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Prevalence and risk factors for motorcycle accidents presenting to the Korle-Bu Teaching Hospital, Ghana

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Abstract

Introduction: Road traffic injury is of great public health concern, as it stands as the eighth leading cause of death globally with the most affected being the youth aged 15-29 years. It is projected that by 2030, road traffic deaths will become the fifth leading cause of death globally unless urgent action is taken to avert it. Lack of employment has forced many youths in Sub-Saharan Africa into the commercial use of motorcycles known commonly as "*Okada"* business. Unfortunately, most of these riders do not undertake any formal and structured training or are licensed to be riders. Motorcyclists are among the most vulnerable road users in Ghana; they contribute to about 34% of all road traffic injuries. There is a progressive increase in motorcycle-related accidents as a result of the rise in the use of these bikes for commercial transport despite it being illegal. Statistics from the National Road Safety Commission of Ghana indicate that in 2020 road traffic crashes involving motorcycles killed 1,056 and injured 4,684 commuters. The primary aim of this study is to identify the prevalence and the associated risk factors for motorcycle accident cases and to assess the knowledge of motorcyclists' on-road regulations on admission at the Korle-Bu Teaching Hospital, a national referral point for all emergency cases in Ghana.

Methods: The study employed a cross-sectional design that used a structured questionnaire to collect data from 200 respondents using a systematic sampling technique for enrolment. Pearson's Chi-square test statistics were used to estimate the association between helmet usage and respondents' knowledge level of road regulations on selected socio-demographic characteristics.

Results: The results revealed that demographic characteristics such as age ($p < 0.001$), marital status ($p<0.001$), education ($p=0.035$) and occupation ($p=0.002$) have shown a strong association with helmet use. Further analysis conducted on respondents' knowledge level of road regulations showed a statistically significant association with their education ($p < 0.001$), religion ($p=0.001$) and occupation ($p=0.006$). Less than 40% of the participants reported insuring their motors and having valid national health insurance. The accident victims attributed the cause of their situation to non-adherence to road signs and overspeeding.

Conclusion: Motorcycle-related accidents could be reduced through law enforcement agencies, continuous mass education using all media available and helmet use. Also, there should be a collaboration between all road sectors and road users to find a solution to the current motor accident trend.

Keywords: Road injuries; Motorcycle accidents; Korle-Bu Teaching Hospital; Ghana

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1. Introduction

The motorcycle is one of the most common and popular modes of transport in Africa and other Asian countries, and it predominantly provides the travel needs of obligatory work trips. However, a small proportion of motorcycle trips do cater for most business-related services (milk/newspaper/food/courier delivery), recreation, social and other purposes. According to the World Health Organization (WHO), approximately 1.35 million lives are cut short globally as a result of a road traffic crash every year. Between 20 and 50 million more people suffer non-fatal injuries, with many incurring a disability as a result of their injury. The majority of these people are vulnerable road users, pedestrians, motorcyclists, and cyclists [1].

Road traffic accidents kill an average of four persons daily in Ghana. Also, motorcycle crashes recorded a 21.75% increase in 2020, spiking to 5,684, compared to 4,643 in 2019 [2]. The Ashanti, Eastern, Greater Accra, Central and Brong Ahafo Regions of Ghana account for more than 70% of the total number of crash fatalities. Road users between 16-45years are the most vulnerable group and account for 58% of total road crash fatalities [3]. These high accident rates, in part, can be attributed to the consumption of alcohol. Alcohol consumption reduces the perceived negative consequences of risk-taking, which increases the willingness to take risks after drinking [4].

The World Health Organization (WHO, 2013) identified the improper or non-use of motorcycle crash helmets as one of the five high-risk factors for road safety. The effect on death may be attributed to other factors surrounding the crash, such as the speed at which the motorcyclist was travelling when the crash occurred. A study done by Ackaah & Afukaar, (2010) in Ghana, found the difference in helmet use among different age groups. Helmet use was recorded as the highest among the elderly (>50 years), followed by adults (26-50 years) and young people (<26 years) [5].

The objective of this study is to identify the prevalence and the associated risk factors for motorcycle accident cases and to assess the knowledge of motorcyclist on-road regulation at the Korle-Bu Teaching Hospital in Ghana.

2. Methods

2.1. Profile of Study Area and Population

Korle-Bu Teaching Hospital (KBTH) established on 9th October 1923 is the premier healthcare facility in Ghana located in the Greater Accra Region to address the health needs of the indigenous people under the administration of Sir Gordon Guggisberg, the then British Governor of the Gold Coast during the colonial regime. The hospital gained "Teaching Hospital" status in 1962 when the University of Ghana Medical School (UGMS) was established for the training of medical doctors. At the moment, the hospital has 2,000 beds and 17 clinical and diagnostic Departments/Units. It has an average daily attendance of 1,500 patients and about 250 patient admissions. The Accident Centre in the Trauma Emergency Unit of the Hospital sees an average of 30 new trauma cases per day including children with a yearly visitation of about 10,800. The unit sees all forms of trauma with motor or vehicle-related cases forming the majority of cases**.** The study population involves all patients aged 18 years and above that were engaged in motorcycle-related accidents and presented to the Accident and Emergency Unit of KBTH. All patients that were conscious from the time of the accident till the time of discharge were sampled. All minors were excluded from the study.

2.2. Study Design and Method

This study adopted the descriptive quantitative data collection approach to study the factors influencing high motorcycle accident cases among admitted patients at the hospital at the time of recruitment. A descriptive survey research design is the most suitable, especially when the study aims to create a detailed description of a problem.

2.3. Data Tools

The study used a primary data collection approach, involving the use of a structured questionnaire. This instrument was developed based on the research literature review and the research objectives. A well-structured questionnaire comprising closed-ended questions was administered to participants to obtain information using English or a local language that they will understand.

2.4. Sample Size and Sampling Technique

The sample size was calculated using Cochran's formula as shown below at a 95% Confidence Interval and a 5% margin of error, considering a 37% prevalence motorcycle accident rate from previous literature [6].

$$n = \frac{Z^2 \times pq}{e^2},$$

Where,

- ***n*** = sample size [7]
- ***Z*** = the z-score that corresponds with a 95% confidence interval which is 1.96
- ***p*** = reported proportion of motorcycle accident cases which is 37%
- ***q*** = Proportion of accident cases which are not due to motorcycle
- ***e*** = Margin of error set at 7% (0.07).

Hence,

$$n = \frac{(1.96)^2 \times (0.37) \times (0.63)}{(0.07)^2} \cong 182.75$$

A non-response rate of 10 %, resulting in about 18 respondents was added to the projected sample size to get 200 participants. A systematic sampling technique was used to enrol the individual participants in the study. Respondents that were available at the time of data collection and consented to participate in this study were recruited.

2.5. Data Analysis

STATA statistical software package (*StataCorp.2007. Stata Statistical Software. Release 16. StataCorp LP, College Station, TX, USA*) was used to analyze the data from completed questionnaires. Univariate analysis was adopted to establish the frequency and percentage distributions of the responses. Pearson's Chi-square (χ^2) tests were employed to determine the association of selected variables with chosen response indicators. The threshold for statistical significance was set at a p-value less than 0.05.

3. Results

3.1. Socio-demographic Characteristics of the respondents

Of the total 200 motor accident study respondents, the majority 66 (33%) were in the 18-25 years age bracket. On the distribution of the respondents' attained highest educational level, those in Junior High School 66 (33.0%) formed the majority among the accident victims. This was followed by Senior High School graduates (32.5%) with the least being those with no formal education. Regarding the gender distribution of the study participants, males representing 99.0% constituted the majority of the accident cases. The singles (56.5%) accounted for the majority within the marital scope, while only 4% accounted for accidents within the divorce categories. The majority of the victims are Christians (68.5%) followed by Islam (30.5%), while those in the "Other" category accounted for only 1.0%. About 85% have various livelihood activities ranging from artisanship (33.5%) to petty trading. Meanwhile, (7.5%) were unemployed while students also accounted for 7.5% of the respondents. Those who ride motor as their main livelihood accounted for 24.5% of the accident victims.

Regarding the rider's experience in motor riding (in years), the majority 169 (84.5%) had less than 15 years of riding experience. Six of the respondents had as long as over 26 years of riding experience, which accounted for (3.0%). Again, 80 (40%) had no rider's license. Of those who ever had, 27.0% reported it has expired and had not renewed their license at the time of responding to the survey. A majority (47.5%) of the respondents were not actively enrolled in the National Health Insurance Scheme (NHIS), while 21.0% of them have never enrolled in the scheme. Most of the accidents reported at the Accident Unit occurred during nighttime (52.0%). Upon reaching the unit, the death rate accounts for 2.5%, while 30.5% falls within the critically injured category. The majority, 67.0% sustained slight injuries. About (56.5%) were in a crashed helmet before the accident occurred. The majority (54.5%) of the accident victims are rightful owners of the motorbikes (ownership) (Table 1*).*

Table 1 Demographic information of the respondents

Age	**Freq. (N=200)**	**Percent (%)**
18-25	66	33
26-30	38	19
31-35	48	24
36-40	18	9
41-45	4	2
46-50	20	10
>51	6	3
Education		
None	17	8.5
Primary	19	9.5
Junior High School (JHS)	66	33
Senior High School (SHS)	65	32.5
Tertiary	33	16.5
Gender		
Female	2	1.0
Male	198	99.0
Marital		
Single	113	56.5
Married	79	39.5
Divorced	8	4,0
Religion		
Christian	137	68.5
Islamic	61	30.5
Others	2	1.0
Occupation		
Artisan	67	33.5
Motor Rider	49	24.5
Office Worker	31	15.5
Trader	23	11.5
Unemployed	15	7.5
Student	15	7.5
Duration for bike riding		
≤15	169	84.0
16-20	21	10.5
21-25	4	2.0

≥26	6	3.0
License Status		
Invalid	54	27.0
None	80	40.0
Valid	66	33.0
NHIS Status		
Active	63	31.5
Inactive	95	47.5
Never Enrolled	42	21.0
Time of Accident		
Day	96	48.0
Night	104	52.0
Outcome of Accident		
Critical Injury	61	30.5
Dead	5	2.5
Slight Injury	134	67.0
Helmet Usage		
No	87	43.5
Yes	113	56.5
Owner of the motorbike		
No	91	45.5
Yes	109	54.5

3.2. Knowledge of cyclist on road regulations

From Table 2 below, the majority 156(78.05%) of the respondents have heard of road regulations before. Out of the 156 who heard of road regulations on motor riding, workshop attendance accounted for the least (7.67%). However, those who attributed their source of information on motor riding to "*Other sources*" represent the majority. The respondents were again assessed on various road signs. These were categorized as follows;

- A-Prohibitory Signs
- B -Mandatory Signs
- C -Informatory Signs and
- D- Breakdowns and Accident Signs.

The riders were more familiar with the Prohibitory, Mandatory, and Informatory signs with few of them having some knowledge of the Breakdown and Accident signs. Even though the respondents were of the view of knowing prohibiting signs, upon proper assessment, the majority could not remember the signs or responded as "I don't know" (65.0%).

Table 2 Regulatory information

Have you ever heard about road regulations	**Freq. (N=200)**	**Percent (%)**
No	44	22.00
Yes	156	78.00
Which source provided you with the information? (n=156)		
Seminars	36	23.08
Television	28	17.95
Workshop	12	7.69
Others	80	51.28
What of the following are part of the road regulation signs?		
A	2	1.0
AB	8	4.0
ABC	27	13.5
ABCD	34	17,0
AC	1	0.5
ACD	2	1.0
AD	1	0.5
B	3	1.5
C	5	2.5
CD	3	1.5
D	2	1.0
I don't know	112	56.0
Which of the following is a prohibitory sign?		
A	12	6.0
AB	16	8.0
ABC	18	9.0
AC	13	6.5
B	6	3.0
BC	2	1.0
C	3	1.5
I don't know	130	65.0
Which of the following forms part of a mandatory sign?		
A	19	9.5
AB	14	7
ABC	16	8
AC	10	5
BC	2	1
C	5	2.5
I don't know	134	67

3.3. Perceived factors contributing to motorcycle Accidents

The perceived factors that play a role in a motor accident were critically assessed using Likert scales. The majority of the respondent disagreed (58.0%) that motor accidents occurred as the result of riders being inexperienced. In contrast, (14.5%) believed that some riders are inexperienced and that may contribute to a motorcycle accident.

Responding to dazzling lights on the riders as a contributing factor, the majority (74.5%) still disagreed with the assertion, while 20.5% also strongly disagreed. However, only 29 (2.0%) agreed with the assertion. About 53% disagreed obstruction on the part of the riders could contribute to a motor accident. Only a handful agreed (19.0 %) that, the obstruction could lead to road accidents during ridding.

About 46 (23.0%) felt that excessive speeding is one of the major causes of motor accidents. The defective lights assessment saw a rating of 10(5.0%). Few of the respondents (5.0%) have expressed their opinion that defective light was a risk factor for a motor accident. Pedestrians on the roads have accounted for 15.5% of motor accidents, according to the respondents. The respondents, on the other hand, thought that apart from the variables mentioned above, mechanical fault (3.0%), improper overtaking (5.5%), and the use of alcohol (21.0%) during riding also account for motor accidents. Negligence by the motor riders on our roads has however accounted for (11.0%) of road accidents (**Table 3**).

Table 3 Motor accident contributory factor

Inexperience on the side of the rider	**Freq. (200)**	**Percent (%)**
Agree	29	14.5
Disagree	116	58.0
None	3	1.5
Strongly Agree	8	4.0
Strongly Disagree	44	22.0
Dazzling lights		
Agree	4	2.0
Disagree	149	74.5
None	4	2.0
Strongly Agree	1	0.5
Strongly Disagree	41	20.5
Obstruction		
Agree	38	19.0
Disagree	106	53.0
None	3	1.5
Strongly Agree	16	8.0
Strongly Disagree	37	18.5
Excessive speeding		
Agree	46	23.0
Disagree	85	42.5
None	6	3.0
Strongly Agree	18	9.0
Strongly Disagree	45	22.5

Defective lights		
Agree	10	5.0
Disagree	134	67.0
None	1	0.5
Strongly Agree	4	2.0
Strongly Disagree	51	25.5
Pedestrians		
Agree	31	15.5
Disagree	94	47
None	5	2.5
Strongly Agree	15	7.5
Strongly Disagree	55	27.5
Mechanical defects		
Agree	6	3.0
Disagree	128	64.0
None	3	1.5
Strongly Agree	3	1.5
Strongly Disagree	60	30.0
Negligence by the motor rider		
Agree	22	11.0
Disagree	106	53.0
None	6	3.0
Strongly Agree	6	3.0
Strongly Disagree	60	30.0
Improper overtaking		
Agree	11	5.5
Disagree	125	62.5
None	1	0.5
Strongly Agree	3	1.5
Strongly Disagree	60	30
Level erosions		
Agree	16	8.0
Disagree	126	63.0
None	2	1.0
Strongly Disagree	56	28.0
Poor roads		
Agree	16	8.0

Disagree	127	63.5
None	1	0.5
Strongly Agree	2	1.0
Strongly Disagree	54	27.0
Overloading		
Agree	8	4
Disagree	123	61.5
None	1	0.5
Strongly Agree	2	1
Strongly Disagree	66	33
Confusion		
Agree	31	15.58
Disagree	121	60.8
None	2	1.01
Strongly Agree	3	1.51
Strongly Disagree	42	21.11
Talking of alcohol or other substances		
Agree	42	21
Disagree	99	49.5
None	1	0.5
Strongly Agree	8	4
Strongly Disagree	50	25
Does not know road signs		
Agree	60	30
Disagree	100	50
None	9	4.5
Strongly Agree	3	1.5
Strongly Disagree	28	14

3.4. Bivariate Analysis of Demographic Information and Usage of Helmet

Demographic information associated with helmet usage was analyzed using Pearson's Chi-Square test at a 95% Confidence interval (CI). It was realized that variable such as Victim's age ($p = 0.001$), Marital Status ($p = 0.001$), Educational level ($p = 0.035$) and Occupation ($p = 0.002$) are statistically associated with helmet usage during riding. However, the respondent's Gender ($p = 0.852$) and Religion ($p = 0.544$) showed no significant statistical association with helmet usage among the study participants (Table 4*).*

Table 4 Association between demographic information and helmet usage

Variable	Helmet Usage		p-value
	No n (%)	Yes n (%)	
Age			
18-25	40 (60.61)	26 (39.39)	0.001*
26-30	14 (36.84)	24 (63.16)	
31-35	24 (50.00)	24 (50.00)	
36-40	3 (16.67)	15 (83.33)	
41-45	0 (0.00)	4 (100.00)	
46-50	4 (20.00)	16 (80.00)	
>51	2 (33.33)	4 (66.67)	
Marital Status			
Divorced	5 (62.50)	3 (37.50)	0.001*
Married	22 (27.85)	57 (72.15)	
Single	60 (53.1)	53 (46.90)	
Sex			
Female	1 (50.00)	1 (50.00)	0.852
Male	86 (43.43)	112 (56.57)	
Education			
Junior High School	28 (42.42)	38 (57.58)	0.035*
Primary	139 (68.42)	6 (31.58)	
Senior High School	31 (47.69)	34 (52.37)	
Tertiary	8 (24.24)	25 (75.76)	
None	7 (41.18)	10 (58.82)	
Religion			
Christian	56 (40.88)	81 (59.12)	0.544
Islamic	30 (49.18)	31 (50.82)	
Others	1 (50.00)	1 (50.00)	
Occupation			
Artisan	25 (37.31)	42 (62.69)	0.002*
Office Worker	8 (25.81)	23 (74.19)	
Motor rider	20 (40.82)	29 (59.18)	
Trader	11 (47.83)	12 (52.17)	
Unemployed	11 (73.33)	4 (26.67)	
Student	12 (80.00)	3 (20.00)	

3.5. Associations between Victim's Demography Information and Road Regulations

Bivariate analysis was conducted on whether the victim's demography is associated with the respondents' knowledge level of road regulations. As seen in the above analysis, the same result was seen in this section of the analysis. The victims Age (p= 0.173), Marital Status (p=0.286), Sex (p=0.450) are not statistically associated with road regulations however, Education (p=<0.001), Religion (<0.001) and occupation have a strong statistical association with road regulations (Table 5).

Table 5 Associations between victim's demography data and road regulations

Age	Knowledge of Road Regulations		P-Value
	No	Yes	
18-25	21(30.43)	48(69.57)	0.174
26-30	8 (27.59)	21(72.41)	
31-35	7(17.95)	32(82.05)	
36-40	2(9.09)	20(90.91)	
41-45	2(8.00)	23(92.00)	
46-50	3(23.08)	10(76.92)	
>51	1(33.33)	2(66.67)	
Marital Status			
Divorced	0(0.00)	8(100.00)	0.286
Married	17(21.52)	62(78.48)	
Single	27(23.89)	86(76.11)	
Sex			
Female	0(0.00)	2(100.00)	0.450
Male	44(22.22)	154(77.78)	
Education			
Junior High School	21(31.82)	45(68.18)	<0.001
Primary	10(31.82)	9(31.82)	
Senior High School	3(4.62)	62(95,38)	
Tertiary	0(0.00)	33(100.00)	
None	10(22.00)	7(78.00)	
Religion			
Christian	44(32.12)	83(67.88)	<0.001
Islamic	0(0.00)	61(100.00)	
Others	44(22.0)	156(78.0)	
Occupation			
Artisan	15(22.39)	52(77.61)	0.007
Office Worker	0(0.00)	31(100.00)	
Motor rider	18(36.73)	31(63.27)	
Trader	5(21.74)	18(78.26)	
Unemployed	4(26.67)	11(73.33)	
Student	2(13.33)	13(86.67)	

4. Discussion

Findings from the study showed that about a third of the motor accident victims are within the age bracket of 18 to 24 years with more of them having completed Junior High School. The most affected victims are single males, of which the majority are Christians. Most of them are artisans by profession while some are commercial motor riders for their source of livelihood. These findings were similar to those observed by Begg (2010), which noted that motor victims in New Zealand who reported at health facilities with multiple injuries are mainly males with lower educational backgrounds [8]. In a study by Sami (2013), it was reported that most victims of motor accidents are less educated and for that matter, the state should play a role in assisting them with road signs. This study further revealed that most of the riders have been riding for over a decade yet only one out of three has a valid license with three out of ten having an active health insurance status. It was also observed that most of the accidents occurred during the night time with 30.5% reported in critical medical conditions [9]. Kudebong *et al*., (2011) reported that about 71% of motor riders do not possess valid licenses and only 13% of riders have insured their motors and possess valid motor insurance [10].

A study conducted by WHO (2004) indicates that most victims of road traffic injuries are from developing countries who do not have the requisite skills for riding and have no formal training in motor riding [11]. Similarly, the U.S National Higher Traffic and Safety Administration (NHTSA) in 2006 reported that about 13 cars out of 100, 000 ended up in fatal crashes and the rate of motorcycles crash was 72.34 per 100,000 registered motorcycles [12].

Wearing a helmet is the single most effective way of reducing head injuries and fatalities resulting from motorcycle crashes. From this study, 56.5% reported wearing helmets when the accident occurred. Pickrell and Starnes, (2008) pointed out that an unhelmeted motorcyclist is 40% more likely to suffer a fatal head injury and 15% more likely to suffer a nonfatal injury than a helmeted motorcyclist in the same crash. They also estimated that a helmet reduces the likelihood of a crash fatality by 37%. Most of the motors that were involved in an accident were used by their rightful owners (54.5%) [13]. This is similar to a report by the Bolgatanga Municipal Health Administration, Annual Report, (2008) that about 95% of the accident victims own the motorbikes [14].

There was an observed high knowledge level (78.0%) of motorcyclists on road signs, with the majority stating their source of information from other non-traditional media sources. About 14.5% thought that motor accident occurs as a result of inexperience on the part of the riders. The commonest sign known by the riders is the prohibitory sign. This supports the study at LEKMA Hospital [15]. According to Ngim and Udozen (2007), motorbike accident occurs as a result of non-adherence to traffic regulation. According to them, the lack of education is a direct factor [16]. In Iran, it was recorded that, negligence on the part of the riders causes 34% of motor accidents (Pourhossein, 2003) [17].

4.1. Perceived Factors Contributing to Motorcycle Accidents

About 14.5% of the respondents alluded to riders' inexperience and 23,0% hinted at overspeeding as a contributory factor to motor accidents. However, the majority (58.0%) disagree with this assertion. These findings were in contrast to the study conducted in Nigeria by Aworemi *et al*., (2019), which that mentioned over 75% of traffic accident situations in Nigeria can be attributed to inexperience on the part of the riders [18]. Also, Huang and Preston (2004) confirm that in 2016 almost all motor accidents were caused by inexperienced riders in the Tamale Metropolis in northern Ghana [19].

In this study, only 2.0% agreed that dazzling lights from approaching vehicles contribute to motor accidents. A recent study by the Royal Automobile Club (RAC),(2018) found that an estimated 16.1% of drivers in the UK experience some form of headlight dazzle, where 89% of motorists said they get distrusted by incoming high vehicle lights. About six in ten drivers said they are unable to tell if headlights are dipped or on full beam [20]. A recent report published by the National Road Safety Commission (NRSC) in Ghana, stated factors including unnecessary speeding, lack of proper judgment of drivers, inadequate experience, carelessness, wrong overtaking, recklessness, intoxication, overloading, machine failure, dazzling and defective light, boredom, unwillingness to alight from motion objects skid and road surface defect, level crossing and obstruction. Other factors are inadequate enforcement of road laws and traffic regulations, use of mobile phones when driving, failure to buckle the seat belt and corruption [21].

This study, however, recorded 23.0% of respondents who thought that motor accident victims brought to KBTH were the result of excessive speeding. In India when road accident was becoming rampant, it was observed that the physical layout of the road and its surroundings can both encourage and discourage speed. They added that crash risk increases as speed increases, especially at road junctions and while overtaking as road users underestimate the speed and overestimate the distance of an approaching vehicle. Drivers' speed choice is influenced by several factors that can be considered driver-related factors (age, sex, alcohol level, number of people in the vehicle); factors relating to the road

and the vehicle (road layout, surface quality, vehicle power, maximum speed); traffic-related and environment-related factors (traffic density and composition, prevailing speed, weather conditions) [22].

Road defects could not be underestimated in this study. About 8.0% of the victims of the accident were of the view that the bad nature of our road and the neglect of maintaining the road had caused them to be motor victims. A study conducted in Tanzania reported bad road networks contributed to 67% of road accidents of which 48% of them were motor riders [23]. Regarding traffic lights, the respondents acknowledged that non-functioning lights and the non-availability of road signs contribute strongly to the frequent occurrence of motorbike accidents in the region. About 30% of the victims said the ridders were not adhering to road signs.

4.2. Bivariate analysis of demographic information and usage of helmet and road regulations

Age as a demographic variable was observed in this study to be statistically associated with helmet usage (p=<0,001). This reflects the finding in a similar study by (Huang, 2013) that documented a p-value of 0.011 as the measure of association between age with helmet use. In Tanzania, the age of the ridders after assessment strongly supports the assertion (p=0.031) (Bland, 2018). In another related study conducted among 567 riders, it was revealed that adult riders tend to be responsible and that those who ride carelessly general are singles who do not have their own family [24]. It was also observed in this study that the respondents' marital status tends to be strongly associated with helmet usage (p = 0.001).) According to the Centers for Disease Control and Prevention (CDC), the purpose of the helmet laws for riders is to reduce the number of severe and fatal head injuries when involved in crashes [25]. Motor helmets, when used properly, reduce head injuries and fatalities.

Other socio-demographic indicators that showed a very strong statistically significant association with helmet use among riders include the reported educational level (p = 0.035) and occupation (p = 0.002). However, one's gender (p = 0.852) and religious affiliation (p = 0.544) were found to have no statistical association with helmet usage during riding. This, however, contradicts a study conducted in Wa, where gender and religion were found to correlate strongly with helmet use and knowledge of road regulations [26]. In the Bolgatanga Municipality, the bivariate analysis performed on demography and road regulation among 871 respondents shows that education (p=0.021) and respondents' age (p=<0.001) are statistically associated with road regulation whereas the rest of the demographic attributes have no association [27].

5. Conclusion

From the analysis, it was noticed that most of the respondents do not adhere to road traffic regulations. This could be attributed to the age factor and marital status. From the report, the married and middle-aged respondents are more in compliance with traffic regulations than the young and the single. Also, the respondents have a very low level of education. This is also attributed to neglect from both government and other stakeholders. Another observation made was overspeeding, non-compliance to road signs and poor road network. Lastly, non-helmet usage contributed to serious and critical and even fatal medical conditions compared to other factors causing road accidents.

Compliance with ethical standards

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Authors' contributions

This work was carried out in collaboration with all authors. AM and SM participated in conceiving the study and in the development of data collection tools. AM carried out data collection. AM and SM participated in the data analysis and drafting of the manuscript. All authors read and approved the final manuscript.

Disclosure of conflict of interest

All authors declare no conflict of interest.

Statement of ethical approval

Ethical approval to undertake the study was obtained from the Ethics Review Board of Ensign Global College. Also, administrative permission was sought from the Korle-Bu Teaching Hospital to allow the research team to collect data in the facility.

Statement of informed consent

The study participants were informed of their rights to voluntarily consent or decline to participate and to withdraw participation at any time without penalty. All respondents were treated equally after explaining to them the purpose of the study and their roles.

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