passenger in the back of a car	□	□	□	□

8. How DANGEROUS do you think the following driving offences are?

	Very dangerous	Dangerous	Not very dangerous	Not at all dangerous
Driving at 60 kph in a 50 kph limit	□	□	□	□
Drink driving	□	□	□	□
Not wearing a seat belt as a front seat passenger	□	□	□	□
Driving through a red traffic light	□	□	□	□
Not wearing a seat belt as a passenger in the back of a car	□	□	□	□

9. How OFTEN do you think people are fined or punished for the following driving offences?

	Very often	Often	Rarely	Very rarely
Driving at 60 Kph in a 50 Kph limit	□	□	□	□
Drink driving	□	□	□	□
Not wearing a seat belt as a front seat passenger	□	□	□	□
Driving through a red traffic light	□	□	□	□
Not wearing a seat belt as a passenger in the back of a car	□	□	□	□

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SECTION 4: PERSONAL DETAILS

10. Sex: Male □ Female □

11. Please indicate your occupation ……

13. Do you hold a driving licence? No □ Yes □

Do you have any comments that you would like to make about the use of seat belts in vehicles? If so, please write below.

……
……
……

THANK YOU VERY MUCH FOR YOUR HELP.

APPENDIX C: ATTITUDINAL SURVEY RESULTS

Table C1: OCCUPANT GROUP AND DANGEROUSNESS AS REASON FOR NON-USE OF SEAT BELT

			THEY ARE DANGEROUS				
			IMPORTANT	MODERATELY IMPORTANT	OF LITTLE IMPORTANCE	UNIMPORTANT	Total
OCCUPANT STATUS	Passenger	Count	8	2	1	47	58
		% within OCCUPANT STATUS	13.8%	3.4%	1.7%	81.0%	100.0%
	Private driver	Count	2	0	0	28	30
		% within OCCUPANT STATUS	6.7%	.0%	.0%	93.3%	100.0%
	Commercial driver	Count	5	2	1	105	13
		% within OCCUPANT STATUS	4.4%	1.8%	.9%	92.9%	100.0%
Total		Count	15	4	2	180	21
		% within OCCUPANT STATUS	7.5%	2.0%	1.0%	89.6%	100.0%

Table C2: OCCUPANT GROUPAND DISCOMFORT A S REASON FOR NON-USE OF SEAT BELT

			THEY ARE UNCOMFORTABLE				
			IMPORTANT	MODERATELY IMPORTANT	OF LITTLE IMPORTANCE	UNIMPORTANT	Total
OCCUPANT STATUS	Passenger	Count	18	1	17	24	60
		% within OCCUPANT STATUS	30.0%	1.7%	28.3%	40.0%	10.0%
	Private driver	Count	3	11	2	14	30
		% within OCCUPANT STATUS	10.0%	36.7%	6.7%	46.7%	100.0%
	Commercial driver	Count	62	13	10	28	113
		% within OCCUPANT STATUS	54.9%	11.5%	8.8%	24.8%	100.0%
Total		Count	83	25	29	66	203
		% within OCCUPANT STATUS	40.9%	12.3%	14.3%	32.5%	100.0%

Table C3: OCCUPANT GROUP AND "UNNECESSARY FOR SHORT TRIPS" AS REASONS FOR NON-USE OF SEAT BELT

			THEY ARE UNNECESSARY FOR SHORT TRIPS				
			IMPORTANT	MODERATELY IMPORTANT	OF LITTLE IMPORTANCE	UNIMPORTANT	Total
OCCUPANT STATUS	Passenger	Count	41	9	4	6	60
		% within OCCUPANT STATUS	68.3%	15.0%	6.7%	10.0%	100.0%
	Private driver	Count	6	0	11	13	30
		% within OCCUPANT STATUS	20.0%	.0%	36.7%	43.3%	100.0%
	Commercial driver	Count	87	4	12	10	113
		% within OCCUPANT STATUS	77.0%	3.5%	10.6%	8.8%	100.0%
Total		Count	134	13	27	29	203
		% within OCCUPANT STATUS	66.0%	6.4%	13.3%	14.3%	100.0%

Table C 4 : OCCUPANT GENDER AND "UNNECESSARY FOR TRIPS" AS REASONS FOR NON-USE OF SEAT BELT

			THEY ARE UNNECESSARY FOR SHORT TRIPS				
			IMPORTANT	MODERATELY IMPORTANT	OF LITTLE IMPORTANCE	UNIMPORTANT	Total
GENDER	Male	Count	118	11	14	23	166
		% within GENDER	71.1%	6.6%	8.4%	13.9%	100.0%
	Female	Count	16	2	13	6	37
		% within GENDER	43.2%	5.4%	35.1%	16.2%	100.0%
	Total	Count	134	13	27	29	203
		% within GENDER	66.0%	6.4%	13.3%	14.3%	100.0%

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Table C5: OCCUPANT GROUP AND "LIKELY TO MESS UP CLOTHES" AS REASONS FOR NON-USEOF SEAT BELT

			THEY ARE LIKELY TO MESS UP CLOTHES				
			IMPORTANT	MODERATELY IMPORTANT	OF LITTLE IMPORTANCE	UNIMPORTANT	Total
OCCUPANT STATUS	Passenger	Count	12	23	3	22	60
		% within OCCUPANT STATUS	20.0%	38.3%	5.0%	36.7%	100.0%
	Private driver	Count	16	4	0	10	30
		% within OCCUPANT STATUS	53.3%	13.3%	.0%	33.3%	100.0%
	Commercial driver	Count	1	9	54	49	113
		% within OCCUPANT STATUS	.9%	8.0%	47.8%	43.4%	100.0%
Total		Count	29	36	57	81	203
		% within OCCUPANT STATUS	14.3%	17.7%	28.1%	39.9%	100.0%

Table C6: OCCUPANT GROUP AND FORGETFULNESS AS REASONS FOR NON-USE OF SEAT BELT

			THEY ARE EASY TO FORGET				
			IMPORTANT	MODERATELY IMPORTANT	OF LITTLE IMPORTANCE	UNIMPORTANT	Total
OCCUPANT STATUS	Passenger	Count	48	3	5	4	60
		% within OCCUPANT STATUS	80.0%	5.0%	8.3%	6.7%	100.0%
	Private driver	Count	14	0	11	5	30
		% within OCCUPANT STATUS	46.7%	.0%	36.7%	16.7%	100.0%
	Commercial driver	Count	88	0	10	15	113
		% within OCCUPANT STATUS	77.9%	.0%	8.8%	13.3%	100.0%
Total		Count	150	3	26	24	203
		% within OCCUPANT STATUS	73.9%	1.5%	12.8%	11.8%	100.0%

Table C7: OCCUPANT GROUP AND NO/FAULTY BELTS AS REASONS FOR NON-USE OF SEAT BELT

			NO/FAULTY SEAT BELTS				
			IMPORTANT	MODERATELY IMPORTANT	OF LITTLE IMPORTANCE	UNIMPORTANT	Total
OCCUPANT STATUS	Passenger	Count	56	0	1	3	60
		% within OCCUPANT STATUS	93.3%	.0%	1.7%	5.0%	100.0%
	Private driver	Count	11	3	11	5	30
		% within OCCUPANT STATUS	36.7%	10.0%	36.7%	16.7%	100.0%
	Commercial driver	Count	98	4	0	11	113
		% within OCCUPANT STATUS	86.7%	3.5%	.0%	9.7%	100.0%
Total		Count	165	7	12	19	203
		% within OCCUPANT STATUS	81.3%	3.4%	5.9%	9.4%	100.0%

Table C8: OCCUPANT GROUP AND SERIOUSNESS OF OFFENCE (OVER SPEEDING)

			DRIVING AT 60km/h IN A 50km/h LIMIT				
			VERY SERIOUS	SERIOUS	NOT VERY SERIOUS	NOT AT ALL SERIOUS	Total
OCCUPANT STATUS	Passenger	Count	7	15	17	21	60
		% within OCCUPANT STATUS	11.7%	25.0%	28.3%	35.0%	100.0%
	Private driver	Count	2	6	22	0	30
		% within OCCUPANT STATUS	6.7%	20.0%	73.3%	.0%	100.0%
	Commercial driver	Count	4	8	101	0	113
		% within OCCUPANT STATUS	3.5%	7.1%	89.4%	.0%	100.0%
Total		Count	13	29	140	21	203
		% within OCCUPANT STATUS	6.4%	14.3%	69.0%	10.3%	100.0%

Table C9: OCCUPANT STATUS AND SERIOUSNESS OF OFFENCE(DRINK DRIVING)

			DRINK DRIVING				
			VERY SERIOUS	SERIOUS	NOT VERY SERIOUS	NOT AT ALL SERIOUS	Total
OCCUPANT STATUS	Passenger	Count	49	8	2	1	60
		% within OCCUPANT STATUS	81.7%	13.3%	3.3%	1.7%	100.0%
	Private driver	Count	26	4	0	0	30
		% within OCCUPANT STATUS	86.7%	13.3%	.0%	.0%	100.0%
	Commercial driver	Count	93	18	2	0	113
		% within OCCUPANT STATUS	82.3%	15.9%	1.8%	.0%	100.0%
Total		Count	168	30	4	1	203
		% within OCCUPANT STATUS	82.8%	14.8%	2.0%	.5%	100.0%

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Table C10: OCCUPANT GROUPAND SERIOUSNESS OF OFFENCE (UNBELTED FRONT SEAT PASSENGER)

			NOT WEARING A SEAT BELT AS FRONT SEAT PASSENGER				
			VERY SERIOUS	SERIOUS	NOT VERY SERIOUS	NOT AT ALL SERIOUS	Total
OCCUPANT STATUS	Passenger	Count	6	14	19	21	60
		% within OCCUPANT STATUS	10.0%	23.3%	31.7%	35.0%	100.0%
	Private driver	Count	15	12	2	1	30
		% within OCCUPANT STATUS	50.0%	40.0%	6.7%	3.3%	100.0%
	Commercial driver	Count	12	83	18	0	113
		% within OCCUPANT STATUS	10.6%	73.5%	15.9%	.0%	100.0%
Total		Count	33	109	39	22	203
		% within OCCUPANT STATUS	16.3%	53.7%	19.2%	10.8%	100.0%

Table C11: OCCUPANT GROUP AND SERIOUSNESS OF OFFENCE (DRIVING THROUGH A RED TRAFFIC LIGHT)

			DRIVING THROUGH A RED TRAFFIC LIGHT				
			VERY SERIOUS	SERIOUS	NOT VERY SERIOUS	NOT AT ALL SERIOUS	Total
OCCUPANT STATUS	Passenger	Count	52	5	1	2	60
		% within OCCUPANT STATUS	86.7%	8.3%	1.7%	3.3%	100.0%
	Private driver	Count	21	8	1	0	30
		% within OCCUPANT STATUS	70.0%	26.7%	3.3%	.0%	100.0%
	Commercial driver	Count	70	41	1	1	113
		% within OCCUPANT STATUS	61.9%	36.3%	.9%	.9%	100.0%
Total		Count	143	54	3	3	203
		% within OCCUPANT STATUS	70.4%	26.6%	1.5%	1.5%	100.0%

Table C 12 : OCCUPANT STATUS AND SERIOUSNESS OF OFFENCE (UNBELTED BACK SEAT PASSNEGER)

			NOT WEARING A SEAT BELT AS A BACK SEAT PASSENGER				
			VERY SERIOUS	SERIOUS	NOT VERY SERIOUS	NOT AT ALL SERIOUS	Total
OCCUPANT STATUS	Passenger	Count	6	6	24	24	60
		% within OCCUPANT STATUS	10.0%	10.0%	40.0%	40.0%	100.0%
	Private driver	Count	3	4	21	2	30
		% within OCCUPANT STATUS	10.0%	13.3%	70.0%	6.7%	100.0%
	Commercial driver	Count	2	5	97	9	113
		% within OCCUPANT STATUS	1.8%	4.4%	85.8%	8.0%	100.0%
Total		Count	11	15	142	35	203
		% within OCCUPANT STATUS	5.4%	7.4%	70.0%	17.2%	100.0%

Table C 13: OCCUPANT GROUP AND DANGEROUSNESS OF OFFENCE (OVER SPEEDING)

			DRIVING AT 60km/h IN A 50KM LIMIT				
			VERY DANGEROUS	DANGEROUS	NOT VERY DANGEROUS	NOT AT ALL DANGEROUS	Total
OCCUPANT STATUS	Passenger	Count	8	17	15	20	60
		% within OCCUPANT STATUS	13.3%	28.3%	25.0%	33.3%	100.0%
	Private driver	Count	3	7	20	0	30
		% within OCCUPANT STATUS	10.0%	23.3%	66.7%	.0%	100.0%
	Commercial driver	Count	7	14	92	0	113
		% within OCCUPANT STATUS	6.2%	12.4%	81.4%	.0%	100.0%
Total		Count	18	38	127	20	203
		% within OCCUPANT STATUS	8.9%	18.7%	62.6%	9.9%	100.0%

Table C14 : GENDER AND DANGEROUSNESS OF OFFENCE (OVER SPEEDING)

			DRIVING AT 60 km/h IN 50km/h LIMIT				
			VERY DANGEROUS	DANGEROUS	NOT VERY DANGEROUS	NOT AT ALL DANGEROUS	Total
GENDER	Male	Count	12	25	113	16	166
		% within GENDER	7.2%	15.1%	68.1%	9.6%	100.0%
	Female	Count	6	13	14	4	37
		% within GENDER	16.2%	35.1%	37.8%	10.8%	100.0%
	Total	Count	18	38	127	20	203
		% within GENDER	8.9%	18.7%	62.6%	9.9%	100.0%

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Table C 15: OCCUPANT STATUS AND DANGEROUSNESS OF OFFENCE (DRINK DRIVING)

			DRINK DRIVING			
			VERY DANGEROUS	DANGEROUS	NOT VERY DANGEROUS	Total
OCCUPANT STATUS	Passenger	Count	51	6	3	60
		% within OCCUPANT STATUS	85.0%	10.0%	5.0%	100.0%
	Private driver	Count	23	7	0	30
		% within OCCUPANT STATUS	76.7%	23.3%	.0%	100.0%
	Commercial driver	Count	75	38	0	113
		% within OCCUPANT STATUS	66.4%	33.6%	.0%	100.0%
Total		Count	149	51	3	203
		% within OCCUPANT STATUS	73.4%	25.1%	1.5%	100.0%

Table C 16 : OCCUPANT GROUP AND DANGEROUSNESS OF OFFENCE (UNBELTED FRONT SEAT PASSENGER)

			NOT WEARING A SEAT BELT AS FRONT SEAT PASSENGER				
			VERY DANGEROUS	DANGEROUS	NOT VERY DANGEROUS	NOT AT ALL DANGEROUS	Total
OCCUPANT STATUS	Passenger	Count	49	0	10	1	60
		% within OCCUPANT STATUS	81.7%	.0%	16.7%	1.7%	100.0%
	Private driver	Count	22	4	3	1	30
		% within OCCUPANT STATUS	73.3%	13.3%	10.0%	3.3%	100.0%
	Commercial driver	Count	60	51	2	0	113
		% within OCCUPANT STATUS	53.1%	45.1%	1.8%	.0%	100.0%
Total		Count	131	55	15	2	203
		% within OCCUPANT STATUS	64.5%	27.1%	7.4%	1.0%	100.0%

Table c 17 : OCCUPANT GROUP AND DANGEROUSNESS OF OFFENCE(DRIVING THROUGH ARED TRAFFIC LIGHT)

			DRIVING THROUGH A RED TRAFFIC LIGHT				
			VERY DANGEROUS	DANGEROUS	NOT VERY DANGEROUS	NOT AT ALL DANGEROUS	Total
OCCUPANT STATUS	Passenger	Count	54	2	3	1	60
		% within OCCUPANT STATUS	90.0%	3.3%	5.0%	1.7%	100.0%
	Private driver	Count	24	5	1	0	30
		% within OCCUPANT STATUS	80.0%	16.7%	3.3%	.0%	100.0%
	Commercial driver	Count	67	43	3	0	113
		% within OCCUPANT STATUS	59.3%	38.1%	2.7%	.0%	100.0%
Total		Count	145	50	7	1	203
		% within OCCUPANT STATUS	71.4%	24.6%	3.4%	.5%	100.0%

Table C 18 : OCCUPANT GROUP AND DANGEROUSNESS OF OFFENCE (UNBELTED BACK SEAT PASSENEGER

			NOT WEARING A SEAT BELT AS A BACK SEAT PASSENGER				
			VERY DANGEROUS	DANGEROUS	NOT VERY DANGEROUS	NOT AT ALL DANGEROUS	Total
OCCUPANT STATUS	Passenger	Count	5	15	35	5	60
		% within OCCUPANT STATUS	8.3%	25.0%	58.3%	8.3%	100.0%
	Private driver	Count	4	5	19	2	30
		% within OCCUPANT STATUS	13.3%	16.7%	63.3%	6.7%	100.0%
	Commercial driver	Count	4	3	104	2	113
		% within OCCUPANT STATUS	3.5%	2.7%	92.0%	1.8%	100.0%
Total		Count	13	23	158	9	203
		% within OCCUPANT STATUS	6.4%	11.3%	77.8%	4.4%	100.0%

Table C 19: OCCUPANT STATUS AND ENFORCEMENT (OVER SPEEDING)

			DRIVING AT 60km/h IN A 50km/h LIMIT				
			VERY OFTEN	OFTEN	RARELY	VERY RARELY	Total
OCCUPANT STATUS	Passenger	Count	8	5	31	16	60
		% within OCCUPANT STATUS	13.3%	8.3%	51.7%	26.7%	100.0%
	Private driver	Count	1	5	19	5	30
		% within OCCUPANT STATUS	3.3%	16.7%	63.3%	16.7%	100.0%
	Commercial driver	Count	13	10	89	1	113
		% within OCCUPANT STATUS	11.5%	8.8%	78.8%	.9%	100.0%
Total		Count	22	20	139	22	203
		% within OCCUPANT STATUS	10.8%	9.9%	68.5%	10.8%	100.0%

Table C 20: OCCUPANT GROUP AND ENFORCEMENT (DRINK DRIVING)

			DRINK DRIVING				
			VERY OFTEN	OFTEN	RARELY	VERY RARELY	Total
OCCUPANT STATUS	Passenger	Count	29	16	10	5	60
		% within OCCUPANT STATUS	48.3%	26.7%	16.7%	8.3%	100.0%
	Private driver	Count	2	19	7	2	30
		% within OCCUPANT STATUS	6.7%	63.3%	23.3%	6.7%	100.0%
	Commercial driver	Count	16	96	0	1	113
		% within OCCUPANT STATUS	14.2%	85.0%	.0%	.9%	100.0%
Total		Count	47	131	17	8	203
		% within OCCUPANT STATUS	23.2%	64.5%	8.4%	3.9%	100.0%

Table C 21 : OCCUPANT STATUS AND ENFORCEMENT (UNBELTED BACK SEAT PASSENGER)

			NOT WEARING A SEAT BELT AS A FRONT SEAT PASSENGE		
			RARELY	VERY RARELY	Total
OCCUPANT STATUS	Passenger	Count	23	37	60
		% within OCCUPANT STATUS	38.3%	61.7%	100.0%
	Private driver	Count	23	7	30
		% within OCCUPANT STATUS	76.7%	23.3%	100.0%
	Commercial driver	Count	108	5	113
		% within OCCUPANT STATUS	95.6%	4.4%	100.0%
Total		Count	154	49	203
		% within OCCUPANT STATUS	75.9%	24.1%	100.0%

Table C22 : OCCUPANT GROUP AND ENFORCEMENT (DRIVING THROUGH A RED TRAFFIC LIGHT)

			DRIVING THROUGH A RED TRAFFIC LIGHT				
			VERY OFTEN	OFTEN	RARELY	VERY RARELY	Total
OCCUPANT STATUS	Passenger	Count	29	12	12	7	60
		% within OCCUPANT STATUS	48.3%	20.0%	20.0%	11.7%	100.0%
	Private driver	Count	10	11	4	5	30
		% within OCCUPANT STATUS	33.3%	36.7%	13.3%	16.7%	100.0%
	Commercial driver	Count	13	100	0	0	113
		% within OCCUPANT STATUS	11.5%	88.5%	.0%	.0%	100.0%
Total		Count	52	123	16	12	203
		% within OCCUPANT STATUS	25.6%	60.6%	7.9%	5.9%	100.0%

Table C 23: OCCUPANT GROUP AND ENFORCEMENT (UNBELTED BACK SEAT PASSENGER)

			NOT WEARING A SEAT BELT AS A BACK SEAT PASSENGER		
			RARELY	VERY RARELY	Total
OCCUPANT STATUS	Passenger	Count	17	43	60
		% within OCCUPANT STATUS	28.3%	71.7%	100.0%
	Private driver	Count	6	24	30
		% within OCCUPANT STATUS	20.0%	80.0%	100.0%
	Commercial driver	Count	48	65	113
		% within OCCUPANT STATUS	42.5%	57.5%	100.0%
Total		Count	71	132	203
		% within OCCUPANT STATUS	35.0%	65.0%	100.0%

Table C 24: Comparison of some Traffic offences

	SERIOUSNESS OF OFFENCE				DANGEROUSNESS OF OFFENCE			
	Very serious	Serious	Not very serious	Not at all serious	Very dangerous	Dangerous	Not-very dangerous	Not at all dangerous
riving at 60 km/h in a 50 m/h limit	6.4%	14.3%	69.0%	10.3%	8.9%	18.7%	62.7%	9.9%
rink driving	79.3%	18.2%	2.0%	0.5%	73.4%	25.1%	1.5%	0.0%
ot wearing a seat belt as front seat passenger	16.3%	53.7%	19.2%	10.8%	64.5%	27.1%	7.4%	4.0%
riving through a red affic light	70.4%	26.6%	1.5%	1.5%	71.4%	24.6%	3.4%	0.5%
ot wearing a seat belt as passenger in the back eat	5.4%	7.4%	70.0%	17.2%	6.4%	11.3%	77.8%	4.4%

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Table C 25: Comparison of fines/punishments for some Traffic offences

	Very often	Often	Rarely	Very rarely
Driving at 60 km/h in a 50 km/h limit	10.8%	9.9%	68.5%	10.8%
Drink driving	23.2%	64.5%	8.4%	3.9%
Not wearing a seat belt as a front seat passenger	0.0%	0.0%	75.9%	24.1%
Driving through a red traffic light	25.6%	60.6%	7.9%	5.9%
Not wearing a seat belt as a passenger in the back seat	0.0%	0.0%	35.0%	65.0%

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Table C 26: Correlations between Driver and Front-seat passenger Seat belt use

		Driver	Front-seat passenger
Driver	Pearson Correlation	1	.555**
	Sig. (2-tailed)		.000
	N	143	143
Front-seat passenger	Pearson Correlation	.555**	1
	Sig. (2-tailed)	.000	
	N	143	203

**. Correlation is significant at the 0.01 level (2-tailed).

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Table C 27: Correlations between Driver and Rear-seat passenger Seat belt use

		Driver	Rear-seat passenger
Driver	Pearson Correlation	1	.315**
	Sig. (2-tailed)		.000
	N	143	143
Rear-seat passenger	Pearson Correlation	.315**	1
	Sig. (2-tailed)	.000	
	N	143	203

**. Correlation is significant at the 0.01 level (2-tailed).

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Appendix D: Observation Survey Results

Table D1: Observed Seat belt use in the CBD

Occupant Group	No. observed	No. Belted	Usage Rate
All occupants	2228	354	15.9%
Drivers	1415	277	19.6%
Front-right Passengers	813	78	9.6%
Sex of vehicle occupants and seat belt use			
Male occupants	1863	298	16.0%
Female occupants	365	56	15.3%
Male drivers	1324	242	18.3%
Female drivers	91	35	38.5%
Male Front-right Passengers	539	57	10.6%
Female Front-right Passengers	274	21	7.7%
Vehicle type and seat belt use			
Bus	43	9	20.9%
Minibus	195	11	5.6%
Private car	1238	292	23.6%
Taxi	730	42	5.8%
Truck	22	1	4.5%
Vehicle type and Driver seat belt use			
Bus	36	9	25.0%
Minibus	107	9	8.4%
Private car	828	226	27.3%
Taxi	427	33	7.7%
Truck	17	0	0.0%
Vehicle type and Front-right passenger seat belt use			
Bus	7	0	0.0%
Minibus	88	2	2.3%
Private car	410	66	16.1%
Taxi	303	9	3.0%
Truck	5	1	20.0%

Table D2: Observed Seat belt use in areas outside the CBD

Occupant Group	No. observed	No. Belted	Usage Rate
All occupants	7094	1242	17.5%
Drivers	4504	1058	23.5%
Front-right Passengers	2589	183	7.1%
Sex of vehicle occupants and seat belt use			
Male occupants	6197	1060	17.1%
Female occupants	897	182	20.3%
Male drivers	4251	930	21.9%
Female drivers	253	128	50.6%
Male Front-right Passengers	1944	129	6.6%
Female Front-right Passengers	645	54	8.4%
Vehicle type and seat belt use			
Bus	57	10	17.5%
Minibus	1650	182	11.0%
Private car	3141	860	27.4%
Taxi	1902	148	7.8%
Truck	343	41	12.0%
Vehicle type and Driver seat belt use			
Bus	49	9	18.4%
Minibus	917	164	17.9%
Private car	2150	717	33.3%
Taxi	1190	134	11.3%
Truck	198	34	17.2%
Vehicle type and Front-right passenger seat belt use			
Bus	8	1	12.5%
Minibus	733	18	2.5%
Private car	991	143	14.4%
Taxi	712	14	2.0%
Truck	145	7	4.8%

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Table D3: Observed Seat belt use in outskirts of town

Occupant Group	No. observed	No. Belted	Usage Rate
All occupants	2434	585	24.0%
Drivers	1480	487	32.9%
Front-right Passengers	954	98	10.3%
Sex of vehicle occupants and seat belt use			
Male occupants	2115	510	24.1%
Female occupants	319	75	23.5%
Male drivers	1398	446	31.9%
Female drivers	82	41	50.0%
Male Front-right Passengers	717	64	8.9%
Female Front-right Passengers	237	34	14.3%
Vehicle type and seat belt use			
Bus	46	14	30.4%
Minibus	866	123	14.2%
Private car	1037	372	35.9%
Taxi	300	45	15.0%
Truck	185	31	16.8%
Vehicle type and Driver seat belt use			
Bus	36	14	38.9%
Minibus	461	116	25.2%
Private car	691	287	41.5%
Taxi	186	42	22.6%
Truck	106	28	26.4%
Vehicle type and Front-right passenger seat belt use			
Bus	10	0	0.0%
Minibus	405	7	1.7%
Private car	346	85	24.6%
Taxi	114	3	2.6%
Truck	79	3	3.8%

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Table D4: Overall Results of Seat belt use in the KMA

Occupant Group	No. observed	No. Belted	Usage Rate
All occupants	11756	2181	18.6%
Drivers	7399	1822	24.6%
Front-right Passengers	4356	359	8.2%
Sex of vehicle occupants and seat belt use			
Male occupants	10175	1868	18.4%
Female occupants	1581	313	19.8%
Male drivers	6973	1618	23.2%
Female drivers	426	204	47.9%
Male Front-right Passengers	2935	250	8.5%
Female Front-right Passengers	1156	109	9.4%
Vehicle type and seat belt use			
Bus	146	33	22.6%
Minibus	2711	316	11.7%
Private car	5416	1524	28.1%
Taxi	2932	235	8.0%
Truck	550	73	13.3%
Vehicle type and Driver seat belt use			
Bus	121	32	26.4%
Minibus	1485	289	19.5%
Private car	3669	1230	33.5%
Taxi	1803	209	11.6%
Truck	321	62	19.3%
Vehicle type and Front-right passenger seat belt use	7399		
Bus	25	1	4.0%
Minibus	1226	27	2.2%
Private car	1747	294	16.8%
Taxi	1129	26	2.3%
Truck	229	11	4.8%

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APPENDIX E

District trend of Fatalities and injuries: 2008 and 2009 (Ashanti Region)

District	Year	Casualty Severity			Total
		Fatal	Serious	Slight	
KMA	2008	98	273	375	746
	2009	102	249	481	832
	Total	**200**	**522**	**856**	1578
Atwima	2008	52	163	180	395
	2009	69	179	235	483
	Total	**121**	**342**	**415**	**878**
Amansie West	2008	0	0	0	0
	2009	0	0	0	0
	Total	**0**	**0**	**0**	0
Amansie East	2008	9	45	35	89
	2009	9	26	42	77
	Total	**18**	**71**	**77**	166
Adansi East	2008	13	11	27	51
	2009	30	39	37	106
	Total	**43**	**50**	**64**	157
Adansi West	2008	18	52	42	112
	2009	23	44	47	114
	Total	**41**	**96**	**89**	226
Asante Akim South	2008	25	22	80	127
	2009	18	18	83	119
	Total	**43**	**40**	**163**	246
Asante Akim North	2008	8	29	43	80
	2009	16	52	120	188
	Total	**24**	**81**	**163**	268
Ejisu Juaben	2008	25	54	90	169
	2009	31	94	168	293
	Total	**56**	**148**	**258**	462
Bosomtwe Kwan	2008	7	25	8	40
	2009	6	7	9	22
	Total	**13**	**32**	**17**	62
Kwabre	2008	14	22	28	64
	2009	19	27	35	81
	Total	**33**	**49**	**63**	145
Afigya Sekyere	2008	5	22	38	65
	2009	6	73	91	170
	Total	**11**	**95**	**129**	235
Sekyere East	2008	7	53	61	121
	2009	11	54	64	129
	Total	**18**	**107**	**125**	250
Sekyere West	2008	14	55	68	137
	2009	9	75	153	237
	Total	**23**	**130**	**221**	374
Ejura Sekyedumase	2008	16	34	14	64
	2009	20	45	44	109
	Total	**36**	**79**	**58**	173
Offinso	2008	76	104	181	361
	2009	67	189	227	483
	Total	**143**	**293**	**408**	844
Ahafo Ano South	2008	24	69	84	177
	2009	29	85	53	167
	Total	**53**	**154**	**137**	344
Ahafo Ano North	2008	5	14	39	58
	2009	4	15	32	51
	Total	**9**	**29**	**71**	109
Total in Ashanti region		885	2318	3314	6517

Source: Road Traffic Crashes in Ghana, Statistics 2010. CSIR-BRRI

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