UNIVERSITY FOR DEVELOPMENT STUDIES

SCHOOL OF ALLIED HEALTH SCIENCES

PREVALENCE, INJURY PATTERNS AND TREATMENT OUTCOMES IN VICTIMS OF MOTOR VEHICLE CRASHES AT THE TAMALE TEACHING HOSPITAL IN 2014

DAVID SAMUEL NIGARIM

JULY 2020

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DAVID SAMUEL NIGARIM (Bsc. Emergency Nursing)

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A DISSERTATION SUBMITTED TO THE DEPARTMENT OF COMMUNITY HEALTH, SCHOOL OF ALLIED HEALTH SCIENCES, UNIVERSITY FOR DEVELOPMENT STUDIES IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF SCIENCE DEGREE IN COMMUNITY HEALTH AND DEVELOPMENT

JULY, 2020

DECLARATION

Student

I, the undersigned student, hereby declare that this project is my personal work towards an award of Masters of science degree in Community Health and Development; hence, it does not contain materials previously published by other persons or has been tendered in for the award of a degree by the university, with the exception of where due acknowledgement has been done in-text.

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Name: DAVID SAMUEL NIGARIM

Supervisor

I hereby declare that the preparation and presentation of this thesis was supervised in tune with guidelines on research supervision as established by the University for Development Studies.

Supervisor's signature: …… Date: …….....

Name: DR. ALEXIS DUN BO-IB BUUNAAIM

ABSTRACT

Background: motor vehicle crashes (MVCs) are a daily and normal phenomenon in Ghana, Africa and the world in entirety, which is fast becoming a serious menace in these modern times. This study was done to assess the prevalence, injury patterns and treatment outcomes in victims of motor vehicle crashes that reported at the Tamale Teaching Hospital. **Methods:** a retrospective cross-sectional study design was employed to examine casualties of motor vehicle accidents that were admitted at the emergency unit of Tamale Teaching Hospital in 2014. Purposive sampling technique was applied to obtain eligible participants. A Pre-coded structured questionnaire on the prevalence, injury patterns and treatment outcome was used in the collection of data. The data gathered was examined and cleaned for completeness and analysed with Statistical Package for Social Science (SPSS) windows version 21.0 and excel (2013). **Results:** findings obtained from the study, indicate that 21.2% of road traffic injuries was caused by motorcycle-motor vehicle, 19.6% of injuries was caused by motorcycle-motorcycle, whiles19.3% was caused by motorcycle alone. No statistical relationship was established between patients' educational level and wearing of crash helmet at the time of the injury ($P > 0.191$). The findings showed that 68% of the patient had traumatic brain injury; whiles 14% of the victims had scalp lacerations. 0.8percent of the patients died while on admission. **Conclusion:** motorcycle-motor vehicle mechanism of injury was the most prevalent with males being the most affected gender. **Recommendations** were made with regard to serious education by stakeholder state institutions toward the promotion of safety road practices.

Key words: Road Traffic Injury, Accident and emergency, Tamale teaching Hospital, Motorcycles, Motor vehicle crashes, pedestrians, motor vehicles.

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DEDICATION

I dedicate this research to Janet Fatima Nigarim (Mum), Augustine Nigarim and Charles Nigarim (siblings), Isaac Papanko (cousin) Tilimar Natalie Nigarim (daughter), Freda Tuuli (Natalie's Mum) and Dr. Alexis Buunaiam (supervisor).

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RTI	Road traffic injuries
MVCs	Motor vehicle crashes
WHO	World Health Organization
TTH	Tamale Teaching Hospital
CDC	Center for Disease Control
SCI	Spinal cord injury
TBI	Traumatic Brain Injury
OPD	Out-patient Department
ICU	Intensive care unit
SPSS	Statistical Package for Social Sciences

CHAPTER ONE

Introduction

1.1 Background of study

Motor vehicle crashes (MVCs) are among the leading mechanisms of physical injury and death universally. Traffic crashes are responsible for the death of over a million people universally and further injure a population well above 20million every year (WHO, 2012). The cost burden of illnesses and deaths due to MVCs is of socioeconomic and public health concern to any country (Agbonkhese, Yisa & Daudu, 2013; Agbonkhese et al. 2013).

The number of lives lost each year in motor vehicle crashes is alarming, and ignorance of road safety regulations among several factors could be pointed to as the primary causes of these deaths (Adelson et al. 2013; Eze, 2012). Motor vehicle crash can be defined as an incident - intentional or unintentional - that takes place on a highway or road opened to motor vehicles, which could lead to physical injury or lost of lives, and may include one or more vehicles in motion (Ballard, Ogola & Fleming, 2010). Motor vehicle crashes does also occur when fast moving vehicles bump into other vehicles, pedestrians, animals, or stationary objects such as; trees or a pole etc (Clifton et al, 2011; Ballard, Ogola & Fleming, 2010). Motor vehicle crashes can as well be explained as incidents whose occurrences are random or happening unannounced and or not designed (Adelson et al. 2013).

There are marked variations globally in the manner that roads are utilized and how various degrees of injuries result, which leave significant implications for road safety policies and implementations (Clifton, Coffey & Fourwinds, 2012). For instance, road traffic injuries (RTIs) in heavily motorized nations commonly involve four wheeled vehicle operators, whereas in

many developing countries motorcyclists and passengers of buses for instance and pedestrians are the most affected road users (Ibrahim, Christoph & Schmeinck, 2014; Clifton et al. 2011).

There is as well appreciable distinction in the categorization of these injuries by way of causes; i.e. road infrastructural design as against vehicle design compared to exposure verse predisposing factors such as; speeding without the seatbelt or crash helmet applied. To project the possible effect of diverse road safety policies on the health of a population, an appreciable insight into fundamental patterns of traffic usage and the implication of injury on victims is required (Ifeoma Kofoworola & Duro 2013; Urbano & Oddo, 2012)

Africa faces specific issues exacerbating road crash. Transportation by road dominates the modes of motorized transport, however traffic operations are not safe following many variables, including; bad road use and old vehicle fleet (WHO, 2015; Tuppin, Neumann & Danchin, 2010; Mitchell, Paasche-Orlow & Forsythe, 2010). Motor vehicular traffic generally concentrates at, or near urbanized centers and on specific major roads (Odero, Garner & Zwi, 2015; Ifeoma, Kofoworola & Duro, 2013).

In most countries on the African continent, post accident care is either very poor or nonexistent (Urbano & Oddo, 2012). Above all, with the predisposing factors of motor vehicle crashes, poor governance and commitment account for Africa's worsening situation (Juillard et al. 2010; Urbano & Oddo, 2012). There are also significant shortcomings in awareness and capacity to promote road safety (Mitchell, Paasche-Orlow & Forsythe, 2010). Consequently, investment in safe road infrastructure and policies is limited and motor vehicle crashes (MVCs) continue to rise in Africa (WHO, 2012).

Ghana as well is not exonerated from the public health problem that MVCs present (Afukaar, Antwi & Ofosu-Amaah, 2013). On a regular base, news agencies provide coverage of MVCs to a

wide extent (Coleman, 2014). Media houses - both electronic and print or the National Road Safety Commission (NRSC) of Ghana - publicize this public health issue via media or public platforms in their annual review of data on MVCs (Enu, 2015; Siaw, Duodu & Sarkodie, 2013).

In Ghana, reports have consistently stated that the costs of morbidity and mortality resulting from MVCs impact heavily on the psycho-socioeconomic wellbeing of the victims involved (Agbeboh & Osabuohien-Irabor, 2013; Lee et al. 2010). Although, there exist in some countries surveillance systems for injuries, such information is woefully inadequate (Urbano & Oddo, 2012). There also inadequate information on relative population level cost and the cost effectiveness of various actions undertaken for minimizing RTIs, that creates a chasm in the knowledge required to draw new investment and guide decision-making (Klimo et al. 2014; Muzzarelli, Leibundgut & Maeder, 2010).

In the northern parts of Ghana, motor vehicular crashes are responsible for morbidities and mortalities at the accident and emergency rooms of various health facilities. For instance, the Annual Reports of the Tamale Teaching Hospital (TTH) for (2013), (2014) and (2015), injuries involving motorcycle and other MVCs made it onto the list of top 10 causes of patient admissions in the emergency unit. Admissions for injuries related to MVCs stood at 25.4% in 2013 and 30.3% in 2015 respectively for all patients on admissions. Persons in their productive ages are often those mostly affected by injuries resulting from these accidents (TTH Annual Report 2013; 2014; 2015)

1.2 Problem statement

The spate of fatal motor vehicle crashes is phenomenal in the world (WHO, 2015). Annually, MVCs are estimated to take the lives of over 300,000 people in Africa alone (Ogendi et al.

2013). An accurate report on the numbers is unknown due to the poor accident data reporting and management systems in the sub region (Siaw, Duodu & Sarkodie, 2013; Sampson & Barker, 2014). Motor vehicle crashes are believed to be the 4th principal cause of mortality among victims aged between 5 and 44 years respectively (Adiele, 2011; Ombati, 2012).

Even though, there exist a collated knowledge base on how this canker can be lessened through the right kind of road safety regulations, little is understood of the corresponding cost-effectiveness of such regulations, specifically in third world countries such as Ghana, in which road usage and patterns of injury are distinct compared to the developed world (Arrich et al. 2012; Sumaila, 2013; Agbeboh & Osabuohien-Irabor, 2013).

The impact of road traffic incidents in Ghana and the world at large has been of grave consequence. Notwithstanding the happiness and improvement in the quality of life that comes with possessing vehicles, it has contributed to the demise of many breadwinners and loved relations (Chitere & Kibua, 2012; Nesoba, 2010).

Chen (2010) maintained that the social and economic cost associated with MVCs is huge and the estimated cost of injuries may well be perceived with respect to the economic workforce a country loses. Agbonkhese et al. (2013) added that victims who suffer various degrees of injuries in road crashes no more effectively contribute to the economy. This thus obviously negatively impacts productivity.

The condition and regular maintenance of roads in Ghana has always posed a big challenge (Coleman, 2014). Commuting on these roads, even on major roads in cities, or highways connecting major towns in Ghana, road users are often bedeviled with numerous potholes. Intermittently, unpaved sections, or sections requiring major constructions or repairs, as well as

the negative consequence of bad drains along road infrastructure, are recognized as contributing to MVCs (Coleman, 2014).

Ergonomics such as, negligence on the part of both drivers and pedestrians) also contribute to MVCs in Ghana (Afukaar, Antwi & Ofosu-Amaah, 2013). Other factors include; institutions charged with the responsibility to enforce the law on vehicular use and road safety (including the Police Service, DVLA, Customs Excise and Preventive Service, magistrates, etc). Negligence on the part of drivers has been characteristically recognized as a big problem in MVCs (Muzzarelli, Leibundgut & Maeder, 2010). Similarly, ignorance of traffic safety regulations, driving under the influence of a substance, overly loading commercial vehicles, indiscriminately flouting traffic regulations, corruption and bribery in cases of infringing traffic rules and regulations, road rage, drivers without license, over speeding and wrong overtaking etc. are some factors linked to drivers in Ghana that result in MVCs (Enu, 2015).

Bribery and corruption of especially police officials, in terms of its effect of proper traffic regulation is the chief troubling factor (Agbeboh & Osabuohien-Irabor, 2013; and Afukaar, Antwi & Ofosu-Amaah, 2013). This problem is pervasive in society and compromises driver-vehicular regulation (Coleman, 2014).

Unpublished report available at the emergency unit of the Tamale Teaching Hospital (TTH) indicated that a total of 718 (25.4%) victims of motor vehicle crashes were recorded between May and December (2013). The years 2014 and 2015 respectively recorded 800 and 781 casualties of MVCs. However, no detailed analysis of the prevalence, injury patterns of these casualties resulting from motorcycle and other motor vehicle accidents has been documented which can help in policy formulation and Road safety preventive measures. And that has informed research conducted in this regard to fill that gap in literature.

1.3 Objective of the study

The main objective of this research was to ascertain the prevalence, injury patterns and treatment outcomes observed in motor vehicle crashes at the Tamale Teaching Hospital (TTH) in 2014

1.4 Specific objectives

1. To ascertain the prevalence of motor vehicle crashes caused by different vehicle mold at TTH
2. To ascertain the injury patterns observed in victims of motor vehicle crashes at TTH
3. To ascertain the treatment outcomes of patients of motor vehicle crashes in 2014

1.5 Research questions

1. What is the prevalence of road traffic injuries caused by different vehicles at TTH?
2. What injury patterns are observed in victims of motor vehicle crashes at TTH?
3. What are the outcomes of treatment of patients of MVCs at TTH?

1.6 Significance of the study

Executing this research would help in collecting data based on available information and would provide a clear objective for road safety officials and policy makers to consider in putting in place recommended road safety regulations and campaign strategies. The results of this research would be significant for identifying the possible causes of MVCs in northern region and Ghana at large. If carefully implemented, incidents resulting in loss of life and property, injuries to victims, loss of breadwinners and loved ones in various homes and loss of manpower or labour due to injuries would be reduced. Other interested organizations could use the findings to provide education and training for motor riders in Northern Ghana.

On the issue of medical and nursing researches, the research findings are going to provide basis for doctors, nurses and other related disciplines to collaborate with other relevant authorities to

improve upon the road safety campaign, especially at the Tamale metropolis and surrounding towns and villages. Thus, policy makers could use the findings to make sure that road safety manuals are made available at the Tamale Teaching Hospital to help in educating patients.

1.7 Scope of the study

There are several dimensions of motor vehicle crashes which are worth investigating. However, within the context of this research work, the focus was on the prevalence, injury patterns and treatment outcomes observed in motor vehicle crashes at the Tamale Teaching Hospital (TTH). Only road traffic accidents patients formed the study population. The research was delimited to only 3 specific objectives on the prevalence of road traffic injuries caused by different vehicle mold, injury patterns observed in victims of road traffic accidents and patients disposition.

1.8 Operational definitions

- **Disposition**: the nature of treatment outcomes of patients of motor vehicle crashes.
- **Motor vehicle crashes/ Road traffic accidents**: accidents that occurs when a vehicle collides into other vehicles, pedestrians or any stationary object
- **Road traffic injury**: injuries sustained from vehicular crashes.
- **Motor vehicle**: any four wheeled vehicle used in the transport passengers or goods. E.g. cars, pick-ups, Lorries, trucks and buses.
- **Motorcycle**: two wheeled motorbikes or tricycles. E.g. mapuka, kombian, yellow-yellow, motor king.

- **Accident and emergency**: a unit or department of any health facility that designated to the care patients with severe injuries or sudden illnesses are taken for urgent trauma/ medical attention. It is often abbreviated as 'A&E'.
- **Tamale Teaching Hospital**: it is a tertiary hospital located in the northern regional capital (Tamale) of Ghana, and serves as a major referral center the peripheral health facilities.

1.9 Conceptual framework

The researcher constructed a conceptual framework for the study. The figure below illustrates the variables used.

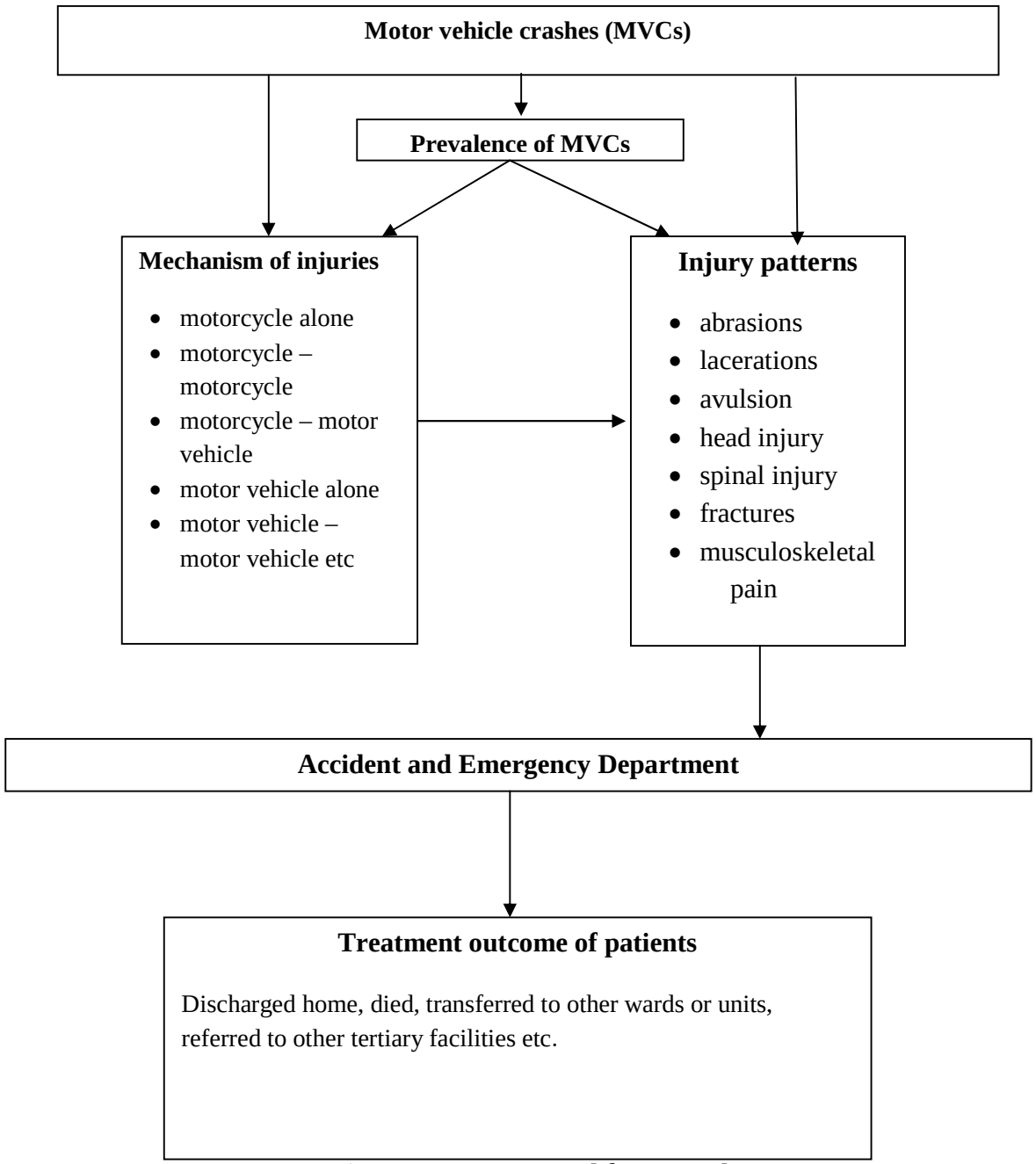


Figure 1.1: Conceptual framework

Source: Author's own construct, 2017

From Figure 1.1, motor vehicle crashes (MVCs) make up the topmost of the figure followed by the prevalence of motor vehicle crashes, which captures the mechanism of vehicular crashes, where the vehicle types involved in road accidents, time and day of MVCs, as well as the demographic information of victims of MVCs among others critically examined.

It was assumed that these identified bio data of patients had the tendency to influence the cause of motor vehicle crashes. For instance, an educated person may have knowledge on road signs and could try to avoid overtaking at a wrong place while the contrary may be for the uneducated person.

The patterns of injury and outcome of treatment of patients who reported at the accident and emergency unit were also looked at in the figure above to determine the particular injuries victims of MVCs present with and the consequence of medical surgical treatment.

1.10 Organization of study

The research is structured into six chapters: Chapter-one contains the background, objectives, research questions, significance and delimitations of the research as well as the conceptual framework. The second chapter reviews literature regarding the subject under investigation. Subsections such as prevalence of road traffic injuries caused by different vehicle mold, injury patterns observed in victims of MVCS and patient disposition are presented.

The third chapter establishes a clear research method employed in doing the research. It contains subsection such as the profile of the study institution, research design, and study

population, sampling technique, sample size determination, data collection procedures, sources of data collection, data validity and reliability, limitations of the study, data processing and analysis as well as ethical considerations.

The fourth chapter deals with the data analysis and presentation, whiles the fifth chapter discusses the analysed data with specific reference to reviewed literature. Chapter-Six summarizes the findings of the research and respectively includes conclusion and recommendations.

CHAPTER TWO

Literature review

2.1 Introduction

This chapter looks at related studies on road traffic accidents. Literature was mostly searched and reviewed through databases such as; CINHL, Medline, Web of Science, Google Scholar and Pub Med. The review was grouped under the following headings; prevalence of road traffic injuries caused by different vehicle mold, injury patterns observed in victims of MVCs, and treatment outcomes.

2.2 Prevalence of road traffic injuries caused by different vehicle mold

Globally, motor vehicle crashes (MVCs) are counted largely as part of social and health problems (WHO, 2015). Motor vehicle crashes is defined or explained as an incident that results on a road or highway that is opened to traffic, leading to increased morbidity or mortality, and involving, at least, one vehicle in motion (Tibebe, Shawndra & Hill, 2016). The costs of death and injuries of persons due to MVCs negatively affect the well-being of society and socio-economic developments (Urbano & Oddo, 2012).

Motor Vehicle Crashes are counted as a principal cause of injury and mortality universally and responsible for more than a million deaths and 50 million injuries annually (Clifton, Coffey & Fourwinds, 2012). In Qatar, Arumugam et al (2015) found that MVCs were the most frequent cause of injury (61%) among other mechanisms of injury. The number of precious lives lost in traffic crashes alone annually has assumed alarming proportions, and this in large part, is attributable to ignorance and carelessness on the highways (Huang, Lunnen, Miranda & Hyder, 2010). Projections made so far point to a rise in figure of about 65% over the next two decades unless concerted efforts are made toward prevention (Ismael and Yahya, 2013).

Public health officials universally have recognized MVCs as a pandemic. Its incidence, however, is alarming in third world countries (Bulto, Dessie & Geda, 2018; Odero, Garner & Zwi, 2015; and Enu, 2015). A report by WHO (2015) indicate that developing countries accounted for 92% of mortality related to MVCs.

In Africa, morbidity and mortality related to MVCs are on the increase (Juillard, Labinjo, Kobusingye & Hyder, 2010) and account for most deaths. MVCs are Africa's third commonest cause of all fatalities and a major mechanism of trauma-related deaths and disability among persons (Tibebe, Shawndra & Hill, 2016).

It is disheartening noting from official data of the NRSC of Ghana, that mortality trend from MVCs has blossomed in consistency since year 2000 - 2010 (NRSC, 2012). Data available indicate a progressive increase in MVC related total deaths annually from 1,578 in 2000 to 1,856 in 2010, (except for 2004, when the number of deaths was reported to be exceptionally high, 2185). Additionally, there was an upward trend of MVCs from 2007 to 2011 per NRSC report (NRSC, 2012).

Matheka et al (2015) indicated that most road crashes (62 percent) in Kenya occurred in susceptible populatios such as: pedestrians, cyclists, motorcyclists etc. They showed MVC related mortality stood at 3,055 in 2010 according to reports of the Kenyan police department, but added that figure was likely to be under estimated since all deaths might not be captured. They added that 54 school children lost their lives, whiles 165 severely injured with 49 sustaining minor injuries in Thika town in year 2012, according official statistics. All victims were either knocked by cyclists or motorcyclists while attempting to cross the road from school. The NTSA as well reported that 13,028 were victims of motor vehicle crashes in year 2013.

A study conducted by Afukaar, Antwi & Ofosu-Amaah (2013) on the epidemiology of MVCs in Ghana also found pedestrians to be the most vulnerable group, and making up to more than 40% averagely of the yearly crash mortalities. More than 65% of pedestrians, who died from MVCs from 2001 to 2011, were within the ages of 1 to 40 years, with males dominating females in terms of deaths.

April, May, August and December recorded the highest number of MVCs, with casualty rates peaking in December, perhaps, from Christmas activities. Their findings revealed that cars predominated in road accidents with buses coming next among vehicle categories (Matheka et al, (2015). Comparatively, an Annual Report (2013) from the Emergency Department (ED) of the Tamale Teaching Hospital (TTH) indicated that a total of 718 (25.4%) victims of MVCs were recorded between May and December 2013. In 2014 and 2015, the total of 781 and 800 casualties of motor vehicle accidents were respectively recorded.

Separate studies conducted in Tanzania and Lagos-Nigeria respectively by Chalya et al (2012) and Ifeoma, Kofoworola & Duro (2013) found that a great number of MVCs were caused by motorcycle alone. Pertaining to the most prevalent of the mechanisms that caused the most MVCs in a mining setting in Ethiopia, Tibebe, Shawndra & Hill (2016) had a contrasting observation; motorvehicle–motorvehicle, motorvehicle–pedestrian and motorcycle-pedestrian were the commonest mechanisms of injuries. In Nigeria, however, Urbano and Oddo (2012) found that the major cause of MVCs was the one involving the motor vehicle alone.

However, in Ghana, Afukaar, Antwi and Ofosu-Amaah (2003) found that the frequent and major cause of MVCs involved motorcycle – motorvehicle mechanism of injuries. A study by Siaw, Duodu and Sarkodie (2013) to assess the trends in road accidents in Ghana, corroborated as it they similarly established that majority (67.4%) of injuries were caused by motorcycle-motor

vehicle, while 32.6% were caused by motorcycle-motorcycle. The study concluded that MVCs in Ghana were on the increase and interventional measures were required to address the menace.

On the other hand, it was found in a retrospective study done in Guinea by Kourouma et al (2019) that passengers, motorcyclists and pedestrians representing a third of victims of MVCs were the most affected group.

In Nigeria, morbidity and mortality caused by MVCs were on the rise and it was reported that the situation was especially alarming on Sundays and Fridays, because of bad road infrastructure and design, inadequate implementation of road laws, population increase, and subsequently the numerical increase in vehicles that ply the roads and highways (Juillard et al. 2010).

In a related study, most severe injuries in Ethiopia - unlike the findings by Chalya et al (2012), where motorcycles dominated in road crashes - were caused by motor-vehicle crashes and thus make it a national health burden. The majority of crashes occurred in the daytime hours, especially, in the mornings and afternoons, involving more of the male gender, and involved persons in the 18-50 age brackets (Tibebe, Shawndra & Hill, 2016; Chalya et al, 2012). However, Matheka et al (2015) in another study to survey road traffic injuries (RTIs) in commercial motor riders in Thika – Kenya, also did find that the vulnerability of persons injured at night was five (5) times higher compared to those injured during the day.

A study done by Bayan et al (2016) to examine the pattern of injuries among victims of MVCs showed most accidents happened on Sundays and Mondays with the least occurring on Wednesdays. The study also revealed that accidents were more likely to occur between 8 PM and midnight and ensued by 4 PM to 8 PM. The findings did reveal also that the mechanism of injury was significantly higher in pedestrian/motorcycle traffic accidents (TA) and lower in passenger. Similarly, Barrimah, Midhet and Sharaf (2012), reported that injuries among victims of MVCs

were usually recorded were highest on Wednesday, Thursday and Friday, with their respective proportion of accidents shown as follows: 15.62%, 15.74% and 14.91%. Whilst Monday recorded the least rate of accidents (13.2%), with a little over 50% of crashes (51.2%) occurring in the day time and 48.8% happening at night. In Ghana however, pedestrian casualties were shown to be significantly higher at night time than daytime at each severity level of comparing fatality rates between daytime and nighttime (Damsere-Dery et al, 2010). Ngunde et al (2019) in a prospective research at four hospitals in Cameroun noticed that injuries related to motor vehicle accidents occurred more during festivities or national celebrations.

In New Zealand, Keall and Newsstead (2012) found that there were generally increased risks for motorcyclists relative to cars, but particularly high risks for motorcycle riders in their 20s, or those who resided in big cities. Meanwhile Tibebe, Shawndra & Hill (2016) found that persons predominantly affected in MVCs were in the age brackets of 18 – 50 years of age.

In the of case motorcyclists with pillions, Chichom-Mefire et al 2015 and Khan et al (2014) both noted that crashes of this category mostly involved females and due to clothing entanglement that led to injury, and did not only affect them but the rider of the motorcycle as well. Children, in some cases, also suffered injuries by this mechanism.

The different causes of MVCs as revealed by Barrimah et al (2012) included; over speeding (43.11percent), wrongfully steering the wheel of vehicles (14.69 percent), vehicles moving wrongfully (14.52 percent), wrongful packing (13.69percent), breaching road signs (1.77 percent), and drivers doping on hard substances (0.01 percent), in addition to other causes (12.21 percent).

In a study conducted in Ghana on pedestrian injury patterns, Damsere-Dery et al (2010) also found that the commonest driver ergonomic resulting in mortal pedestrian injury involved

speeding (44%), then absent mindedness while driving (30%).Ishmail and Yahya (2013) also attributed MVCs prevalence to driving whiles physically and mentally exhausted especially among long distance drivers, over speeding, overloading, incorrectly overtaking other vehicles, bad roads, and poor maintenance culture among vehicle owners. At a hospital in Dilchora, Ethiopia and in Lagos – Nigeria respectively, Bulto, Dessie & Geda (2018) and Atubi (2012) in similar studies also corroborated the findings of other studies that included; excessive speed, disregard for traffic signs and signals, and refusal to use reflective triangles in cases of vehicular breakdowns. Odero, Khayesi & Heda (2003) making reference to other researches done, indicated that most motor vehicle crashes were preventable if vehicle users were discipline on the roads and highways, so as not to indulge acts such as; excessively speeding, wrongful overtaking, drunk driving and overloading. They concluded there was the need for education on behavior change since attitude is a culprit in most cases of MVCs.

In Ghana, injury rates due to MVCs relative to population data rates per 100,000 inhabitants have been recorded, with the highest crash rates 286 in a 100,000 population occurring in the Greater Accra region. These accidents were predominantly low speed ones, which happened in the cities of Accra and Tema respectively. The highest morbidities and mortalities were recorded in Eastern and Central Regions of Ghana, which all share boundaries with Greater Accra region, as well as serve as transitional regions via which major roads and highways from the capital city - Greater Accra – connects to the Kumasi (second largest city), Takoradi (a harbor city in the western region). The lowest crash injuries (approximately 40%) were recorded in northern, upper regions combined (Quansah, Afukaar & Salifu, 2011; Coleman, 2014).

Regrettably, the high incidence of mortalities recorded in crashes involving motor vehicles is preventable. The lack of attentiveness from a percentage of road-user population, especially the

driver population has increasingly exacerbated the prevalence of MVCs. In order to curtail this menace, there is the urgent need for stakeholders to fashion out a predictive model on the trend MVCs against the future (Astrom, Kert & Jovi, 2006; Hazen& Ehiri, 2006).

2.3 Injury patterns observed among victims of motor vehicle crashes (MVCs)

Injuries are on the rise and being considered a public health burden globally. Almost 16,000 lives are lost daily from all manner of injuries and responsible for 12% of the illness pandemic. It is considered as the third most significant cause of overall death among 1-40 year age groups. Among the causes of injuries worldwide, those incurred in motor vehicle crashes remain dominant. The World Health Organisation reports that mortalities from RTIs amount to about 25percent of lives lost from injuries (Supriya et al, 2008). In sub-Saharan Africa, Odero, Khayesi & Heda (2003) noted that 3,000 lives - on the average - are lost universally in traffic crashes alone and more than a million are either injured or perpetually disabled every year. Whiles, Ibrahim et al (2017) in Ikeja, Lagos state University Teaching Hospital, Nigeria, found that road traffic accidents accounted for 35percent (5,629 victims) of the injuries that presented at emergency ward during the course of their study.

In Ghana, Siaw et al (2013) noted that in 2012 alone, the NRSC of Ghana reported that Ghanaians who died through road traffic accidents were 2,249, whiles the injured stood at 14,169. As a result, the world Health Organization has consistently cautioned of a huge number of injuries from motor vehicle crashes in developing countries if the right measures are not kept in place to curb the crisis. Injuries from MVCs portend a great danger to majority of communities globally (Nantulya & Reich, 2002).

Arrich et al. 2012; Klimo et al. 2014 found the head injury among other injuries was captured as the main cause of mortality and disability. Barrimah, Midhet & Sharaf (2012), in a similar study

done in Qassim Region – Saudi Arabia – found also that about two third (63.19%) of victims of MVCs had their heads and necks injured, the lower limbs (27.87%), the upper limbs (18.62%), the trunk (14.11%) and the internal viscera being 1.61%.

In Addis Ababa – Ethiopia, Seid et al (2015) found that head injury constituted up to 50.4% of all bodily injuries sustained by victims. Contusion made up the most of intracranial hemorrhage in 27 victims (54.0percent), whiles subarachnoid hemorrhage was suffered by 4persons (5.8percent) and responsible for the least intracranial bleed accident. Additionally, only 7persons (3.0%) had internal visceral injuries. Kourouma et al (2019) also revealed that asides the commonest injury sites being soft tissues, with 10% of victims experiencing fractures of the lower limbs; the head as well as lower limbs were found to be the bodily regions commonly injured. Most victims had Glasgow coma score of 15/15; however 1.9% of patients had a drastically reduced.

According to Urbano and Oddo (2012), about 5percent of spinal injuries had a second, possibly non adjacent, fracture somewhere along vertebral column. The researchers found that missing out on a spinal injury can present with devastating long lasting complications. As such, spinal injury must always be suspected until proven otherwise. It usually requires arduous efforts to establish a definitive diagnosis especially when multiple organs are involved, competing injuries and altered mentation resulting from head injury, alcohol or substance use can undermine the clinician's judgment. Unrecognized abdominal trauma is a frequent cause of preventable death (Enu, 2015; CDC, 2015).

Most motor vehicle crashes often result in victims getting all manner of injuries ranging from abrasions, minor cuts, lacerations, blunt internal viscera trauma to fractures (Odero, Garner & Zwi, 2015; Siaw, Duodu & Sarkodie, 2013). In india, Supriya et al in 2008 found that the

commonest site of fractures involved the lower limbs, 88 (46.3percent), ensued by the upper limbs, 47 representing 24percent and cranial bone (25) representing 13.2% of the 190 fracture cases that presented at Krishna hospital and Medical Research Center in Karad, Maharashtra. Other sites included the spinal cord, 12 patients (6.3%), ribs, 11 (5.8%) and pelvis 7(3.7%). Total mortality was recorded on 3 patients representing (0.8%). A related research conducted retrospectively in Shanghai – China by Yu et al (2017) involving 2397 subjects, showed that fractures, dislocation of joints, soft tissues and central nervous injuries were those injuries commonly recorded.

In a retrospective based study, Brainard et al (1992) examined the patterns of fractured bones and mechanisms involved in115 consecutive patients. Findings showed that the commonest fracture pattern was tibia-fibula in 39 patients, followed by pelvic fractures observed in 35 victims and femur fractures in 31 clients. A high percentage (90%) of long-bone fractures was from direct-blow mechanism, and pelvic fractures were commonly as a result of lateral-compressive forces. In a related research, Klimo et al. (2014) found that most of the cases of MVCs who presented with fractures also had laceration.

Another study conducted at Hamad General Hospital in Qatar showed that motor vehicle crashes are the commonest mechanism of abdominal injuries (Arumugam et al, 2015). Abdominal trauma ranks third as a cause of mortality and is only preceded by injuries of the head and chest (Arrich et al. 2012; Klimo et al. 2014). Hemorrhage (excessive bleeding) is the initial cause of death in most MVCs, but after 48 hours of injuries sepsis and other complications result in higher incidence of disease and death (Lee et al. 2010). Muzzarelli, Leibundgut and Maeder (2010) revealed that patients on admission at the trauma Ward of a hospital on account of abdominal injuries also suffered abrasions/bruises, polytrauma alongside abdominal organ

injuries. The study revealed that abdominal injuries were usually in the company of other injuries, which resultantly increase morbidity and mortality.

Abdominal injuries are categorized into two (2) based on the mechanism of injury: blunt and penetrating (Raj et al. 2013; Ifeoma, Kofoworolo & Duro, 2013). Blunt abdominal trauma is the commonest injury pattern with MVCs being the predominant aetiology that accounts for approximately 75% (Ifeoma, Kofoworolo & Duro, 2013). Arumugam et al (2015) found that other bodily sites commonly associated with abdominal trauma included; chest (35%), musculoskeletal (32%) and head (24%) injuries respectively. Internal viscera most commonly injured were; the liver (36%) and spleen (32%) respectively, followed by the kidneys (18%), small bowel (12%), large bowel (5%), urinary bladder (4%), and diaphragmatic (2%) injuries. Odero, Garner & Zwi (2015) and Matheka et al (2014) also established in their respective studies that most cases of MVCs presented with musculoskeletal pain and minimal injuries such as, abrasions formed the greater injuries in driver population.

In a retrospective cross-sectional study done in the Upper East Region of Ghana, Kudebong et al (2011) revealed that injuries that resulted from motor vehicle crashes included; head injuries, lacerations, fractures, and contusions. 58 victims suffered contusions and bruises, representing (10.4%); Fractures (humerus, femur etc) were 159 casualties making up 28.6%; 179 (32.2%) victims suffered head injuries; General lacerations were 104 (18.7%) and others such as (dislocations, etc) represented 56 (10.1%).

Seid et al (2015), the bodily parts that were commonly injured included the head (50.4%) and musculoskeletal (especially the extremities) accounting for 47.0% respectively. Out of a total of 230 MVC patients, 130 (56.5 %) sustained open wounds, whereas 12 (5.2 %) of the victims

suffered dislocations. All fracture types were sustained by 177 (78.0 %) of patients, of which lower extremity fractures accounted for by 64 patients (36.2 %); 9 victims of MVCs representing 5.1% suffered pelvic fracture injuries. 19 (8.3%) patients sustained injuries to the thorax, with 10 patients sustaining pneumohemothorax (52.6%) leading in all thoracic injuries and followed by hemothorax and pneumothorax respectively representing 10.5 % each.

TibioFibula fractures were observed in 23patients (4.43percent of the injured in addition to other bodily injuries). 24patients had injuries to the upper limb. 0.96percent had Neck injury (in addition to other corporal injuries, 12patients (2.31percent) had fractured radio-ulna, 42.38percent (220) of cases and 10 (1.92%) sustained Fractured humerus (Satyasi, Shaik & Kishore, 2009).

Spinal cord injury (SCI) can be medically complicated and pose a serious threat to one's life. Historically, SCI is known to have a poor prognosis since it accounts for very high deaths among victims of MVCs. But, in developed worlds, SCI is no longer seen as the termination of a productive life since its associated challenges can be effectively handled. The improved quality of life post injury is as result of improvement in care that offers victims the opportunity to live a meaningful (Burns & O'Connell, 2012).

For example, persons who sustain SCI are now able to gain from advanced emergency care, efficient rehabilitation interventions e.g. respirators and suitable wheelchairs, including an enabling environment and considerable social care services. The outcome being that lives and function are restored consequently. Many people with SCI can now have a longer lifespan, more productive and fulfilled life, than they would have had in times past (Raj et al. 2013; Burns & O' Connell, 2012).

2.4 Treatment or clinical outcomes of traffic accident victims

In a retrospective analysis of patients' data at Hamad General Hospital in Qatar, it was found that the most common causes of death among patients with history of MVCs were unsalvageable traumatic brain injury (TBI), cardiopulmonary arrest and circulatory shock from excessive bleeding. On the other hand, 24 (2.3%) patients died after 24 hours of the hospital admission. Among these 24 patients, 14 died primarily due to severe TBI, 8 developed sepsis and multiple organ failure, one had rupture dissecting aorta, and one had Grade V liver injury with recurrent massive bleeding during postoperative course (Arumugam et al, 2015).

Similarly, Seid et al 2015 also found in Addis Ababa – Ethiopia that the Clinical outcomes of victims of MVC Out of a total of 230 patients understudied, 213 (92.6percent) patients remained alive, whereas 17 (7.4percent) lost their lives whiles still on admission. Patients numbering 165 (77.5percent) were treated and discharged home without any lasting complications, 13patients (6.1percent) were discharged with serious complications such as; severe spine injury, 23patients (10.8percent) were referred to other hospitals for further management, the remaining 12patients (5.6percent) were admitted throughout the study.

Arumugam et al (2015) also found that from the emergency department, 41% of the patients with history of trauma were transferred to trauma ICU, 25% were sent to the operating room for emergency surgery, and 34% were moved to the ward. A total of 86 (8.3%) patients died, of whom 62 (6%) patients died within the first 24 hour of hospital admission. The mean hospital stay, as revealed was 14 days (1-62 days). Overall in-hospital mortality was 454 (22%) of cases. Thirty-nine percent died within 48 hours of injury. Two percent had minor, 12% of moderate and 36% had severe head injured patients expired.

Similarly in Cameroun, Chichom-Mefire et al (2015) in a study showed that 418 casualties (67.3percent) were discharge after having been involved in MVCs, 126casualties (20.3percent) were transferred to the surgical wards or taken to the theatre; whereas 38victims (6.1percent) went to ICU. In a 3-year (2015-2017) retrospective study conducted in hospitals in Guinea, Kourouma et al (2019) reported that of the majority of victims of MVCs who presented to various hospitals, 84% were managed in the emergency room and subsequently discharged without having to be transferred to various hospital wards. The rest of the patients were however transferred to the following departments: surgery (7.8%), orthopedic (2.0%), ICU (0.7%), neurosurgery (<0.1) and 3 % of patients were unaccounted for.

At health facilities in Wolaita , Ethiopia, Hailemichael, Suleiman & Pauolos (2015) found that out of a total of 384 trauma patients, 313 (81.5%) recovered with no lasting complication; 48patients (12.5percent) recovered with lasting complications, 13 (3.4%) were brought in dead, whiles 10 (2.6%) died on discharge. In Nigeria, Ballard, Ogola and Fleming (2010) revealed that most motor vehicle crash victims reported death at the hospital or dead on arrival at home. Similar to some of the outcomes shown by Arumugam et al (2015) in an exploratory laparotomy performed in 27% of the cases of road traffic crashes showed varied results: mortality was 38% in children (≤12 years). Amongst those who survived, 45% had good outcome (GOS 4 or 5), 13% were severely disabled and 19% were vegetative.

In other studies done in a Nigerian Federal State Hospital, Bioku et al (2015) found that 35 patients representing 24.8% requested for discharge against medical advice (DAMA) due to cost of medical treatment or out of fears for amputation. In a related study by Babatude et al (2017), it was revealed, that out of a total of 810 patients with limb injury for the period of the study, 16.2% of the patients requested to be discharged against medical advice (DAMA) with reasons

given by the patients or relatives following a belief in traditional bone setters; pressure from relations, and high cost of hospital care. The study concluded that it causes premature termination of medical care and linked to a various complications and death, re-admission and a higher cost medical treatment.

CHAPTER THREE

Methodology

3.1 Introduction

3.2 Profile of the study institution

This research was carried out at the Tamale Teaching Hospital (TTH), which was initially referred to as the Tamale Regional Hospital. It was officially opened on 2nd February, 1974 by Lt. Col. I. K. Acheampong, Head of State of Ghana at the time. The facility is located at the eastern enclave of the Tamale Metropolis; with a land size of about 490,000 square meters (m^2), of which only122, 500m^2 has been developed.

The facility is located an area with a population of about 4.2million, and was setup to provide tertiary medical care to the people of Northern and Upper Regions especially, portions of volta and Bono-Ahafo Regions respectively. Nationals of neighbouring Ivory Coast, Burkina Faso and Togo also do occasionally benefit from medical services (Annual Report of TTH, 2014).

After 26-years of being a regional referral facility it was eventually granted a teaching hospital status in the latter 2000s, to render tertiary medical care. By the close of 2008, accreditation was obtained for all the four rotations required for houseman-ship training of medical doctors (Annual Report of TTH, 2014).

The facility has developed a strategic plan to cater for the needs of clients from diverse cultures

and communities within and without for over 4 decades now.

The hospital serves as a clinical training ground for schools who undertake programmes in health in and outside of the region. Based on the Ghana Health Service and Teaching Hospitals Act 1996 (Act 525), TTH thus is accorded autonomy albeit subject to policy guidance and strategic direction.

The hospital has the following departments and units that facilitate the management and execution of its objectives: Obstetrics and Gynaecology, Surgery, Accident and Emergency, Internal Medicine, Outpatient (OPD), and Diagnostics. It also has the following Units: Dental, ENT and ICU.

3.3 Research design

A retrospective cross-sectional hospital based study to review the records of motor vehicle crashes.

3.4 Research population and sample size determination

The study population included 260 records of patients of all age groups and gender with history of motor vehicle accidents, who reported at the emergency department (ED) of the Tamale Teaching Hospital in 2014.

3.5 Sampling technique

Purposive sampling technique was employed to trace folders of patients with specific history relevant to the study. The Data were extracted from records of all patients whose mechanisms of injury were on account of motor vehicle crashes and presented at the ED of TTH in 2014.

3.5.1 Inclusion criteria

- All cases of injuries resulting from motor vehicle crashes, which reported at the ED of the Tamale Teaching Hospital in 2014, with his or records available at the records unit at the time of the study.

3.5.2 Exclusion criteria

- All cases of accidents other than motor vehicle accidents, which presented at the ED of hospital in 2014.
- All patient folders with injuries from motor vehicle crashes which were either not recorded or recorded but not specified
- All cases of injuries with the specified mechanism of injuries but with scanty patient information.

3.6 Data collection tool

A structured questionnaire with closed-ended questions was used in the research to collect comprehensive data related to the study variables. The questionnaire was designed in line with the study objectives.

3.7 Data collection processes

Data was gathered using structured questionnaires (data extraction sheets) to draw relevant information from folders/records of victims of motor vehicle crashes, who presented at the Accident Emergency Department in the hospital in 2014. The data extraction lasted for one

month at the hospital where folders of patients were reviewed. The data collection incorporated the socio-demographic information of patients involved in road crashes, prevalence of crashes, patterns of injury and severity and treatment outcomes.

3.8 Quality control

After the data was collected, they were put in a secured place how do you mean be specific after entry into SPSS windows version 21.0 for analysis for the sake of cross-checks and to protect the privacy of patients whose folders were used for the study.

3.9 Study variables

3.9.1 Dependent variable

The dependent variables included outcomes of treatment e.g. death, treated and discharged, transferred to the ward, referred to other facilities for further management.

3.9.2 Independent variables

Independent variables included; age, level of education, marital status, day and time of crash and employment status of study subjects.

3.10 Validity and reliability

Data was collected from folders of patients who were detained or admitted at TTH with respect to the road crash injuries in 2014. The questions were put in simplified language to do away with ambiguity. The questions were appropriate for the study. Data collected were described as they occur without manipulation to avoid bias and obtain accurate information. All the data collected were stored in a safe place to ensure the privacy of the patients.

3.11 Data analysis and presentation

The data was first cleaned, and analysis done using the Statistical Package for Social Sciences (SPSS) windows version 21.0. The presentation of data was done using simple frequency tables mainly. Inferential statistics in the form of Chi-square (χ^2) statistical tests was carried out to consider whether the relationship between the respondents and certain given variables were statistically significant or not. P-values less than 0.05 were considered significant.

3.12 Ethical considerations

Permission was obtained from the management team of the Tamale Teaching Hospital via the research unit. Since human subjects were indirectly involved in the study the researcher did not obtain any informed consent from the patients. However, permission to analyze the data was sought from the management of the TTH. All data collected were confidentially handled.

3.13 Limitations of the study

This was a retrospective study and was thus prone to missing data. A number of folders did not capture certain information of relevance to this study due to poor documentation or inadequate information on patients. Work pressure coupled with time constrains did not allow for the researcher to use a rather longer period and larger sample size. Nonetheless, these did not influence the findings of the study.

CHAPTER FOUR

Data analysis

Results

4.1 Introduction

This chapter presents the results of data that were analyzed from the victims of road traffic accidents in 2014, whose records were available at the time of the data extraction at the study institution. It is presented using mainly tables and pie charts.

4.2. Demographic characteristics of subjects

The study reviewed the demographic characteristics of the victims of road traffic accident on age in years, sex, educational status, marital status and the occupational status of respondents. It is shown in Table 4.1 with each variable heading.

Table 4.1: Demographic data of respondents

Variable		Frequency (260)	Percent (%)
Age (years)	< 15	15	5.8
	15-20	39	15.0
	21-25	68	26.2
	26-30	49	18.8
	31-35	36	13.8
	36+	53	20.4
Sex	Male	195	75.0
	Female	65	25.0
Marital status	Single	135	51.9
	Married	121	46.5
	Divorced	2	0.8
	Widow/widower	2	0.8
Education	Basic	72	27.8
	Secondary	103	39.6
	Tertiary	36	13.8
	Not educated	49	18.8
Occupation	Student	92	35.4
	Self-employed	104	40.0
	Salaried workers	42	16.1
	Unemployed	22	8.5

Source: Records data, 2017

The demographic profile of patient records that were reviewed showed that the minimum age was 6 years and the maximum age was 66 years. From Table 4.1, the modal age group was 21-25 years constituting 26.2% of the total road crash cases reviewed. It also depicted the majority of victims of the MVCs were between the ages of 26-30 years. From the analyses in Table 4.1, 75% of the patients were males whereas the rest were females. There was a single preponderance of

51.9%, whilst the rest were married, divorced, widowed. For the education, 39.6% were secondary school graduates.

The occupational statuses of the road crash victims were also assessed in Table 4.1.

4.3 Prevalence of road traffic injuries caused by different vehicle mold

Table 4.2: Identified causes of injuries in 2014 at TTH Emergency

Variable	Frequency	Percent
Motorcycle alone	50	19.3
Motorcycle-pedestrian	36	13.8
Motorcycle-motor vehicle	55	21.2
Motor vehicle-motor vehicle	14	5.4
Motor vehicle alone	23	8.8
Motorcycle-motorcycle	51	19.6
Motor vehicle-pedestrian	20	7.7
Pillion rider	11	4.2
Total	**260**	**100.0**

Source: Records data, 2017

From Table 4.2 most (21.2%) of the patients injuries were caused by motorcycle-motor vehicle, 19.6% of injuries were caused by motorcycle-motorcycle and 19.3% was also caused by motorcycle alone respectively. Motorcycles were involved in 73.9% of the cases, motor vehicles were involved in 43.1% of the cases; pedestrians were in 21.5% of the cases and pillion riders accounted for 4.2% of the cases seen in 2014.

Table 4.3: Accidents by days and time

Variable	Frequency	Percent (%)
Day		
Sunday	85	32.7
Monday	20	7.7
Tuesday	45	17.3
Wednesday	32	12.3
Thursday	13	5.0
Friday	16	6.2
Saturday	39	15.0
None	10	3.8
Time of accident		
Morning	19	7.3
Afternoon	23	8.9
Evening	156	60.0
Night	57	21.9
None	5	1.9

Source: Records data, 2017

From Table 4.3, majority of the accidents cases were reported on Sundays, representing 32.7% of the total sample population. This could largely be due to the fact that many festivities e.g. church activities, weddings, naming ceremonies, political rallies, and funerals etc., which usually involve large convoys of people accompanying these occasions occur on weekends especially.

Most of the people who attend these occasions may indulge in alcohol consumption and may cultivate the tendency of misbehaving in traffic during these occasions.

From the results also in Table 4.3, 17.3% of the patients involved in motor vehicle accidents occurred on Tuesdays. The rests of the information is shown in the table above. Concerning the time of day that accidents happened, majority (60%) occurred in the evening whereas 21.9% had accidents in the night. The rest have been shown in Table 4.3.

Table 4.4: Age and wearing crash helmet

Variable	**Wearing crashed helmet**	
	Yes n (%)	No n (%)
15-20	3 (7.7%)	36 (92.3%)
21-25	4 (5.9%)	64 (94.1%)
26-30	2 (4.1%)	47 (95.9%)
31-35	2 (5.6%)	34 (94.4%)
36+	3 (5.7%)	50 (94.3%)

Source: Records data, 2017

From Table 4.4, there was no statistical significant relationship between patients age and wearing of crash helmet at the time of the injury (χ^2=1.468; P > 0.917). Of the 245 patients' records containing history of crash helmets usage, 94.3% were not wearing crash helmets at the time road crash.

Table 4.5: Education and crash helmet

Variable	Wearing crashed helmet	
	Yes n (%)	No n (%)
Basic	2 (2.8%)	70 (97.2%)
Secondary	7 (6.8%)	96 (93.2%)
Tertiary	4 (11.1%)	32 (88.9%)
Not educated	1 (2.0%)	48 (98.0%)

Source: Records data, 2017

From Table 4.5, there was no statistical significant relationship between patients educational status and wearing of crash helmet at the time of the accident or crash (χ^2=4.756; P > 0.191). There was also no association between employment status and wearing crashed helmet (χ^2= 5.395; P > 0.145).

Table 4.6: Logistic regression analysis of patients and use of helmet

Independent variables	**P-value**	χ^2	**Odds Ratio (OR)**	**95% Confidential interval**
Sex (male; female)	**0.005**	1.236	1.2	3- 4.2
Age (>15:<15)	**0.00**	3.066	3.7	6.2-9.5
Occupation (formal: informal sector)	0.004	5.395	3.1	6.3- 8.2
Education (educated: non educated)	0.002	4.756	2.1	5-9.2
Marital status (married; single)	0.000	2.105	2.4	8.2- 9.2

Source: Records data, 2017

The demographic factors were marital status, age, occupation, sex and education. Logistic regression analysis yielding odds ratios and Chi-square test were used to test for significant relationships. From the results, it was showed that males were 1.2 times more likely to have worn crash helmet at the time of the accident compared to their females counterparts (χ^2=1.236; OR; 1.2; 95% CI; 3- 4.2; P = 0.005).

The findings from the survey revealed that those who were married were 2.4 times more likely to have worn crash helmet at the time of the accident as compared to singles (χ^2=2.105OR =2.4; 95% CI: 8.2- 9.2; P < 0.001).

4.3.1 Calculation of prevalence of MVCs in 2014 based on collected data

Prevalence of motor vehicle accidents in 2014 at the accident and emergency department was calculated using the illustration below:

Prevalence = n/total No. of admissions seen in 2014 at the ED x 100

Where; n = number of road crash cases recorded in 2014 at the ED

= 718/2,023 x 100

= 0.3549 x 100

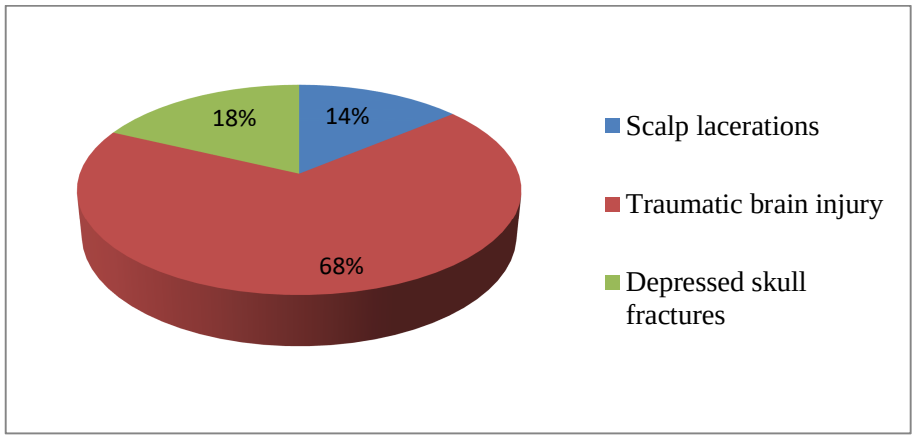
= 0.3549 x 100

= 35.5%

The period prevalence for data retrieved of MVCs recorded at the ED in 2014 was found to be 35.5%

4.4 Injury patterns observed in victims of traffic accidents

Figure 4.1: Head injury



Source: Records data, 2017

From Figure 4.1, majority (68%) of the patients' records showed that they had traumatic brain injury whiles 14% of the victims had scalp lacerations.

Table 4.7: Rating of traumatic brain injuries (TBI)

Variable		Frequency	Percent
	Mild TBI (GCS=13-15)	46	75.4
	Moderate TBI (GCS =9-12)	10	16.4
	Severe TBI (GCS= 3-8)	5	8.2
	Total	**61**	**100.0**

Source: Records data, 2017

From Table 4.7, most (75.4%) patients who suffered traumatic brain injury were mild (GCS=13-15) whilst the rest were rated as shown in the table.

Table 4.8: Lumbar/sacral spine injury

Variable	Frequency	Percent
Lumbar/sacral spine	1	100.0
Total	**1**	**100.0**

Source: Records data, 2017

From Table 4.8, 1 had lumbar/sacral spine injury per the records of the traffic road accidents patients.

Table 4.9: Types of fractures

Variable	Frequency	Percent
Depressed skull #	9	18.4
Shoulder/ clavicular/rib #	4	8.2
Humerus #	5	10.2
Colles #	2	4.1
Femur #	7	14.3
Tibia/fibula #	13	26.5
Phalangeal/carpal/tarsal #	4	8.2
Pelvic #	3	6.1
Maxillofacial #	2	4.1
Total	**49**	**100.0**

Source: Records data, 2017

From Table 4.9, most (26.5%) of the road traffic accident victims had Tibia/fibula fractures, whilst the least types of fractures were recorded as; Maxillofacial and Colle's fractures, evenly distributed at 4.1%. It is also worth stating that few of the traffic accident patients (11.2%) had at least more than one fractures.

Table 4.10: Dislocation

Variable	Frequency	Percent
Knee	1	50.0
Carpal/tarsal	1	50.0
Total	**2**	**100.0**

Source: Records data, 2017

From Table 4.10, 1 road traffic patients each evenly distributed at 50% had knee and carpal/tarsal dislocation.

Table 4.11: Chest, abdominal and other bodily injuries

Variable	Frequency	Percent
Rib #	1	0.5
Pneumothorax	1	0.5
Hemopneumothorax	1	0.5
Abdominal/ other bodily injuries		
Abdominal organ injuries	1	0.5
Laceration/degloving/avulsion	85	40.9
Abrasions/bruises	62	29.8
Mangled hand/foot	4	1.9
Polytrauma	2	1.0
Musculoskeletal pain	46	22.1

Source: Records data, 2017

From the Table 4.11, majority, representing 40.9% of patients, detained at the accident and emergency department as a result of motor vehicle accidents suffered laceration/degloving/avulsion, 22.1% suffered musculoskeletal pain, whereas, 29.8% of the patients had abrasions/bruises. 1.90 and 1.0 percent of victims of traffic accidents represented mangled injuries and polytrauma respectively. 0.50 percent patients each had abdominal organ injuries, hemothorax, pneumothorax and rib fractures respectively as shown on the table.

4.5 Patient outcomes

Table 4.12: Outcome

Variable	Frequency	Percent
Treated and discharged from the ED	183	70.4
Died on admission	2	0.8
Trauma ward	32	12.3
Neurosurgery ward	18	6.9
ICU	6	2.3
Discharged against medical advice	9	3.4
Referred to another facility	1	0.4
ENT Consult	8	3.1
Opthalmology consult	1	0.4
Total	**260**	**100.0**

Source: Records data, 2017

From Table 4.12, majority of the patients who presented at the emergency department in 2014 with traffic injuries represented 70.4%, and were treated and discharged from the emergency

ward, whereas 12.3%, 6.9% of the patients were transferred to the trauma, and neurosurgical wards respectively. A significant group representing 3.4% was discharged against medical advice to seek for treatment elsewhere, especially among traditional healers.

CHAPTER FIVE

Discussion of results

5.1 Introduction

This chapter of the study closely monitors at the main findings of the study and relates them to available literature where appropriate.

5.1.1 Demographic data of respondents

From the results, majority of the subjects under study were in their youthful ages (table 4.4). The researches done by Afukaar, Antwi & Ofosu-Amaah (2013) and Chalya et al (2012); support this finding. The trend observed presents a serious problem as most of the victims were in their productive ages and usually double as breadwinners of families (Bulto, Dessie & Geda, 2018). The high number of the recorded cases attributed to this age group is however not surprising, especially in the Tamale metropolis, where motorcycles are the commonest means of transport and are highly patronized by the youth, who out of exuberance fail to heed to traffic regulations and rules (Bulto, Dessie & Geda, 2018).

The results as well indicate that males were three times more likely to be involved in road traffic accidents as compared to the female gender, which is in consonance with the study carried out by Afukaar, antwi and Ofosu-Amaah (2013); Hailemichael, Suleiman & Pauolos (2015). The observed pattern could probably be due to the daring and careless nature of males on the roads and highways, and owning most of these motor vehicles as compared to their female counterparts, who exercise more control over their exuberance in their daily endeavours.

The youth being affected the most could portend grave economic misfortunes to families, as injuries to these young men or women tend to tear down the support system for most homes. The death of a husband or wife can result in difficulty providing for their families, payment of fees

and other bills. Aside, families and survivors of MVCs may encounter serious psycho-socioeconomic burdens.

The analysis showed that 40% were self-employed similar to the finding of Chalya et al (2012); where about 60% of victims were found to be self-employed. This can be significantly attributed to the fact that motorcycles and tricycles have become a source of employment for the many unemployed youth, who dwell in either the cities or hinterlands. They also serve as a common means of transport to rural dwellers for their farming and trading activities.

5.2 Prevalence of motor vehicle crashes caused by different vehicle mold

The prevalence of road crashes that reported at TTH in 2014 was found to be 35.5% based on a total admission of 2,023 cases, out of which 718 victims reported with RTIs. This finding agrees with a study in Ethiopia by Bulto, Dessie & Geda (2018); where the prevalence of road crashes similarly stood around 35.1% among other causes. Of the entire road crash mechanisms outlined in Table 4.2, motorcycles were involved in 73.9% of cases followed by motor vehicles with 43.1%, similar to the findings of Chalya et al (2012).

5.2.1 Mechanism of injuries

Motor vehicle crashes have physical, socioeconomic and psychological implications. Fatalities, physical disability, and morbidity from road accidents predominantly affect the young and the economically productive age groups. From observations of patients who later report for reviews at the Tamale Teaching hospital, survivors often times have to endure a diminished quality of life from deformities and disabilities, posttraumatic stress disorder and lost personal income, especially in a country like Ghana not well known for exceptional rehabilitation services.

The worst phenomenon is the population of casualties or patients who are unable to foot their medical expenses or those that develop a phobia (extreme fear) for traveling which is normally occasioned by a feeling of not being safe in plying the roads or highways.

From the study results, 19.3% of the reviewed cases were involved in motorcycle alone. This statistics especially within the Northern part of Ghana is not surprising. In festive occasions within the Tamale metropolis, one is left with no option but to be amazed at the display of so called "riding or driving skills or aptitudes" usually by the young population. They would, in most instances, usually crash in their attempt to show how skilful they are during such exciting moments. The good news is when there are no fatalities. This finding from the study points to the high patronage of motorcycles especially the "Mapuka" as it is commonly referred to in the Tamale metropolis. This finding however is at variance with the study done by Siaw, Duodu and Sarkodie (2013), where the mechanism of crashes involved mostly motorcycle-motor vehicle.

From the results, 21.2% of patients' injuries were caused by motorcycle-motor vehicle, which correspond to the findings of Afukaar, Antwi &Ofusu-Amaah (2016); and Siaw, Duodu & Sarkodie (2013) in their research also captured motorcycle-motor vehicle as one of the main causes of MVCs on Ghanaian roads and highways. The results above point to the significant role that motorcycles play in the Ghanaian transport sector as an alternative means of transportation especially in northern and rural Ghana. They are comparatively cheaper and provide the convenience of travelling irrespective of time, nature of road, distance or destination and are readily available to the populace. From the analyses of patient records, an overwhelming majority of 94.6% of motorcyclists and pillion riders – mostly females and children - were not wearing crash helmet at the time of accident and this agrees with the findings of Chichom-Mefire

et al (2015); Khan et al (2012) & Chalya et al, 2012; where most motorcyclists (a whooping number were without crash helmets at the time of accident.

Everyone who rides a motorcycle is probably aware of the usefulness of a crash helmet when riding. However, use of crash helmet when riding in the Tamale Metropolis especially and its environs has been anchored on a social construct or belief among many motorcyclists that one is not civilized if he or she uses a helmet or leaves the side mirrors on, as well as the ineffective use of the law binding on motor riders to use protective gear. The reasons mentioned above could probably explain why majority of subjects were not using crash helmets at the time of accidents.

From the results, 13.8% of the patients involved in motor vehicular crashes were motorcycle-pedestrian. This finding from the research is in tandem with the one conducted by Barrimah et al (2012). It is worth mentioning that in the Tamale metropolis, especially at traffic control points, the uncertainty of people's behaviour in a complicated traffic situation implies that it is unusual for the occurrence on traffic accident.

However, if greater attention was paid to educating road users at reducing speed and generally being careful in densely populated areas, and or, making efforts at improving the designs of roads as recommended by Ifeoma, Kofoworola & Duro, 2013; to ensure an infinitesimal interaction between pedestrians and vehicles; such as providing pavements, footbridges or overhead walkways with appropriately designed and crash-protective interfaces in-between road infrastructure and vehicles could help reduce MVCs on our roads.

It was also revealed in the study that 7.7% of injuries were motor vehicle-pedestrian related. This result from the research was similar to a study done in Ethiopia by Tibebe, Shawndra and Hill (2016), where familiar findings were established. The finding by Chalya et al, 2013; however

differs from this research finding as pedestrian vulnerability in road crash incidents was shown to be highest.

Also, from the results concerning time of accidents, the study showed that 32.7% of cases were recorded on Sunday. Sundays are busy days especially in the Tamale metropolis and surrounding towns and communities. It is a day set aside by majority of Christian denominations to observe their Sabbath or religious activities. As a result there are normally rush hours in the period of the morning - when majority of Christians drive, ride or walk along the streets in an attempt to get to their various worship centers – and the period when majority of church goers close.

On the other hand, some Islamic ceremonies such as; 'Amariya' (Islamic weddings) and outdooring and naming ceremonies as well as political activities are mostly observed on Sundays, and make it a busy day, thus increase the risk of traffic crashes. Researches by Bayan et al (2016) &Ngunde et al (2019) corroborated this as they noticed a rise in road traffic injuries (RTIs) on Sundays and during festive periods or national day celebrations.

The study results also revealed that most of motor vehicle crashes (17.3%) were recorded on Tuesday. This finding however disagrees with related studies done by Bayan et al (2016) and Barrimah, Midhet and Sharaf (2012), where majority MVCs were recorded on Wednesday, Thursday and Fridays. It could also be seen from the study that 15% of all the MVCs were recorded on Saturday. This finding by the study disagrees with one conducted by Juillard et al. (2010), where most of the cases of traffic crashes were recorded on Friday.

From the results obtained, 60% of the MVCs were recorded in the evening, which agrees with a research conducted by Bayan et al (2016), who also established that most MVCs occurred in the time zone between 4-8pm. Evenings usually mark rush hours in most urban or densely populated areas. These mark the period of the day that most traders, professional of various kinds, students

and pupils, as well as all manner of persons are usually in a mad rush to retire from the day's arduous activities. This would normally result in the streets becoming choked with motorcycles, cars, pedestrians and et cetera. As a consequence of the mad rushes, most road users fail to observe proper traffic rules and regulations, which lead to these unfortunate crashes.

This finding where most of the crashes occurred in the evening does not agree with that of Matheka et al (2015), who found that most accidents occurred in the day hours. They however conceded that road users were about five times more likely to be injured at night compared to day, but does not conform to the findings of Tibebe, Shawndra and Hill (2016), where majority of cases were rather recorded in the afternoon hours. The difference observed at the various times of the day that traffic accidents occurred the most in both studies could be the effect of the different geographical settings or perhaps the seasons of the year. From the study, a small percentage (8.9%) of the cases was recorded in the afternoon.

5.3 Injury patterns observed in victims of MVCs

The problem of injuries resulting from motor vehicular crashes indeed pose as a serious issue, but it is not one without a solution should concerted actions be taken by all stake holders towards its curtailment.

From the results, 68 percent of patients who had head injuries also suffered traumatic brain injuries (TBI). In table 4.7; 46patients (75.4%) had mild head injury (GCS between 15/15 – 13/15), 10 (16.4%) suffered moderate TBI (12/15 – 9/15), whereas 5 victims representing 8.2% had severe to critical TBI (GCS of between 8/15 – 3/15). The results as shown above agree somewhat with the study done by kourouma et al (2019), where majority of patients with head injuries had a Glasgow Coma Score (GCS) of 15/15, whereas 1.9% had severe to critical scores.

Patients who had head injuries also suffered other competing injuries alongside as revealed by Yu et al (2017), who, in a related research also did find that head injury was among the three frequently diagnosed injuries among traffic accident victims. Kourouma et al (2019) also found that the head was one of the two foremost bodily sites easily injured in motor vehicle crashes. Kudebong et al (2011) also showed that 179 patients representing 32.2% of the study population were diagnosed of head injury.

This study beyond the Glasgow Coma Scale (GCS) classification however falls short of other emphasis placed on specific head injury diagnoses based on advanced radiological imaging such as Computer Tomographic (CT) scan or Magnetic Resonance Imaging (MRI) , as were the case of Addis Ababa – Ethiopia by Seid et al in 2015, where contusion was found to constitute the majority of intracranial hemorrhage in 27 (54.0 %) of the cases, whiles subarachnoid hemorrhage was sustained by 4(5.8 %) of the victims and accounting for the least intracranial hemorrhage accident. It is significant to note that among the cases of head injury per this study, 18.4% of the subjects had depressed skull fractures. This could be linked to the non use of crash helmets by motorcyclists in the northern regions of Ghana (especially in the Tamale metropolis and its environs).

The findings in Table 4.9 show that most cases of fracture injuries involved the tibio-fibula bones, making up to 26.5% of all fractures. This finding is similar to that of Ngunde et al (2019); where tibia and femur bones separately were the commonest bones affected with tibia and fibula bone fractures responsible for 25percent of all fractures. The similarity between the two separate study results lends some credence to the fact as depicted by so many other researches that the tibia and fibula bones are more likely to be broken in road crashes than any other bone in the body, although, Arumugam et al (2015); found that non specified fractures of the limbs (32%)

were less compared to chest injuries (35%). Yu et al (2019) also listed fractures of all kinds as one of the three most important causes of road traffic injuries. This study showed other bodily sites that were fractured to include: femur 7(14.3), Humerus 5(10.2) phalangeal/carpal/tarsal bone (8.2%), pelvic 3(6.1%), colles 2(4.1%) and others.

As regards soft tissue injuries, the results showed that 29.8% of the cases had abrasions or bruises of the skin; whereas 40.9% of the victims suffered laceration, degloving and avulsion injuries. These findings agree with studies done by Klimo et al (2014) and Muzzarelli, Leibundgut and Maeder (2010) where similar results were established.

It is imperative to note however that as with many related research outcomes, such as found by Yu et al (2017), where 40.6% of all traffic injury patients had other related injuries as against 59.4% of cases who were diagnosed of a single injury, it was similarly found that of the MVC victims who reported at the ED of TTH either had single or multiple injuries.

5.4 Patient treatment outcomes

Most casualties of people are either injured or killed on our roads and highways on a daily base regardless of the gender or age of the victims, who are either walking or riding to work, school, and or hawking on the streets or setting out on long trips, may be badly injured or die from their injuries all the same. Thus, leaving behind families and communities at large shattered. Majority of these victims are usually rushed to the ED within 24hrs of crash for prompt life and limb saving interventions to be carried out as established by other studies. Many of these patients are either discharged or die on admission, or referred to other facilities or specialized units from the ED for further management (Hailemichael, Suleiman and Pauolos, 2015; Chalya et al, 2012).

The results reveal that 70.4% of the cases were reported to have been treated and discharged from the emergency department. This agrees to findings of similar studies done elsewhere by

Kourouma et al, 2019 and Chichom-mefire et al, 2015. This however is not the case compared to the finding of Chalya et al, 2012; where most victims were rather transferred to the general surgical units for further management after they had been stabilized at the ED. This difference in outcome could stem from the differences in the severity of injuries sustained by subjects of the two separate studies. It is not surprising though that over 70percent of the study subjects per the analysis only suffered soft tissue injuries such as; lacerations, abrasions, musculoskeletal pain, which in most instances pose no ominous consequences to life and are easily treatable.

The result of the study also indicate that a total of 25.8% patients were either transferred to various units as their conditions had been stabilized at the ED or referred to other facilities for further management. From the ED, 32patients (12.3%) were sent to Trauma and Orthopedics, Neurosurgery and ICU received 18(6.9%) and 6(2.3%) patients respectively. The ICU candidates were transferred possibly for critical care and advanced airway management as in the case of Chalya et al, 2012. Other patients who had need for ENT and Ophthalmology consults were also referred accordingly.

A total of 2patients representing 0.8% of cases died on admission, which bares similarity with the finding of Hailemichael, Suleiman and Pauolos (2015), where 23patients (6%) died whiles admitted at the ED. But, the percentage attributed to those who died on admission per the results of this research was way lower, perhaps, because lower study subjects. The result however is at variance with the finding of Ballard, Ogola and Fleming (2010), where some cases of MVCs were brought in dead on arrival at the ED.

Also, from the findings, 12.3% of the cases with fracture and joint related injuries were stabilized and subsequently transferred to the Trauma and Orthopedics ward of the Tamale Teaching

Hospital. This result from the study agrees with the study done by Arumugam et al. (2015), where some cases of MVCs were referred to the Trauma ward for further management.

Also, from the findings, 3.4% of the patients - especially those with fractures - were reported to have sought for discharged against medical advice (DAMA), perhaps, because of cost of medical treatment, fear of amputation or a belief in the efficacy of traditional medicine, which agree with similar findings by Boiku et al (2015) and Babatude et al (2015).The assumption among fractured patients especially is that once you are on admission at the hospital for treatment, then you are consenting to amputation in the likely event. Such fears could drive them to make the request to be discharged against medical advice, so as to seek alternative treatment elsewhere.

It was also revealed that 6.9% of the cases were referred to the Neurosurgery unit of the Tamale Teaching Hospital. This perhaps could be related to patients who had neurosurgery related injuries and required neurosurgical consult. This finding may or may not agree with the study done by Chichom-Mefire et al (2015) since patients who were transferred to the surgical unit were not specified or categorized.

CHAPTER SIX

Summary, conclusion and recommendations

6.1 Summary of findings

Motor vehicle crashes occur globally with its incidence being greater in third world countries. About 1.24 million people die each year as a direct consequence of traffic crashes. Injuries from MVCs are the major cause of mortality among young people, aged 15–29 years (Agbonkhese et al. 2013). Somewhere around 91% of the world's deaths on the highways occur in low and middle-income nations, although those countries have close to half of the world's vehicles. Half of those dying on the world's roads are "vulnerable road users". They include pedestrians, cyclists and motorcyclists (Sumaila, 2013). Projections indicate that without any form of action, motor vehicle accidents are predicted to cause deaths involving about 1.9 million people annually (Eze, 2012).

The demographic characteristics of the subjects under the study revealed the modal age group to be 21-25 years, constituting 26.2% of the total accident cases reviewed, with 75% of the patients being males. The results showed that 40% of the patients were self-employed, while 39.6% of the patients were secondary school graduates.

The period prevalence of MVCs in 2014 at TTH from retrieved data was 35.5%. Concerning the prevalence of road traffic injuries caused by different vehicle mold, findings showed that 21.2% of patients' injuries were caused by motorcycle-motorvehicle, 19.6% of injuries were caused by motorcycle-motorcycle and 19.3% was also caused by motorcycle alone. However note that motorcycles were involved in 73.8% of cases, whereas motor-vehicles were involved in only 41.3% of cases. Hence making motorcycle crashes the most prevalent.

The results showed that, 68% of the patients' had traumatic brain injury whiles 14% of the victims had scalp lacerations. The findings showed that, 70.4% of the patients were treated and discharged from the emergency ward, whereas 12.3%, 6.9% of the patients were transferred to the trauma, and neurosurgical wards respectively.

However, a significant group representing 3.4% opted to be discharged against medical advice to seek alternative treatment elsewhere, especially among traditional bone setters. More than individual interventions, however, combined enforcement strategies are the most efficient way to respond to the burden of road traffic injuries, because they benefit from significant synergies on the cost side, while generating greater overall health gains on the effect side.

6.2 Conclusion

In conclusion, the study reveals that youth were more prone to be involved in MVCs and males found to be more susceptible than their female counterparts. The ratio of males to females was found to be 3:1respectively.

Sundays were found to be days on which majority of the accidents occurred. Road crashes were found to be more rampant in the evening hours, followed by the night ours.

Motorcycle - motorvehicle mechanism was found to be the commonest mechanism among the various mechanisms of injuries listed in Table 4.2; followed by motorcycle - motorcycle and motorcycle alone mechanisms in their respective order. However, motorcycles were found to be more involved in crashes than motor-vehicles.

The proportion of injuries attributable to motorists not wearing crash helmets at the time of crashes was quite huge. The results showed that TBI was the commonest head injury among the subjects, with majority of them in this injury category rated as mild TBI.

The study also established that the tibia and fibula bones were more likely to be fractured and followed by the skull. However, lacerations/degoving/avulsion topped in all injury categories. The results showed that most of the subjects who were admitted at the ED in 2014, were treated and discharged; with some of them requesting to be discharged against medical advice (DAMA). Other patients were also referred to various units, wards or other facilities appropriate for further management of their specific injury.

6.3 Recommendations

- The government should address laxity by the Motor Transport and Traffic Directorate (MTTD) of the Ghana police Service in enforcing traffic laws related to driving and motorcycling so as to ensure sustainable compliance by operators, especially, in the Tamale metropolis and its environs.
- The National Road Safety Commission should revise and standardize training courses for drivers of vehicles and motorcyclists in Ghana, particularly in Northern and Upper regions, so as to ensure road-user proficiency. Regular refresher courses and awareness campaigns should be made mandatory for drivers and motorcyclists pertaining to their knowledge levels. These could be done by means of seminars, workshops, mass media, banners et cetera and efforts geared its sustenance.
- The Drivers and Vehicle Licensing Authority (DVLA) should issue certificates to only road users, who are cleared from regulated driving schools.

- The emergency rooms and various specialized units in each health facility in and around the Tamale metropolis should be well resourced to manage various degrees of RTIs in order to save lives and limbs. Doctors and nurses working in various emergency units or centers should regularly be evaluated for knowledge gaps regarding the management of RTIs, especially the life-threatening ones.
- Hospital staff education on customer care should be regularly organized and strictly enforced to ensure customer satisfaction and trust in mainstream health system, in order to cut down on discharges against medical advice (DAMA). Efforts should be made towards incorporating traditional healers or bonesetters into the mainstream health system so as to reduce the burden of complications on victims who opt for alternative treatments.
- The National Health Insurance Scheme should extend treatment to capture the management of fractures, spinal and head injuries so as to lessen the burden of cost on victims of MVCs.

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APPENDICES

QUESTIONAIRE

SECTION 'A'

DEMOGRAPHIC INFORMATION OF VICTIMS OF MOTOR VEHICLE CRASHES

Folder Number……

1. DAY: 1. Sun [ ] 2. Mon [ ] 3. Tues [ ] 4. Wed [ ] 5. Thurs [ ] 6. Friday [ ] 7. Sat [ ]
2. TIME: 1. Morning [ ] 2. Afternoon [ ] 3. Evening [ ] 4. Night [ ]
3. GENDER: 1. Male [ ] 2. Female [ ]
4. AGE……...
5. MARITAL STATUS: **1.** Single [ ] **2.** Married [ ] **3.** Divorced [ ] **4.**widow/widower
6. EDUCATION: **1.** Basic [ ] **2.** Secondary [ ] **3.** Tertiary [ ] **4.** Not educated [ ] **5**. Not specified [ ]
7. EMPLOYMENT: 1. Student [ ] 2. Private Employee [ ] 3. Government employee [ ] 4. Self employed [ ] 5. Unemployed [ ]
8. NHIS: Yes [ ] No. [ ]

SECTION 'B'

PREVALENCE OF MOTOR VEHICLE CRASHES CAUSED BY DIFFERENT VEHICLE MOLD

9. Mechanism of injury

1. Motorcycle alone [ ]
2. Motorcycle - pedestrian [ ]
3. Motorcycle – motor vehicle [ ]
4. Motor vehicle – motor vehicle [ ]
5. Crash helmet use:
    1. Yes [ ] 2. No [ ] 3. Not documented [ ]
6. Motor vehicle alone [ ]
7. Motorcycle – motorcycle [ ]
8. Motor vehicle – pedestrian [ ]
9. Pillion rider [ ]
10. Motorcycle – Stationary object

SECTION 'C'

INJURY PATTERNS OBSERVED IN VICTIMS OF MOTOR VEHICLE ACCIDENTS

10. Diagnosis of injuries

1. Head Injury:

1. *Scalp laceration [ ]*
2. *Traumatic brain injury*
    1. *Mild TBI (GCS = 13 – 15)*
    2. *Moderate TBI (GCS = 9 – 12)*
    3. *Severe TBI (GCS = 3 – 8)*
3. *Depressed skull fracture [ ]*
4. *Basal skull # [ ]*

2. Spinal injury:

1. *C-spine [ ]*
2. *Thoracic spine [ ]*

i. *Lumbar/sacral spine [ ]*

3. Fractures (#):

1. *Depressed skull/ Facial #[ ]*
2. *Teeth/Mandibular/Maxillar # [ ]*
3. *Spinal # [ ]*
4. *Shoulder/clavicular/ rib #[ ]*
5. *humerus # [ ]*
6. *Radio/ulna # [ ]*
7. *Colles # [ ]*

8. *Femur # [ ]*
9. *Tibia/fibula # [ ]*
10. *Phalangeal/carpal/tarsal # [ ]*
11. *Ankle joint # [ ]*
12. *Foot # [ ]*
13. *Pelvic # [ ]*

4. Dislocations:

1. *Shoulder joint [ ]*
2. *Elbow joint [ ]*
3. *Wrist [ ]*
4. *Hip [ ]*
5. *Knee [ ]*
6. *Ankle joint [ ]*
7. *Carpal/tarsal [ ]*
8. *Tempromental [ ]*

5. Chest injuries:

1. *Rib #* [ ]
2. *Hemothorax* [ ]
3. *Pneumothorax* [ ]
4. *Hemopneumothorax* [ ]
5. *Blunt chest trauma* [ ]

6. Abdominal organ injuries [ ]

7. Laceration/degloving/avulsion injuries [ ]

8. Abrasions /bruises [ ]
9. Mangled injuries of hand/foot [ ]
10. Polytrauma [ ]
11. Musculoskeletal/soft tissue pain [ ]
12. Blunt abdominal trauma [ ]

SECTION 'D'

PATIENT DISPOSITION

10. Outcome

1. Treated and discharged from the ED [ ]
2. Died on admission [ ]
3. Trauma ward [ ]
4. Neurosurgery ward [ ]
5. ICU [ ]
6. Operation theatre [ ]
7. Discharged against medical advice [ ]
8. Referred to another facility [ ]
9. ENT
10. Ophthalmology consult [ ]
11. Dental consult