Socio-Demographic and Environmental Factors Associated with Motorcycle Accidents: A Study at Nakuru Level 5 Hospital, Kenya

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ABSTRACT

Motorcycle accidents currently rank third among the leading causes of injuries resulting from road traffic accidents in Kenyan hospitals. This study aimed to assess the socio-demographic characteristics and perceived environmental factors influencing motorcycle accidents among patients seeking medical care at Nakuru Level 5 Hospital in Kenya. A cross-sectional study design was employed, and structured questionnaires were used to collect data. The study population comprised individuals who had been involved in motorcycle accidents and were seeking treatment at the hospital. The assessment included gathering socio-demographic information, roles played by participants during accidents, and environmental factors present at the time of the accidents. Data analysis was conducted using descriptive statistics. Out of the 150 questionnaires distributed, 136 were completed and returned, resulting in a response rate of 90.67%. The majority of participants fell into the age range of 25 to 29 years (59.23%), and the majority were male (82.96%). Most participants had attained a secondary level of education (51.29%) and had a monthly income ranging from KES 0 to KES 10,000 (52.96%). Furthermore, a significant percentage of the participants were involved in the "Boda Boda" business (89.23%). In terms of their roles during accidents, motorcycle riders accounted for 78.56%, followed by passengers (13.89%). Environmental factors indicated that accidents were more frequent during rainy weather (73.53%) and at night when visibility was impaired (73.53%). Interestingly, the majority of accidents (94.85%) occurred irrespective of the road condition, highlighting the need for improved road infrastructure. In conclusion, this study underscores the susceptibility of young adults, particularly male motorcycle riders, to accidents. It also reveals prevalent factors such as low education levels, low income, and engagement in the "Boda Boda" business among the participants.

Keywords: Motorcycle accident, Motorcycle riders, Road conditions, Weather conditions.

INTRODUCTION

The transportation industry plays a significant role in contributing to a country's economic growth and development. Public transportation offers mobility and access to various areas based on individual needs. The use of motorcycles as a mode of public transportation is particularly popular in low and middle-income countries, especially within urban settings. Motorcycles offer convenience to the public and serve as a swift means of navigating through traffic and tight spaces within cities. Over the years, the use of motorcycles has grown, especially for providing passenger taxi services (Kinyanjui, 2023). This can be attributed to the affordability and widespread availability of two-wheeler transportation in low and middle-income countries. However, this increase has also resulted in a rise in motorcycle accidents. Motorcycle riders are 28 times more likely to lose their lives in a fatal crash and four times more likely to sustain injuries compared to other motorists (Bieber, 2023). According to the World Health Organization, two- and three-wheeler transports account for 43% of all road traffic deaths in the South East Asian region, 73% in Thailand, and 74% in Cambodia (World Health Organization, 2022). Furthermore, a majority of the victims are young adults aged between 15 and 34 years (World Health Organization, 2022).

In Kenya, motorcycle accidents account for 2%-3% of all hospital visits, 22%-64% of trauma admissions, and 50%-52% of total surgical interventions (Sisimwo et al., 2014; Saidi & Mutisto, 2013). The National Transport and Safety Authority (NTSA) has expressed concerns about the increasing number of accidents caused by motorcycle riders in the past five years. In 2022, NTSA ranked motorcycles as the most dangerous mode of transport. Notably, motorcycles recorded 1,209 fatalities that year, contributing to the highest number of fatalities (Kinyanjui, 2023). Several factors have been linked to the causes of motorcycle accidents, with socio-demographic characteristics of the riders and environmental factors where they ride the motorcycles being key. Previous studies suggest that age, gender, education level, income, and occupation are potential risk factors for motorcycle accidents (Njenga et al., 2018). Evidently, young adults, particularly males, have consistently been identified as high-risk groups. This may be attributed to their engagement in risky behaviors while driving, lack of experience, and inadequate safety precautions.

Furthermore, perceived environmental factors such as road infrastructure, traffic conditions, weather conditions, the presence of speed bumps, visibility of signage, and the enforcement of traffic rules also play a contributory role in the occurrence of motorcycle accidents (Francis et al., 2021). Importantly, there is significant variation in the quality of road infrastructure and adherence to traffic regulations here in Kenya. Nakuru town, in particular, features a diverse network of road architecture, encompassing both well-maintained and poorly-maintained roads. There is a need to understand the influence of these factors on the incidence of motorcycle accidents, which can guide the development of interventions such as targeted road improvements, traffic enforcement measures, and educational campaigns. Therefore, this study aimed to assess the socio-demographic and perceived environmental factors contributing to motorcycle accidents among patients treated at Nakuru Level 5 Hospital.

METHODOLOGY

Study Design & Setting

A descriptive cross-sectional study design was employed for this study. The research was conducted at Nakuru Level 5 Hospital located in Nakuru town, Nakuru county, Kenya. The medical facility serves as a tertiary referral hospital catering for healthcare needs of patients both within the county and also from neighboring counties.

Study Population

In this study, individuals of both gender, who were at least 18 years old formed the study population. This population encompassed patients attending

orthopedic, trauma, and surgical clinics, as well as those in stable condition during follow-up after traumatic incidents or surgical procedures. Only those who met the following requirements were allowed to participate in the study: they had to be 18 years of age or older, had given their informed consent, and were hemodynamically stable [maintaining steady and normal values for blood pressure, heart rate, cardiac output, stroke volume, and oxygen saturation].

Sample Size Determination & Sampling Technique

The sample size for this study was 150 participants calculated using the Taro Yamane simplified formula (1967). Simple random sampling method through lottery method was used to select participants as the sample size was not large and there was no need for stratification.

Data Collection

Structured closed- and open-ended questionnaires, sectioned into three parts: sociodemographic characteristics, participant role during motorcycle accident and environmental factors, were used to collect data. The questionnaire was pretested in a pilot study involving 10% of the study participants to ensure reliability. To ensure validity, the supervisor, 15 participants selected at random and the investigator assessed the questionnaire for content validity, face validity and criterion validity respectively. Data collection was done after the patients' daily routines of care so that care was not interrupted. The questionnaires were administered to the participants by the researchers. Prior to data collection, the participants had to consent to participate in the study. afterwards, they were assured that their responses would remain anonymous and confidential. Filled questionnaires were assessed for accuracy and completeness after data collection and kept in a lockable cabinet only accessible to the principle investigator. Fully filled questionnaires were retained and the ones not fully filled or not filled at all were discarded by paper shredding and burning.

Data Analysis

Data was collected, converted to digital form, and then analyzed with SPSS version 28.0 software. The digital data was then subjected to descriptive analytical approaches that encompass computing metrics like the mean, frequency, and percentages.

Ethical Considerations

Ethical clearance was obtained from Kabarak University Research Ethics Committee. Research clearance was obtained from the National Commission for Science, technology and innovation (NACOSTI). Permission to conduct the study in Nakuru level 5 hospital was obtained from Nakuru level 5 administrator.

RESULTS

Response Rate

The questionnaires were administered to 150 respondents 136 questionnaires were successfully filled and returned back. This represents 90.67% return rate.

Table 1:
Participant Response Rate

Respondents	n	%
Returned questionnaires	136	90.67
Unreturned questionnaires	14	9.33
Total respondents	150	100

Socio-Demographic Results

Table 2 below shows that 59.23% of participants were aged between 25yrs-29yrs while 18yrs-24yrs old were 9.26%. Additionally, 28.21% were between 30yrs-35yrs, 2.30% were between 40yrs-45yrs and only 1% were 50yrs-55yrs. Based on gender, most participants were males (82.96%) and a majority of them had acquired secondary level education (51.29%). In terms of income, majority of motorcycle riders earned between KES 0 to KES 10,000 on a monthly basis. Correspondingly, a larger portion of participants were in the Boda boda business (89.23%). Lastly, 71.55% of participants were married.
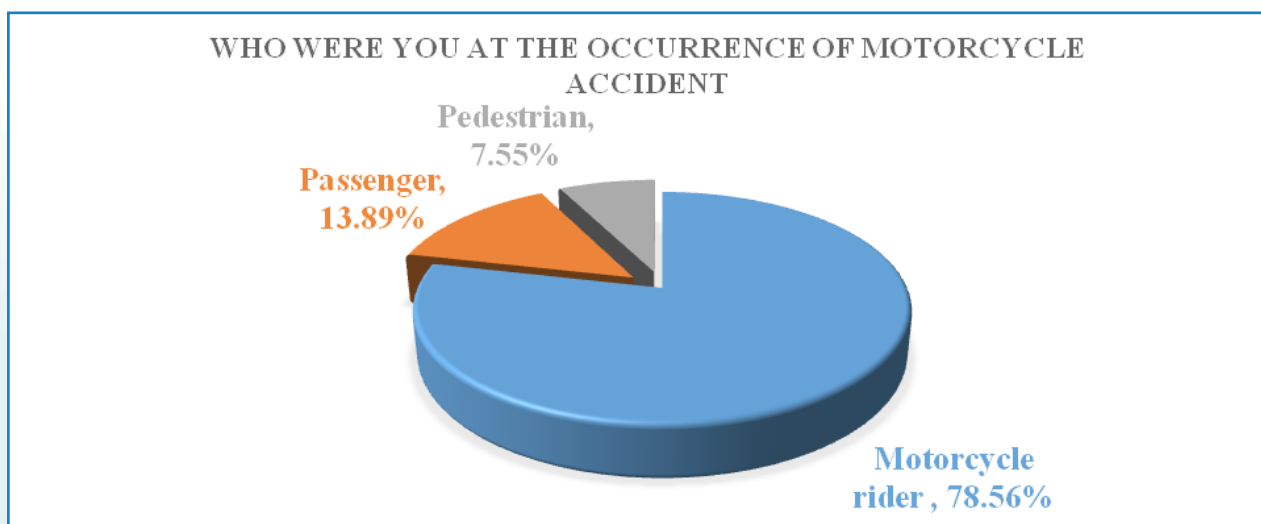
Table 2:

Socio-Demographic Characteristics of Study Participants

Socio-demographic variable		n
Age (yrs.)	18 -24	9.26%
	25-29	59.23%
	30-35	28.21%
	40-45	2.3%
	50-55	1.0%
	>60	0
Gender	Male	82.96%
	Female	17.04%
Highest education level	Primary school	40.23%
	Secondary school	51.29%
	Tertiary school	4.28%
	No formal education	4.2%
Monthly income (KES)	0-10,000	52.96%
	10,000-50,000	40.87%
	Above 50,000	6.17%
Occupation	Boda boda	89.23%
	Others	10.77%
Marital status	Single	28.45%
	Married	71.55%

Participant Role During Motorcycle Accident

The findings reveal that 78.56% were actually Motorcycle rider, 13.89% were passengers while Pedestrian were 7.55%, this shows that most of the people who actually get hurt after the accident are normally the rider and the passengers.

Environmental Factors

Table 3 below shows the environmental conditions during at the time the motorcycle accident occurred. Accordingly, in majority of cases it was raining (73.53%), while for others the road visibility was impaired as they were riding at night (73.53%) without sufficient lighting (94.85%). Evidently, whether the road was tarmacked, marram road, smooth or broken, there was still a high rate (94.85%) of motorcycle accidents.

Table 3:

Environmental Factors at The Time of the Motorcycle Accident

Environmental factors		n
Weather condition	Raining	100 (73.53%)
	Sunny	36 (26.47%)
	Others	0
Road visibility	Night	100 (73.53%)
	Day	36 (26.47%)
Enough lighting at night	Yes	129 (94.85%)
	No	(5.15%)
Road condition	Tarmac road	129 (94.85%)
	Marram road	129 (94.85%)
	Smooth road	129 (94.85%)
	Broken road	129 (94.85%)

Figure 1:

Role of Study Participant During the Motorcycle Accident

WHO WERE YOU AT THE OCCURRENCE OF MOTORCYCLE ACCIDENT

Pedestrian, 7.55%
Passenger, 13.89%
Motorcycle rider, 78.56%

DISCUSSION

Majority of the participants, approximately 59.23%, fell within the age bracket of 25 to 29 years. This finding underscores the vulnerability of young adults to motorcycle accidents, aligning with previous research that has consistently indicated that young adults face a heightened risk of becoming victims of such accidents. This elevated risk among young adults can be attributed to various factors, including their relative inexperience as riders, a propensity for engaging in risk-taking behavior, and a tendency to disregard traffic rules and regulations. This observation is consistent with a study conducted by Gudaji and Habib in 2016, which reported that young adult riders are significantly more likely to be involved in motorcycle accidents due to their proclivity for engaging in risky behaviors while operating motorcycles. Similarly, findings by Tumwesigye et al. in 2016 also support this trend, revealing that a substantial portion of motorcycle riders involved in accidents are young adults who may lack comprehensive knowledge of the traffic policies and regulations in place. Consequently, there is a clear imperative for the implementation of targeted road safety campaigns and educational initiatives that specifically address young adults. These efforts should aim to raise awareness about safe riding practices and foster a deeper understanding of the importance of adherence to traffic rules. Such interventions are essential for mitigating the disproportionately high incidence of motorcycle accidents among young adults and ultimately enhancing road safety.

In terms of gender distribution among the participants, a significant majority, approximately 82.96%, were male. This observation aligns with global trends in accident statistics, where males consistently account for a higher proportion of accident involvement than females (The Guardian, 2022; Cullen et al., 2021). Oluwadiya et al. (2016) further corroborates this trend, attributing the higher prevalence of males in motorcycle accidents to their increased exposure in multi-occupant motorcycle transport and engagement in risk-prone behaviors. Moreover, gender disparities in risk-taking behaviors, occupational exposure to motorcycles, and societal expectations contribute to this observed pattern. Addressing gender-specific risk factors through targeted interventions, such as providing comprehensive training opportunities, holds the potential to reduce the incidence of accidents among male motorcycle riders.

Regarding income levels, more than half of the participants, specifically 52.96%, reported earning a monthly income falling within the range of KES 0 to KES 10,000. Significantly, 89.23% of the participants identified the "boda boda" business as their primary occupation. This income distribution reflects the financial challenges faced by a substantial portion of motorcycle riders. Consequently, many riders in this group may experience constraints in accessing quality protective gear and affording maintenance for their motorcycles due to their limited financial resources. Tumwesigye et al. (2016) reaffirm this observation by highlighting that most commercial motorcycle riders primarily use their earnings for daily expenses rather than allocating funds for motorcycle repair and maintenance. Consequently, this results in the deterioration of the motorcycles' roadworthiness, while riders continue to operate them on a daily basis without adequate protective gear. This correlation underscores the increased incidence of motorcycle accidents within this demographic.

In addition to sociodemographic factors, it is evident that environmental factors play a significant role in the occurrence of motorcycle accidents. A substantial majority of participants (73.53%) reported that most accidents took place during rainy weather conditions, and an equal proportion occurred at night, often characterized by impaired road visibility. Remarkably, the study's findings indicated that motorcycle accidents were prevalent regardless of the road's surface type, whether it was tarmacked, murram, smooth, or in disrepair. This underscores the pressing need for infrastructure improvements, encompassing enhanced road lighting, the implementation of reflective signage, and the promotion of weather-awareness campaigns. Furthermore, regular road maintenance and

repair should be prioritized.

It is worth noting that impaired visibility, road bends, the presence of potholes, loose road materials, and inadequate road markings not only endanger the motorcycle rider but also pose risks to other road users, including passengers and pedestrians. In this study, the majority of the participants involved in motorcycle accidents were the riders themselves, accounting for 78.56%, followed by passengers at 13.89%. The health impacts resulting from a single motorcycle accident extend beyond the rider alone, affecting other parties involved. Significantly, a majority of the study participants were married (71.55%), emphasizing the importance of implementing measures that directly address rider safety while also improving passenger safety. Such measures are essential in mitigating fatalities and minimizing the overall impact on family members.

Conclusion

In conclusion, most motorcycle riders who are involved in motorcycle accidents:

- Are mostly young adults, of male gender, who have attained secondary school level of education, married and earn between KES 0 and KESH 10,000 on a monthly basis.

- Depend on the "boda boda" business as their sole occupation and are the majority victims when a motorcycle accident occurs.

- State that rainy weather conditions and driving at night with impaired road visibility are the main environmental conditions associated with occurrence of motorcycle accidents.

Recommendations

We recommend that the county government of Nakuru in conjunction with national government to:
- Collaborate with local schools, colleges, and universities to implement comprehensive road safety education programs targeting young adults, emphasizing responsible

motorcycle riding and risk avoidance.

- Develop gender-specific road safety campaigns, addressing the unique risk factors faced by male motorcycle riders, such as risk-prone behaviors and higher accident involvement rates.

- Improve road infrastructure, particularly in areas prone to accidents, by increasing road lighting, installing reflective signage, and addressing issues like potholes and inadequate road markings.

- Explore opportunities for diversifying income sources for motorcycle riders, reducing their dependence on the "boda boda" business as their sole occupation.

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