Determinants of Commercial Motorcycle Related Injuries In Butula Subcounty, Busia County, Kenya.

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Abstract:
Background: *Motorcycle injuries constitute a major but neglected emerging public health problem in developing countries. In Kenya, Commercial motorcycling has become a popular mode of transport in both rural and urban areas since 1990s but traced to 1960s. However, its related injuries cause significant morbidity and mortality. Many road users have viewed their presence in the roads as the cause of congestion, confusion, fear, and decreased safety in the road system. Few community-based studies have investigated the problem leading to inadequate data to inform prevention strategies.*
Objectives: *The primary objectives were; to determine the demographic characteristics of motorcyclists in Butula sub county, determine the, environmental and human factors associated with commercial motorcyclist's crashes and injuries.*
Study design and Methods: *Population based, cross-sectional study involving 197 commercial motorcyclists, Cluster, systematic and simple random sampling methods were used at different stages to select sites and motorcyclists within Butula Sub County. Structured questionnaires were administered to the commercial motorcyclists*
Results: *One hundred and ninety seven male commercial motorcyclists were interviewed. Sixty nine percent were aged below 30years with a majority (32%) between 20-25years. Most (70%) of the participants were married and had only attained upper and lower primary level of education (62%). More than half (59%) of the motorcyclists had no formal training in driving and 35% of them had only one year experience. Almost all (80%) of the participants ever had an accident. Drug abuse (20%) and over speeding (36%) are leading human factors associated with commercial motorcycle related injuries and of this drugs, alcohol is the most (70%) abused. Lack of road signs (27%) and poor road networks (23%) are the leading environmental factors causing injuries. Tyre defect (45%) and mechanical failure (27%) are also contributory factors and more than half (52%) of cyclists own Bajaj type of motorcycle which according to 48% of them is mostly involved in accident because of its high speed and is considered very light.*
Conclusion: *Commercial motorcyclists in Butula Sub County are men aged below 30years: are highly exposed to injuries due to interaction with traffic systems. Therefore emphasis need to be put to curb the human, environmental and vehicle- related factors that have been established to be associated with commercial motorcycle related injuries in the study area.*
Key: *Commercial, Motocycle, Butula, Determinants,*

I.   Introduction

Road transport plays an important role in integrating the various sectors in any given economy in the world. This is because the transport sector makes crucial contribution to overall economic growth and development[1]. The increase in the use of motorcycles as a form of road transport for commercial or public transport in Africa is a relatively recent phenomenon. Motorcycle use in Kenya as means of transport dates back in the 1960s where bicycle taxis were used to transport people and smuggle goods across the Kenya-Uganda border. From 1990s the bicycle are being replaced by light engine motorcycle 50-80cc.[3, 4] The emergence of boda boda motorcycles as a means of transport in the village paths, the highways and city streets has brought a new dimension to road safety in Kenya. Motorcycle transport, though most dangerous it is still preferred by many because of its availability, flexibility and economical.[5, 6, 7,]

Motorization rates rise with income[8] and a number of LMICs experiencing growth have seen a corresponding increase in the number of motor vehicles [9, 10]. In some LMICs, this growth has been led by an increase in motorized two wheeled vehicles, one of the least safe forms of travel which has resulted in

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concurrent increases in related injuries.[11] Kenya, like other parts of the world, has experienced immense growth in the transport sector. Between 2005 and 2011 the overall, registered motor vehicles in Kenya increased by a factor of 4.5 (from 45,653 annual registrations in 2005 to 205,841 in 2011); and 32.6% increase to stand at 161,813 in 2009 up from 121,831 in 2008.[12]

In Kenya motorcycles registration increased by 2324.87% in 2009 from about 3759 units in 2005[12]. In 2010 about 9000 motorcycles entered into the transport sector every month and by December 2010, the registered number of motorcycles had surged to nearly 200000 from 91151 in December 2009.[12] The emergent boom of commercial motorcycle in major urban centre in the country raises serious safety concern requiring urgent government intervention.

Injuries to motorcycles are an important but neglected public health concern. Motorcycles riders have highest public health burden expressed in disability adjusted life years lost (DALYS). Many developing countries are facing the problem of a rapidly increasing fatality and disabilities due to injuries with the vulnerable groups bearing the brunt of it.[14]

Motorcycle accidents among other types form a fatal category of motor traffic accident [15]. The reported prevalence of motorcycle injuries varies around the world from 22.8% in China [11] to as high as 62% in Vietnam. In Nigeria, prevalence ranging from 12.8-60% has been reported in different studies and in Kenya 39.4%.[17]Of total traffic fatalities reported, global motorcycle mortality rates were highest in Thailand, Cambodia, Indonesia, Malaysia, France USA and Mexico at 70, 63, 61, 58, 25, 11 and 6% respectively. [11,16]According to[18] ,among the general road injuries reported, those that involved commercial motorcyclists was estimated at 10 − 15% at the national level (Kenya), Busia County and Butula Sub County level

The Kenya vision 2030, launched in the year 2008, aims to transform Kenya into a middle income country from the current third world state. [19]Working towards achieving this, the Kenya government recognizes that transportation is the one of the key pillars in achieving this strategy, and has therefore invested not only in improving the physical road infrastructure but also prioritizing road safety as an urgent systemic issue. In 2012, NTSA was founded as the lead authority in Kenya for road transport and safety [20](NTSA, 2014). The organization recognizes motorcycle operation as a big challenge in curbing transport related injuries.[20]

Previous researchers have identified various problems related with the revolution of motorcycle in various part of the world ranging from health related problems, increase in crime rate as they are used to ferry gangs, motorcycles flouting traffic regulations, overload by carrying more than one passenger, increased road accidents, non-helmet use by riders and their passengers, passenger overload, lack of certified driver training and valid licensing, over speed and reckless driving, poor regulation and law enforcement and possible use of alcohol and drugs. [21]

Despite burden of the problem and recognition by agencies such NTSA, motorcycle injuries have not received the attention they deserve partly because of lack of local data and the public policy response to this epidemic have been muted at regional and national level. [22,23]

Motorcyclists are at high risk of road traffic accidents and attendant injuries, but are greatly neglected and few community-based studies have investigated the problem in Kenya. [24] There is also paucity in literature concerning commercial motorcycle related injuries and previous studies have concentrated in urban centre population and hospital – based. This study assessed the determinants of commercial motorcycle injuries in B

II.   Materials And Methods

Study Area

The study was carried out in Butula Sub County which is one of the seven Sub Counties in Busia County and is made up six administrative wards namely Marachi West, Kingandole, Marachi Central, Lugulu, Marachi North and Marachi East. The Sub County borders Kakamega County to the East and Siaya County to the West and is thus regarded as terminal Sub County as it connects these two Counties to Busia County via the busy Kisumu – Busia highway and Ijinja – Bumala tarmac road. Butula Sub County has one town (Bumala town) and seven other market centres;Murumba, Butula, Ogalo, Ligulu, Bumutiru and Shibale and the main economic activities are farming and small scale businesses, commercial motorcyclists being one of the economic players of the Sub County.

Study Design

Since the study was carried out for a specified short period of time, descriptive cross-sectional design was used to determine factors associated with commercial motorcycle related injuries in Butula Sub County.

Sample Size Determination

Sample size required was determined using Fishers et al (1998) formulae for a population less than 10,000.

$$N = \frac{Z^2 pq}{d^2}$$

Where

N = desired sample size (for the population greater than 10,000)

Z = is the standard normal deviation usually set at 1.96 which corresponds to the 95% confidence level.

p = the proportion in the target population estimated to have characteristics being measured. Because there is no documented proportion or prevalence of the events and due to financial and time constraint then researcher will use 20% (0.8)

q = 1-p

d = the level of statistical significance (degree of accuracy desired usually set at 0.05 level)

Hence Z= 20% (target population 0.2)

q = 1-0.2 = 0.8

D = % represented 0.05

Therefore N $= \frac{1.96^2 \times 0.2 \times 0.8}{0.05 \times 0.05}$

$= \frac{(3.8316)\ (0.16)}{0.0025}$

N = 245.22

N = 245

Therefore, because the population in the study site was less than 10000 and in this case being estimated at 1000 commercial motorcyclists, the researcher used determining formula of;

$$nf = \frac{n}{1 + n/N}$$

Where nf= desired sample size (for population less than 10,000)

n = constant, thus 384(for population more than 10,000)

N = estimate of the population size; 245

Therefore nf $= \frac{245}{1 + 245/1000}$

$= \frac{245}{1 + 0.245}$

nf = 196.787

nf = 197

III. Sampling Methods/ Techniques

Butula Sub County was purposively sampled as the study site because it was convenient and of interest to the investigators. The Sub County is divided into six administrative wards that formed the clusters that were purposively chosen to cover the whole research area. Each of the clusters identified was further divided according to the locations where the motorcyclists operate from and then again simple random sampling was applied to obtain number of the respondents required per the cluster. In all the stages present in each cluster, simple random sampling using folded papers of **YES** or **NO** was used to pick the number of respondents proportionate to number allocated to that cluster to whom to administer the questionnaire. Cluster sampling method was applied in this case because it was not possible to obtain a sampling frame from the large and scattered population of motorcyclists in the entire Sub County thus involving chosing/selecting an intact group of bodabodas as per their area of operation. As for the case of key informants; clinical or nursing health care providers and police officers, five in each category were purposively chosen for an interview according to the researcher's convenience. Two Focused group discussions comprising 10 motorcyclists were derived from two clusters (Marachi Central and Marachi North clusters) that were randomly selected.

Table 2. Estimated study population per administrative ward cluster

No.	Administrative wards	Estimated number of motorcyclists
1.	Marachi West ward	250
2.	Kingandole ward	50
3.	Marachi Central ward	200
4.	Lugulu ward	125
5.	Marachi North ward	150
6.	Marachi East ward	225
	Total	**1000**

To get true approximation of the number of respondents to administer questionnaire, the researcher subjected the determined sample size (197) to law of proportionality in order to get the required sample size from the ward cluster that would be sampled.

Table 3. Sample size of commercial motorcyclists per cluster

No.	Administrative wards	Estimated study population	Sample size
1.	Marachi West ward	250	49
2.	Kingandole ward	50	10
3.	Marachi Central ward	200	39
4.	Lugulu ward	125	25
5.	Marachi North ward	150	30
6.	Marachi East ward	225	44
	Total	**1000**	**197**

Using probability sampling techniques, the researcher applied simple random sampling method to pick the respondents for the research.

IV.   Data Collection

Data collection instruments

The study employed the following data collection instruments to obtain the data;

i.   Structured standard questionnaire

Structured questionnaire is a research tool associated with quantitative research and it is meant for collecting and recording information about a particular issue of interest. It is made of a list of questions with clear instruction and space for answers or administrative details. It is convenient tool especially where there are large numbers of respondents to be handled, facilitates easy and quick derivation of information within a short time [26]. The tool bored both closed and open-ended questions that were used to get responses from the motorcyclists. Closed-ended questions provided greater uniformity and easy/more processing of the data. [27,41] It was accompanied by a list of possible alternatives from which respondents selected suitable answers that described their situation by simply ticking.[28] Open-ended part of the questions enabled respondents give additional answers not among the listed alternatives to describe their situation.

ii.   Observational checklist

This was utilized to record what was observed by research assistant during data collection. The respondents' behaviour was defined in terms of their general presentation by looking at their protective clothing, documents and general condition of the motorcycle.

iii.   Focused Group Discussions

Is a form of data collection tool that is used to gather people from similar background or experiences like the motorcyclists to discuss specific themes of interest to the investigators according to the objectives. This was useful in providing an insight into different opinions among different parties involved in change process thus enabling process to be managed smoothly. The researcher facilitated the discussion to ensure even participation, careful wording of key question, maintaining a neutral attitude and appearance and summarizing session to reflect the opinions evenly and fairly on different factors associated with commercial motorcycle injuries.

iv.   Interviewer Schedule

Is a research tool with list of topics to be covered and potential question also referred to as interview schedule or unstructured interview. This was used by the researcher and adopted moderately scheduled interview containing major questions and possible probing questions under each which allowed freedom to probe into answers and adopt to situation. It was administered to specific individuals with knowledge on issue of commercial motorcycle related injuries like police officers and health care providers. The tool was relevant because it provided face to face interaction with the commercial motorcyclists and enabled the investigators to adopt necessary questions, clarify doubts and ensure that respondents are properly understood, repeating or rephrasing the question. Prior to taking part in the interview, investigator gave respondents an opportunity to adequately prepare themselves for the interview. It gave accurate and relevant information as it was positively looked forward upon.

Data collection procedure

After obtaining permission from the university to go ahead with research work, research assistant was trained for the study. Both the questionnaire and observation checklist were administered by the researcher and

research assistant through the identification of the participants of the study by use of simple random technique. This helped to avoid misinterpretation of questions and also obtain accurate and relevant information. The interview sessions and focused group discussions were conducted by the researcher himself to get in-depth information on the research problem.

INCLUSION CRITERIA
All commercial motorcyclists that were operating within Butula Sub County, Busia County.

EXCLUSION CRITERIA
Non commercial motorcyclists that were operating within Butula Sub County and commercial motorcyclist operating outside the study area.

VALIDITY
Validity refers to the degree of accuracy and meaningful of the inference based on the research results or the contents of the items reflects the content domain of interest. According to [29]Best and Kahn (2005), validity of the instrument is asking the right questions, framed from the least ambiguous way and based on the study objectives. This was done by representing the instrument to the supervisor to evaluate the applicability and appropriateness of content and adequacy of construction and suggestion made and modify appropriately. This measures the degree to which data collected using a particular instrument represent a specific concept. [28](Mugenda and Mugenda, 2003)

RELIABILITY
Reliability of a research tool is realized if it yields consistent information after repeated measurements are taken under the same conditions. The tool was pre-tested with respondents from neighbouring commercial motorcyclists in Matayos Sub County and data obtained was not included in the final analysis. The main purpose of pre-testing the research tool was to identify any weakness and improve on them. Pre-testing was purposed to give an indication of the time required to complete the tool.

V.   Data Analysis And Presentation
The data collected from the study was analysed using descriptive statistical methods (quantitatively) and qualitative methods. Data gathered through interviews and focused group discussions was analysed qualitatively. Qualitative analysis refers to non-empirical analysis whereby researcher will obtain detailed information about the phenomenon and establish relationship from the information gathered. [28] This involved categorizing and sorting out the data into patterns or thematic analysis as primary basis for organizing and reporting the study findings. The data was examined, interpreted via formation of an impression and reporting researcher's impression in a structured way. The technique that was used in the analysis was coding which is an interpretive technique that both organizes the data and provides a means to introduce interpretations of it into quantitative methods. The quantitative data gathered through questionnaire was coded and entered in a statistical computer package; data was cleaned and checked for discrepancies or errors. During entry process data was analyzed using specific tests that include descriptive statistics and chi square which yielded mean frequencies in terms of percentages, means and mode. Chi square was used to relate variables and check association between one factor and its association with commercial motorcycle related injuries. Analyzed data was presented in tables and charts according to appropriateness.

VI.   Results
SOCIO-DEMOGRAPHIC INFORMATION OF THE RESPONDENTS
#### Table 1. Socio demographic characteristics of the respondents

Socio demographic characteristic	Frequency	Percentage(%) freq.
Gender of respondents		
Male	197	100
Female	0	0
Total	**197**	**100**
Age bracket of respondents in years		
13 -19	53	27
20 -25	63	32
26 - 30	39	20
More than 30	42	21
Total	**197**	**100**
Respondents' level of education		
University/ Tertiary	21	11
Secondary	53	27

Primary	123	63
Total	**197**	**100**
Marital status of the respondents		
Single	42	21
Married	137	70
Separated	14	7
Divorced	4	2
Total	**197**	**100**

All 197 (100%) of the respondents were male commercial motorcyclists

More than quarter of the respondents 53(27%), 63(32%) were in age bracket 13-19 and 20-25 years respectively with those in age bracket 26-26 being the least 39(20%).

Most of the respondents 123 (62%) had attained primary level of education with least 21(11%) having either attained university or tertiary level of education

More than half 137 (70%) of the respondents were married and almost quarter 42 (21%) were single

**HUMAN FACTORS ASSOCIATED WITH COMMERCIAL MOTORCYCLE RELATED INJURIES**
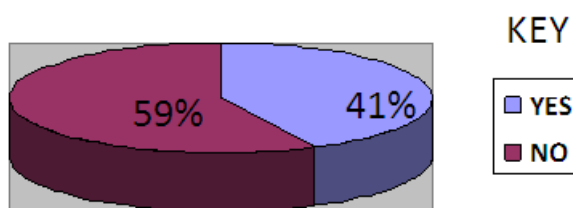
Fig. 1. Training in motorcycle riding

More than half (59%) of the interviewed respondents admitted to have not undergone any formal motorcycle riding training and less than half (41%) having formal training. This was also observed as few respondents were able to produce their driving licences during the interview and also as admitted by motorcyclists during FGD session and interviews held with HCWs and police officers.

Table5. Distribution of respondents by experience in commercial motorcycle riding

Duration (Years)	Frequency	Percentage (%)
Less than 1	70	35
1 - 2	49	25
3 - 5	46	23
Above 5	32	17
Total	**197**	**100**

More than three quarter of the respondents 70 (35%) have less than one year experience in motorcycle riding and with the rest of either 1-2, 3-5 and above 5years representing 49(25%), 46(23%) and 32(17%) respectively. During FGD with motorcyclists, most of them in were in this business to as less as 6months period to 9 years.
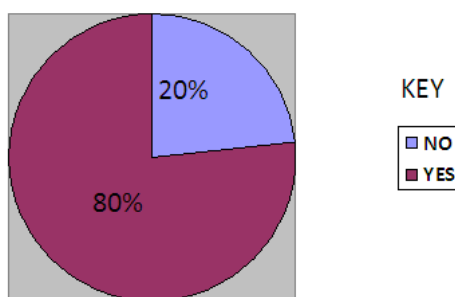
Fig 2. Distribution of respondents according to whether ever had an accident or not

Almost all (80%) of the respondents interviewed said they ever had an accident with only few (20%) indicating to have never had an accident before. This is supported by interview held with motorcyclists, all of them admitting to have had an accident and that this is witnessed weekly on the roads.

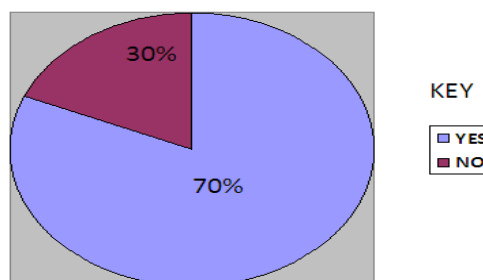**Table6. Distribution of respondents by frequency of the accidents experienced**

No. of Accidents	Frequency	Percentage (%)
Once	70	44
More than Once	88	56
Total	**158**	**100**

Of the respondents who said to have experienced motorcycle accident, more than half 88(56%) have experienced more than once while the rest 70 (44%) experienced only once thus implying commercial motorcycle related injuries is a reality. To support this, HCW at KSCH also said that they handle victims of motorcycle injuries almost daily in the hospital and few cases are brought to attention of police officers at Bumala police station as few are reported weekly.

**Table7. Distribution by respondents on human causal factors of motorcycle related injuries**

Causes	Frequency	Percentage (%)
Lack of formal training	21	11
Drug abuse	39	20
Over speeding	70	36
Poor knowledge of traffic rules	28	14
Over loading	14	7
Wrong overtaking	14	7
Income generation competition	11	5

Over speeding 70(36%), drug abuse 39(20%) and poor knowledge of traffic rules 28(14%) are the leading human factors related to commercial motorcycle injuries being experienced and competition among motorcyclists 11(5%), overloading and wrong overtaking 14(7%) being the least factors according to the respondents. Most of the victims of motorcycle injuries that are attended to by nurses and clinicians are due to riding under the influence of alcohol, over speeding, lack of crash helmet and ignoring the poor sate our motorcycles. This also supported by police officers. Motorcyclists also witnessed that most of them cause accident due to lack of concentration by looking at passersby especially ladies and riding under full of stress.

Fig3. Distribution of respondents by alcohol consumption, n=137

More than half 96 (70%) of the respondents interviewed said they consume alcohol in the course of their motorcycle riding business while the rest of the respondents 41(30%) said they do not consume alcohol.
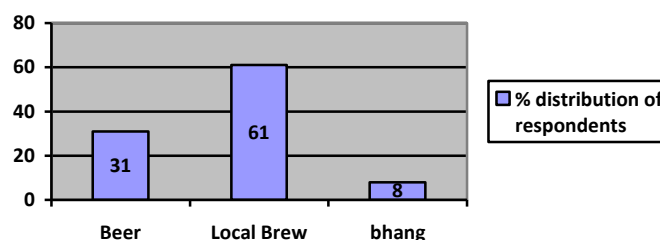
Fig 4. Distribution of respondents taking alcohol by brand/type, n=96

According to 96 respondents who drink alcohol, 30(31%) drink local brew, 59(61%) take beer and 8(8%) use bhang in the course of their motorcycle business. This was also echoed by motorcyclists during FGD who most of them said they take local alcohol brew because it is cheap and available.

Table8. Distribution of respondents by time of taking/consuming alcohol, n=96

Time	Frequency	Percentage (%)
Morning	15	15
Afternoon	30	31
Evening	51	54

More than half 51(54%) of respondents take in the evening and 30(31%) in the afternoon. FGD with motorcycle operators revealed that most of them take alcohol in the morning hours before beginning their business.

Table9. Distribution of respondents' reasons for riding under influence of drugs, n=96

Reason	Frequency	Percentage (%)
Addiction	37	39
To reduce stress	32	33
I feel good	27	28
Total	**96**	**100**

Out of 96 respondents who consume alcohol, more than quarter 37(39%) do so because of addiction and less than quarter 13 (33%) do so because of reducing stress and 27 (28%) do so because they feel good.

Table10. Distribution of respondents by number of clients they carry per trip

No. of clients	Frequency	Percentage (%)
One	74	38
Two	95	48
More than two	28	14
Total	**197**	**100**

Almost half 95(48%) of the respondents carry two clients per trip and 74(38%) carry only one client per trip. Focused Group Discussion with motorcycle operators also revealed that they carry two clients and even more at a time. This amounts to overloading as the HCWs and police officers eluded that some of the accidents to overloading.

ENVIRONMENTAL FACTORS ASSOCIATED WITH COMMERCIAL MOTORCYCLE RELATED INJURIES

Table11. Environmental causal factors associated with commercial motorcycle related injuries/deaths

Causal factors	Frequency	Percentage (%)
Heavy rains	21	11
Lack of road signs	49	27
Poor road networks	46	23
Lack of visible road bumps	35	18
Pot holes	14	7
Dangerous check points	28	14

More than a quarter 49(27%) of the respondents said that lack of road signs in most of the roads is the major cause of commercial motorcycle related injuries followed by poor road networks at 46(23%) according to the respondents. Lack of visible road bumps, dangerous check points, heavy rains and potholes with 35(18%), 28(14%), 21(11%) and 14(7%) respectively in descending order had also a bearing to experienced injuries by the respondents. Same and other environmental factors shared by the respondents in interviews and FGDs are poor road network and maintenance, missing road signs to either indicate bumps, schools, market centres, animals crossing, bridges and sharp corners.

Table 12. Respondents who are aware of roads demarcated for the motorcyclists use

Response	Frequency	Percentage (%)
Yes	0	0
No	197	100
Total	**197**	**100**

All 197 (100%) the respondents indicated that there is no any road demarcated for use by motorcyclists separately within the Sub County

VEHICLE RELATED FACTORS ASSOCIATED WITH COMMERCIAL MOTORCYCLE RELATED INJURIES

Table13. Distribution of respondents by vehicle related causal factors of motorcycle related injuries

Cause	Frequency	Percentage (%)
Mechanical failure	53	27
Tyre defect	88	45
Non functional siren	28	14
Non-functional indicators	28	14
Total	**197**	**100**

Almost half 88 (45%) of the respondents said that major causal factor related to vehicle is due to tyre defect followed by more than quarter 53(27%) who attribute accidents due to mechanical failure. Other causal factors were also brought up during the interview with HCWs, police officers and FGD with motorcycle operators and included; missing indicators, brake failures, poor motorcycle maintenance, defective speedometers, tyre punctures, lack of head lumps and inappropriate chain.

Table 14. Distributions of respondents by type of motorcycle make ownership

Type	Frequency	Percentage (%)
Bajaj	102	52
TVS Star	73	38
Kingbird	11	5
Yamaha	11	5
Total	**197**	**100**

More than half 102 (52%) of the respondents own Bajaj type of motorcycles followed by more than quarter 73 (38%) who owns TVS Star type.

Table15. Distribution of respondents by type of motorcycle make that is mostly involved in accidents.

Type of motorcycle	Frequency	Percentage (%)
Bajaj	95	48
Yamaha	32	16
TVS Star	63	32
Kingbird	7	4

Almost half 95(48%) of the respondents said that the type of motorcycle mostly involved in accidents witnessed in rural roads within the sub county is Bajaj type followed by TVS Star with 63(32%) according to the respondents interviewed. The rest of the types are least involved with Yamaha and Kingbird that are also owned by few having 32(16%) and 7(4%) respectively

Table16. Distribution of respondents by reason to why each of the mentioned motorcycle make is mostly involved in accidents

Reason for accident	Bajaj	Yamaha	TVS Star	Kingbird
Comfortable	11	7	4	-
High speed	56	14	21	4
Low fuel consumption	7	7	3	-
Very light in high motion	7	7	14	-
Mostly bought	7	-	-	-
Light steering head	21	-	7	-
Total Frequency	**109**	**35**	**49**	**4**
Percentage (%)	**55%**	**18%**	**25%**	**2%**
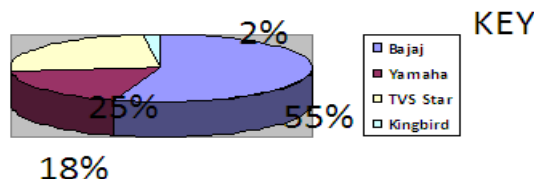
Fig5. Reason for accident involvement per the type of motorcycle according to the respondents

Most (55%) of the respondents gave a reason that Bajaj is mostly involved in accidents because of its high speed, light steering head, comfortable while riding it, low fuel consumption, it is very light while in motion and is also mostly purchased in descending order of major reason for its involvement in accidents (Table. 16)

Table 17. Distribution of respondents to whether their motorcycles are fitted with speed governors or not

Response	Frequency	Percentage (%)
Yes	0	0
No	197	100

All 197(100%) of the respondents do not have speed governors fitted on their motorcycles. Addition to this, most of the commercial motorcyclists observed during the interviews had their motorcycles lacking one or all the indicators, some miss side mirrors, foot rests, non functioning siren and a few had non- functioning speedometers that aggravates over speeding amongst them.

Table18. Distribution of respondents by frequency of motorcycle servicing

No. of times servicing done	Frequency	Percentage (%)
Weekly	84	43
Monthly	63	32
After 2 months	39	20
More than 2 months	11	5

Almost half 84 (43%) of the respondents service their motorcycles on weekly basis while others 63(32%), 39(20%) and 11(5%) on monthly, after two months and more than two months respectively.

VII. Discussion
SOCIO-DEMOGRAPHIC INFORMATION OF THE RESPONDENTS

Road traffic injuries contribute significantly to burden of diseases and mortality throughout the world but particularly in developing countries. [13] The study found that commercial motorcycling is dominated by male gender as all (100%) of the motorcyclists interviewed were male and this is in consistency to survey done by [8] who in their study found that there were no single female motorcyclists in commercial motorcycling business. According to [30] and colleagues, most of the crashes and injuries were highest amongst commercial motorcyclists male aged 24 and 38 years and this is similar to the revelation of this study as more than quarters (32%) of the motorcyclists were in the age bracket of 20 - 25 years. Most of them in this age bracket are hyper in their actions, explore frightening riding styles and tend to over speeding in the course of riding their motorcycles. Most of the motorcyclists (62%) had attained primary level of education. This is in agreement with findings by a study by [24] which established that most commercial motorcyclists (58-9%) had attained primary level of education. This mostly happen especially in developing due to the fact that they do not follow and comprehend traffic rules and they in their mentality coupled with their young age believe they are 'the king on the roads' [31]. Almost three quarter (70%) of the motorcyclists were married people. These individuals are also often heads of households and their mortality and morbidity could have potential long-term implication not only on financial sustainability and social well-being of their families but also on the general economic growth of the region. [32]

HUMAN FACTORS ASSOCIATED WITH COMMERCIAL MOTORCYCLE RELATED INJURIES BY THE RESPONDENTS

More than half (59%) of the respondents admitted that they had not undergone any formal motorcycle riding training. This was also observed whereby by few of motorcyclists, 57(29%) were able to produce driving licences during the interview and also during FGD, interview with HCWs and police officers. This finding is in agreement with findings in a study done in Sierra Leone where many commercial motorcyclists ride without licenses or insurance and by their riding etiquettes, it is easy to tell that they are novice in the motorcycle riding business.[33] Most of the respondents (35%) had less than one year experience in motorcycle riding business as at the time of interview. This has a bearing to cases of injuries as in Thailand, where it was reported that motorcycle crashes accounted for majority of injuries and deaths from RTAs; contributing factor including inexperience and age of drivers as they were found to be a common characteristic in motorcycle accidents than in accidents by other vehicles.[34] The study also found that almost all (80%) of the respondents interviewed said they ever had an accident before and this was supported by the interview held with motorcyclists during FGD who also said they experienced accidents and that this is witnessed almost weekly on our roads. Motorcycle injuries are among leading cause of disability and deaths and the problem is increasing at a fast rate in developing countries due rapid motorization and other factors. [35] This finding supports the findings of this study whereby more than half (56%) of the 45 respondents who ever had an accident admitted to have had more than once while 44% just once thus implying that the problem is a really phenomenon. To support this, HCWs at KSCH also said that they handle motorcycle injuries almost daily in the hospital and few cases are reported to Bumala police station. The study revealed that over speeding (36%), drug abuse (20%) and poor knowledge of traffic rules (14%) are the most causal factors related to commercial motorcycle related injuries being experienced on the roads. This in agreement with study done by Oyo state sector command in Nigeria that noted

that incessant rise of motorcycle accidents includes disobedience to traffic rules, overloading by carrying more than one passenger, over speeding running mode on a curve due to excess speed or under cornering, riding under the influence of alcohol which affects rider's judgement, route violation, facing on-coming vehicles that is riding against traffic and riding motorcycle without crash helmet which account for 95% permanent injury and death of Okada accident victims.[36] Most (70%) of the respondents interviewed said that they consume alcohol in the course of their motorcycle riding business and according to the respondents who drink, more than quarter (31%) take local brew and few (8%) use bhang in their business. This was also echoed by motorcyclists during FGD who most said they consume local brew because it is cheaper and available than beer. For those respondents who take alcohol, more than half (54%) consume alcohol in the evening and more than quarter (31%) in the afternoon and during FGD most motorcyclists said that they consume alcohol before beginning their business. This finding has a bearing to an observation that among various factors associated with accidents, such causes may have had alcohol consumption as underlying factor.[37] The study further revealed that almost half (39%) of the respondents consume alcohol because of addiction. Almost half (48%) of the respondents carry two passengers at a time and the same sentiments was also revealed during FGD with the motorcyclist who said they can carry two or even more. The same case of overloading was eluded by HCWs and police officers. This finding is similar to a research done in Oyo state by state sector command where overloading by carrying more than one passenger was one of the factors responsible for incessant rise of motorcycle accidents.[36]

ENVIRONMENTAL FACTORS ASSOCIATED WITH COMMERCIAL MOTORCYCLE RELATED INJURIES

More than a quarter (27%) of the respondents said that lack of road signs in most of the roads is the major cause of commercial related injuries. This and other environmental factors shared by respondents in interviews and FGD include; poor road network and maintenance, missing road signs to either indicate bumps, schools, market centres, animals crossing, bridges, sharp corners and presence of filled up pot holes by rain water on the roads. The same finding is shared by research done in Nigeria where most drivers take for granted the ability of their automobile to handle minor road hazards such as pot holes or rail road tracks, these minor road hazards are major problems for motorcycles because they may require sudden changes of lane position and direction[38] (Taiwo, 2007). All (100%) of the respondents said that there is no road demarcated separately for use by the motorcyclists within the Sub County. This is contrary to research finding done in Sierra Leone where it was observed that Okada which refers to special types of motorcycles that are ridden by special licensed motorcyclists on specially demarcated paths along streets.[33]

VEHICLE-RELATED FACTORS ASSOCIATED WITH COMMERCIAL MOTORCYCLE RELATED INJURIES

Almost half (45%) of the respondent said that major vehicle-related causal factor associated with motorcycle injuries is due to tyre defect. Other causal factors that were also brought up during the interview with HCWs, police officers and FGD with motorcyclists include; missing indicators, brake failure, poor motorcycle maintenance, defective speedometers, tyre puncture, lack of head lamps and inappropriate motorcycle chain. These study findings are similar to factors responsible of motorcycle accidents like brake failure, where control of motorcycle is lost when the brake fails and there by resulted in an accident as identified by [31]. More than half (52%) of the respondents own Bajaj type of motorcycle. Almost half (48%) of the respondents said that the type of motorcycle mostly involved in accidents witnessed in rural roads within the Sub County is Bajaj and most (55%) of the respondents gave a reason as to why Bajaj is mostly involved in accidents as because of its high speed, light steering head, comfort ability while riding it, low fuel consumption, being light while in motion and due to motorists' high purchasing power. This finding is not similar to previous research where it was found basing on engine sizes, overall total number of rider fatalities increased by 18% over past decade from 3713 in 2004 to 4399 in 2013 where number of fatalities on motorcycles with engine sizes of 1000cc or less showed an increase of 12% during this time period, according to [39]. NHTSA's further finding indicated that rider fatalities on motorcycle with engine sizes between 1001 and 1500cc decreased by 12% while the number of riders on motorcycle with higher increased by over 500% (from 122 to 738). All (100%) of the respondents do not have speed governors fitted on their motorcycles. In addition to this, most of the commercial motorcyclists observed during the interview had their motorcycles lacking one or all the indicators, some miss side mirrors, foot rests, functioning siren and few had non-functioning speedometers that aggravate over-speeding among them. This finding is contrary to [40] report whereby it was found that appropriate speed can be imposed on traffic through design features that limit speed of vehicle itself. This is already being done in many countries with heavy goods vehicles and coaches and is estimated to contribute to a 2% reduction in number of injury crushes. Almost half (43%) of the respondents service their motorcycles on weekly basis while 32%, 20% and 5% service after more than two months. This study finding has a correlation with a finding

by[31] on factors responsible for accidents that include brake failure, which has a bearing to lack of proper and frequent motorcycle maintenance.

VIII.   Conclusion

Based on the findings of the study, the following conclusions are drawn. Gender, age, level of education and marital status of the motorcyclists are major socio-demographic factors associated with accidents. The findings also shows that most commercial motorcyclist lack formal training in driving; meaning they are not privy to the current rules and regulations governing driving on roads, others are inexperienced in this motorcycle riding business, abuse drugs as they drive under alcohol influence, overload by carrying more than one passenger per trip, over speed and do not down reflector jackets and crash helmet. Environmental factors including pot holes, lack road signage and poor road networks have also been evidenced to be associated to motorcycle related injuries. Further findings indicate that motorcycles lacking speed governors as opposed to motor vehicles contribute to cases of over speeding, others lack important accessories like side mirrors, indicators and foot rests which actually contribute to instability and inconsistence on the road thus resulting to injuries/accidents occurrence.

RECOMMENDATIONS

Based on the findings of this study, the following recommendations are made to both National and County governments and all other stake holders transport sector;

Awareness creation through workshops in rural set ups should be held to educate motorcyclists on road safety facts Driving course fee and other costs should be subsidised to encourage most motorcyclists undergo training. Regulation to be formulated to compel motorcycle assembling industries to include speed governors on its parts just like what is currently done on motor vehicles Rural roads should be improved and maintained

Traffic law enforcement agents should strictly ensure that commercial motorcyclists adhere to traffic rules and regulations both in urban and rural areas

Alco blow tester should also be introduced on roads to address/curb alcohol consumption among the motorcyclists.

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