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INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI:10.21474/IJAR01/13148
DOI URL: <http://dx.doi.org/10.21474/IJAR01/13148>



RESEARCH ARTICLE

PREDISPOSING-PERSONAL FACTORS ASSOCIATED WITH PASSENGER SAFETY AND SAFE RIDING BEHAVIORS AMONG CYCLISTS (BODA BODA RIDERS) IN KAMPALA

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Manuscript Info

Manuscript History

Received: 15 May 2021
Final Accepted: 18 June 2021
Published: July 2021

Key words:-

Predisposing-personal factors, Road safety, Safe riding behaviors, Bodaboda, Accident

Abstract

Background: Motorcycle taxis are common means of transportation in Uganda and sub-Saharan Africa which remains a major neglected public health issue that presently at any time constitutes risk for road traffic accident and injuries in low and middle income countries. This study describes the level of predisposing-personal factors associated with passenger safety and safe riding behaviors among cyclists (bodabodariders) in Kampala and the relationship between age, educational attainment and the risk of road accident.

Methodology: The study design was a cross-sectional survey using a validated semi-standard questionnaire to collect data on predisposing-personal factors and safe riding behaviors measured on a 31 and 24-point reference scale respectively from 422 consenting riders in the metropolis. Data from the study was analyzed using statistical package for social sciences (SPSS) and simple descriptive statistics such as means, standard deviations, and proportions were used to describe the data all in 95% confidence interval and Analysis of variance was employed to test differences in measures across age and level of education with a cut-off set at ($p \leq 0.05$) significance level.

Results: The findings showed that majority of the respondents were between age of 25 and 29 (35.5%) where most of them (36.0%) had secondary educational attainment. The mean score for the level of predisposing-personal factors measured on a 31-point reference scale among respondents in our study was 23.9 (CI = 23.60 ± 24.20) denoting a prevalence of 77.1% while the mean score for the safe riding behaviors as measured on 24-point scale was 9.3 (CI = 9.10 ± 9.60) which translates to prevalence of 38.8%. The study further revealed that older respondents and riders with non-formal education inconsistently reported lowest score for predisposing-personal factors ($F=3.54$, $p=0.007$ and $F=14.49$, $p<0.0001$), whereas older respondents and riders with tertiary educational attainment constantly displayed lowest scores for safe riding behaviours ($F=14.86$, $p<0.0001$ and $F=7.15$, $p<0.0001$).

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Conclusions: The level of predisposing-personal factors associated with road safety and safe riding in terms of knowledge about passenger safety, perception of risk on road accidents and health consequences as well as attitudes toward safety rules and safe riding among respondents in the study is relatively high but the level of their safe riding behaviors is low and quite unsatisfactory. Thus, this calls for education and training exercises by the regulatory agencies on the initiation of safe riding behaviors among riders for knowledge without practice is useless.

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Introduction:-

Bodabodas are bicycle and motorcycle taxis commonly found in East Africa. While motorcycle taxis like bodabodas are present throughout Africa and beyond, the term bodaboda is specific to East Africa. Although, mortality in motorcycle crashes is largely due to head injury and musculoskeletal problem such as limb injury is the leading cause of morbidity, (Galukandeet *al.*, 2009). Several factors determine the degree of morbidity and mortality patterns following motorbike-related accidents ranging from the use of protective helmets, site of injury, type and mechanism of collision and injury-medical care interval (Boniface *et al.*, 2016).

Road traffic injuries (RTIs) globally constitute a significant proportion of overall injury, morbidity and mortality at approximately 1.3 million people every year and 93% of fatalities on the roads are reported to be in low in middle income countries even though they possess approximately 60% of the world's vehicle (Peden, 2005; WHO, 2021). They remain the leading cause of injury-related disability-adjusted life years (DALYs) and they pose a significant economic and societal burden (Bachaniet *al.*, 2017).

Globally, Motorcyclists known as Bodaboda in the East African region and their passengers have the highest vulnerability to fatal injury among all motor vehicle users. In 2016, 5,286 motorcyclists died in traffic crashes in the United States (NCSA, 2018). Per mile travelled, motorcyclist fatalities occurred nearly 28 times more frequently than passenger vehicle occupant fatalities in traffic crashes (NCSA, 2018).

However, considering per vehicle miles traveled previously in 2009, motorcyclists were 37% more likely than drivers of passenger cars to die in a motor vehicle crash and nine times more likely to be injured. This high accident rates are in part attributed to consumption of alcohol. Alcohol consumption reduces the perceived negative consequences of risk-taking which increases the willingness to take risks after drinking (Traffic Safety Facts: 2008, NHTSA). In Tanzania 181 lives were claimed due to motorcycle accidents during the first quarter of 2010 (Nkwame, 2010). This is partly as a result of the swiftly increasing number of motorcycles from 6,700 in 2007 to 85,000 in 2009, a 13 fold increase in the period of 2 years (Nkwame, 2010). Uganda has not been spared from the heavy magnitude of RTIs. At present, it experiences RTI mortality at 28.9 per 100,000 populations. This is quite concerning as it even exceeds the 24.1 per 100,000 population for the AFRO and 18.0 per 100,000 population global average for deaths respectively. As a result, Uganda is among the top-ranking countries for RTIs along with South Africa, Nigeria, Iran, Thailand and Dominican Republic at 31.9; 33.7; 34.1; 38.1; and 41.7 per 100,000 populations, respectively. The trend of Uganda's RTIs is further mirrored by the solid evidence denoting traffic injuries within the top-ten causes of mortality in the country. Accordingly, not less than 1,000 and 10,000 victims were killed and injured respectively due to RTIs in Uganda between 2010 and 2013, (Magoolaet *al.*, 2018).

According to the County Police Commander report (2014), Kampala capital city has recorded the highest number of fatal accidents involving bodabodas operators. The County police commander said to record an average of 20 to 30 fatal traffic accidents involving bodabodas every month (Mirukaet *al.*, 2013).

Despite many interventions the government has tried to put in place to avert the road accident menace involving all road service providers ranging from vehicles to Bodabodas, for instance news about accidents through local media. The most recent attempt to avert the situation is the introduction of Alcohol blow, mobile courts and night travels ban yet Bodaboda accidents are on the toll in our roads (MOT, 2014). Consequently, this study proposes to investigate the factors that have led to the high accident rates among the bodaboda operators in Kampala Capital City, with the intention of identifying critical areas and issues by assessing riders predisposing-personal factors that

investigate their knowledge of passenger safety and safe riding, perception of risk associated with road accidents as well their attitudes toward obeying safety rules and traffic regulations among others and their behavioral factors that demonstrate their safe riding behaviors because predisposing-personal factors and behavior toward traffic regulation and safe riding are known to be key factors in decreasing traffic morbidity and Mortality.

Methodology:-

The study used a cross-sectional study design employing a two-sectioned semi-standard questionnaire whose validity had been previously established with face and content validity to collect quantitative data between September 2019 and November 2019 on the predisposing-personal factors and safe riding behaviors among 422 randomly selected riders in Kampala, Makindye division with sound state of mind and who were able to speak and understand English language or Luganda as the questionnaire was translated into the most locally spoken language (Luganda).

Sample size estimation

The sample size of the study was estimated using Kish Leslie formula (1965) based on assumption that proportion of riders' knowledge about passenger safety and safe riding is 50% as calculated below:

$$N = \frac{Z\alpha^2 P(1-P)}{D^2}$$

$$= \frac{1.96^2 \times 0.5(1-0.5)}{0.05^2}$$

0.05²

N=384 Adding 10% to account for response bias N=422, N = total population of the study, P= proportion of riders' knowledge about passenger safety and safe riding= 50%, D = level of significance = 0.05

Sampling Techniques

This research employed a multistage sampling and a simple random sampling to sample the stages in Makindye division and then simple random sampling was used to select the respondents. This method enabled the researcher to obtain the sample from the population in the way that the sample will give an equal chance for everyone to be chosen.

Ethical considerations

Informed consent orally and in written form was obtained from every respondent before the interviews, information about the study including its benefits and likely effects was communicated to the respondents and participation in the study was upon verbal and written informed consent.

Data process and Analysis

Data from questionnaire was edited and coded then entered in a computer and Statistical Package for the Social Sciences (SPSS) version 24 program to analyze it, the items under the predisposing-personal factors and behavioral factors were all computed together (where every correct answer was coded "1" and every incorrect response coded "0" for dichotomous variable and for the 4-Likert scale used for other variables, responses were coded as "0,1,2 and 3" for incorrect to the most correct response ascendingly) to assess the respondents' score levels for the study variables and simple descriptive statistics such as means, standard deviations, and proportions were used to describe the data using 95% confidence interval, analysis of variance was used to test for differences in measures across demographic characteristics (age and education), regression analysis was conducted to reveal the statistical relationship between the predisposing-personal factors and the safe riding behaviors among the respondents.

Results:-

The study revealed that majorities (35.5%) of the respondents were between the age of 25 and 29 and the least (3.8%) were 40-44 years of age. Majority (48.3%), reporting to be Catholics followed by Muslims (22.0%). Most of the respondents were married (50.5%) and almost all the respondents (36.0%) had at least secondary education (*see table 1 below*).

Table 1:- Frequency distribution on demographic variables.

Variables	Respondents in this study N=422	Percentage (%)
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Age		
• 20-24	65	15.4
• 25-29	150	35.5
• 30-34	143	33.9
• 35-39	48	11.4
• 40-44	16	3.8
• 45-49	0	0
Religion		
• Islam	93	22.0
• Protestant	71	16.8
• Catholic	204	48.3
• Pentecostal	21	5.0
• Others	33	7.8
Marital status		
• Single	188	44.5
• Married	213	50.5
• Divorce	13	3.1
• Others	6	1.4
Level of education		
• Non formal	32	7.6
• Primary	109	25.8
• Secondary	152	36.0
• Post-secondary	77	18.2
• Tertiary	52	12.3

Majority of the respondents (84.1%) agreed that road accidents can kill. To find out whether Over-speeding in most cases leads to accident on this (93.8%) agreed that over-speeding leads to accident, majority of the respondents have knowledge on road safety rule (88.4%) and when asked if the riders use protective gears, (83.9%) uses protective gears when riding as shown in table 2.

Table 2:- Frequency Distribution on knowledge about passenger safety

Variable	Respondents in this study N=422	Percentage (%)
Road traffic accident can kill		
• Yes	355	84.1
• No	67	15.9
Over speeding in most cases leads to accident		
• Yes	396	93.8
• No	26	6.2
I use protective gears		
• Yes	354	83.9
• No	68	16.1
Do you have knowledge on road safety rule		
• Yes	373	88.4
• No	49	11.6
Young riders are more reported to be involved in accident than the elderly ones		
• Yes	342	81.0
• No	80	19.0
Have you ever had accident		
• Yes	233	55.2
• No	189	44.8

Those accidents were caused by improper riding		
• Yes	353	83.6
• No	69	16.4

The Result presented below shows the perception of danger on road accidents and health consequences, out of the 422 respondents that participated in the study, majority of the respondents (68.5%) strongly agreed on whether those who ride recklessly are most likely to get involved in accident. Majority of the respondent (65.2%) agreed that everybody can get accident. As to if motorcycle accident can be serious on the rider as well as the passenger (39.8%) respondents strongly agreed. (See table 3).

Table 3:- Frequency Distribution on perception of danger on road accidents

Variable	Respondents in this study N=422	Percentage (%)
Those who ride recklessly are most likely to get involve in accident		
• SD	0	0
• D	16	3.8
• A	117	27.7
• SA	289	68.5
Everybody can get accident		
• SD	3	.7
• D	26	6.2
• A	275	65.2
• SA	118	28.0
A motorcycle accident can be very serious on the rider as well as the passenger		
• SD	3	0.7
• D	84	19.9
• A	167	39.6
• SA	168	39.8
A motorcycle crash involving rider and passenger wearing helmet will protect the head		
• SD	28	6.6
• D	37	8.8
• A	221	52.4
• SA	136	32.2

In this study to find out attitudes toward passenger safety and safe riding on the road as a construct of predisposing-personal factors, on whether riders are always afraid of accidents occurring when they are reckless, (65.2%) strongly agreed, whether they are willing to obey all traffic regulations, nearly three quarters, (71.3%) agreed to obey all traffic regulation and less than half of them 204 (48.3%) strongly agreed to willingto ride with caution while riding on the road. (See table4)

Table 4:- Frequency Distribution on attitude toward passenger safety and safe riding on the road.

Variable	Respondents in this study N=422	Percentage (%)
I am always afraid of accident occurring when I am reckless		
• SD	6	1.4
• D	38	9.0
• A	103	24.4
• SA	275	65.2
I am willing to ride with caution when riding on the		

road		
• SD	15	3.6
• D	16	3.8
• A	187	44.3
• SA	204	48.3
I am willing to obey all traffic regulations		
• SD	12	2.8
• D	28	6.6
• A	301	71.3
• SA	81	19.2

The result presented below displays the safe riding behaviors of riders in Kampala where majority of the respondents (45%) do not take alcohol as habit,(46.7%) do not take alcohol while riding motorcycle, one-third (33.9%) do take drugs that mind –after their perception of reality while riding, majority (61.1%) of the riders do stop at traffic lights. (73.9%) sometimes drive fast and overtake while riding, (54.5%) do talk on telephones sometimes while riding motorcycle and (63.5%) of the riders do not take more than one passenger at a time while (62.1%) do observe all traffic regulation all of the time while riding.(See table 5)

Variable	Respondents in this study N=422							
	None of the time		Some of the time		Most of the time		All of the time	
	N	%	N	%	N	%	N	%
I often take alcohol as a habit.	190	45.0	185	43.8	41	9.7	6	1.4
I often take alcohol during the time i am riding a motorcycle.	197	46.7	177	41.9	44	10.4	4	.9
I do take drugs that mind-after my perception of reality like cocaine, heroin, marijuana while riding a motorcycle.	171	40.5	143	33.9	71	16.8	37	8.8
I do stop at traffic lights.	24	5.7	52	12.3	86	20.4	260	61.6
How often do you drive fast and overtake while riding the motorcycle.	18	4.3	312	73.9	82	19.4	10	2.4
I do talk on telephone while riding the motorcycle.	175	41.5	230	54.5	17	4.0	0	0
I take more than one passenger at a	268	63.5	87	20.6	67	15.9	0	0

time.								
I observe all traffic regulations	15	3.6	79	18.7	66	15.	262	62.1

Table 5:- Frequency distribution of behavioral factor.

Table 6 below shows the summary of the descriptive statistics computed for the variables among respondents in the study where the mean score for the level of predisposing-personal factors among respondents in our study was 23.9, SD of 3.10, prevalence of 77.1% and CI (23.60±24.20) while the mean score for the safe riding behaviors equals 9.3, SD of 2.73, prevalence of 38.8% and CI (9.10± 9.60). (See table 6).

Table 6:- Descriptive statistics computed for the variables.

Variables	Max. score on ref scale	Mean (prevalence)	Standard deviation	95% confidence-interval
Predisposing-personal factors	31-points ref scale	23.9(77.1%)	3.10	23.60-24.20
Behavioral factors	24-points ref scale	9.3(38.8%)	2.73	9.10-9.60

Table 7:- Comparing predisposing personal factors and behavioral factors across **age groups** for study participants using Analysis of Variance (ANOVA).

VARIABLES	Scale	20-24yrs		25-29 yrs		30-34 yrs		35-39 yrs		40-44 yrs		F-value (p-value)
		\bar{X}	±SD	\bar{X}	±SD	\bar{X}	±SD	\bar{X}	±SD	\bar{X}	±SD	
Predisposing-personal factors	31	23.29	4.02	23.97	3.33	24.28	2.55	22.88	2.02	25.4	3.01	3.54 0.007
Behavioral factors	24	10.45	2.45	8.66	2.85	9.27	2.65	11.15	1.49	7.0	1.86	14.86 0.000

Table 8:- Comparing predisposing personal factors and behavioral factors across respondents' **educational attainment** using Analysis of Variance (ANOVA).

VARIABLES	Scale	Non-formal		Primary		Secondary		Post-secondary		Tertiary		F-value (p-value)
		\bar{X}	±SD	\bar{X}	±SD	\bar{X}	±SD	\bar{X}	±SD	\bar{X}	±SD	
Predisposing-personal factors	31	22.09	2.53	22.47	3.05	24.61	3.55	24.88	1.96	24.5	1.85	14.49 0.000
Behavioral factor	24	10.94	0.91	9.72	2.67	9.34	2.84	9.21	2.07	7.92	3.45	7.15 0.000

When the mean score for the level of predisposing-personal factors measured on a 31-point reference scale among respondents in our study was 23.9 (CI =23.60± 24.20) denoting a prevalence of 77.1% , the mean score for the safe riding behaviors as measured on 24-point scale was 9.3 (CI =9.10± 9.60) which translates to prevalence of 38.8%. Similarly, older respondents (40-44 years) and riders with non-formal education inconsistently reported lowest score for predisposing-personal factors (F=3.54, p=0.007 and F=14.49, p<0.0001), whereas older respondents and riders with tertiary educational attainment constantly displayed lowest scores for safe riding behaviours (F=14.86, p<0.0001 and F=7.15, p<0.0001) (see table 7 and 8)

Table 9:- Relationship between predisposing-personal factor reinforcing enabling factors and level of road-use risks and safety.

Variables	B	R ²	F-value	p-value
Level of behavior		.594	75.9	

Predisposing-personal factors	-0.02			0.000
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The finding on the relationship from regression analysis between predisposing-personal factors and the level of road-use risk and safety (the safe riding behaviors) showed that the beta-coefficient B of -0.02 for the predisposing factors is statistically significant given the $R^2=0.594$, F-value of 75.9 and ($P<0.001$) which means that predisposing-personal factors and safe riding behaviors are covariant and are negatively related (See table 9)

Discussion:-

This present study was conducted to provide better understanding of how predisposing-personal factors of bodaboda riders (cyclists) which included knowledge of passenger safety and safe riding, perception of risk associated with road accidents as well attitudinal disposition toward safety rules and traffic regulations may be associated with their safe riding behaviors. The two variables measured in this study were levels of predisposing-personal factors towards safe riding and the safe riding behaviors necessary to reduce the risk and burden of road traffic accidents, morbidity and mortality among riders and passengers' population.

Demographically, out of the four hundred and twenty-two respondents that participated in this study, majority (35.5%) reported to be within the age of 25-29, a finding that is nearly in line with the report of the study conducted by Luchidio *et al.*, (2013) to assess the impact of training bodaboda operators and safety status in Kakamega county in Kenya which showed that the majority (51%) among the respondents were above 18 and below 29 years of age of which our report falls within, although in their study reckless driving and over-speeding was being attributed to this age group of riders which also increases their risk of being involved in accident, responses from 81% of our respondents seem to agree with that fact that young riders are more reported to be involved in accident than the elderly ones as also stated by Glaiza *et al.*, (2011) in a study conducted to analyze motorcycle accidents based on environmental and personal factors.

As this study sought to assess the level of predisposing-personal factors associated with passenger safety and safe riding behaviors among boda-boda riders in Kampala capital city, Makindye division, findings regarding the level of predisposing-personal factors showed that in terms of level of knowledge about passenger safety, riders demonstrated good level of knowledge regarding passenger safety and safe riding on road. More so, looking at their perception of danger on poor riding skill and with adverse health consequences, bodaboda riders demonstrated well a correct perception of danger which also implies that their perception of danger on road accident is relatively high and positive as well as their attitudes toward passenger safety and safety regulations. Based on the general assessment of the level of the respondents' predisposing-personal factors, the study revealed a mean score of 23.9 and standard deviation of 3.1 which denotes 77.1% of complete predisposing factors required of the riders to practice safe riding and prevent the risk of traffic accidents.

Furthermore, Our study respondents' knowledge that over speeding in most cases lead to accident and perception of reckless and improper riding as one of the major causes of accident is in accordance with the report from a study conducted by James Damsere-Derry *et al.*, (2017) on the knowledge, attitudes, and practices toward drink driving/riding as a risk factor for road traffic crashes in 3 regional capitals in Ghana whose report demonstrated that majority of the respondents were of the opinion that speeding was the major causes of traffic crashes, followed by driver carelessness, poor road conditions, inexperienced driving and drink driving respectively.

However, The report on right attitude toward passenger safety and safe riding on the road where around 71.3 % of the respondents showing the right attitude to obey all traffic regulations is contrary to the report of James Damsere-Derry *et al.*, (2017) whose report showed that majority of the respondents around 83% had four times likelihood of violating traffic regulation because of the bad attitude predicting drink-riding compare to those who show right attitude towards safe riding. Also, the attitude towards passenger safety and safe riding report where more than two-third (71.3%) of our respondents agreed and willing to obey all traffic regulations might have translated to their behaviour of not carrying more than one passenger while riding but this is in contrast to what was reported by Luchidio and others that majority of those who obey traffic regulation by carrying one passenger were just 54% despite being trained by bodaboda operators (Luchidio *et al.*, 2013) although our study did not indicate if the riders have been trained by operators, driving schools or by themselves as stated in their study. This relatively high knowledge about passenger safety and safe riding as well as correct perception reported in our study might not

translate to precautionary riding, avoiding reckless or improper riding and over speeding which can be a step towards reduction of road traffic accidents' prevalence in Kampala as evidenced in our report but however many intermediate variables like environmental factors or enabling factors may interact together with the predisposing personal factors to predict a better safe riding behaviors but at the sametime evidence from this study demonstrated that predisposing-personal factors if assigned a relevant intervention can play a key role in reduction of the magnitude of traffic injuries and mortality as also reported by Tajvaret *al.*, (2015) in a related study conducted in Iran.

The observation that older riders between 34-39 years of age and with non-formal education considering the age categories in our study displayed lowest level of predisposing-personal factors showed that age group and educational attainment can play a significant role in shaping the knowledge of safe riding, right attitudinal disposition as well as positive perception towards safe riding behaviors and this is an implication for health and safety education targeting this group of riders. However, studies like the one conducted by Ishrat (2018) reported a contrasting association between age and knowledge in their KAP study geared towards traffic rules and regulation in Pakistan.

Findings regarding safe riding behaviors on general assessment demonstrated a mean score of 9.3 and standard deviation of 2.7 which translates to 38.8% of the safe riding behaviours expected of the riders, this implies a very low and unsatisfactory behaviors where majority (73.9%) drive fast and overtake while riding motorcycle, and also (54.5%) do talk on telephone while riding although, none of the respondents reported to carry more than one passenger all the time and majority (45%) as well do not often take alcohol while riding. This is almost contrary to what many researchers found in their studies like Luchidioet *al.*, (2013) reported that majority (52%) of the respondents drives carelessly and over speeds and where around (45%) of their respondents often practices drunk-driving, the over speeding reported in their study has however contributed to the increase in number of accidents in the setting with 52% of the respondents agreeing that over speeding is a big problem this can be attributed to the operators who rush so as to make extra money, this idea can as well be a justifiable reason for the finding from this present study where older riders with tertiary educational attainment constantly displayed lowest scores for safe riding behaviours, this might imply that their educational attainment played norole in them practicing safe riding which is in accordance with the findings reported by Goupalet *al.*, (2016) that respondents high educational attainment and knowledge of safe riding did not influence compliance with the regulations and safe riding or they choose not to practice safe riding because of underemployment they have found themselves engaged in as many would consider riding job and yet they need to make extra money to meet up with their expected standards, with this, speed and reckless driving will not be far-fetched from their practices, another finding that is nearly similar to our study report is that of Pierroet *al.*, (2013) although, their findings focus on drivers other than riders that our study employed. This however calls for a targeted and monitored strict safety regulation and traffic laws on unsafe riding among riders.

Moreover, to the best of our knowledge across literature search, no study have been said to report on the predisposing-personal factors associated with passenger safety and safe riding behaviors which may be a hindrance to comparing our reports to many previous literatures most especially in Kampala, however the report from this study could be a base line reference for subsequent studies that may want to investigate on riders knowledge of passenger safety and safe riding, perception of road accidents risks as well as attitudes toward safety rules and regulations in addition to their safe riding behaviors as this study's major strength includes the relatively large sample size of 422 respondents covering different group of riders within Kampala, Makindye division. In addition, a key strength of this study is that it is the first study conducted to assess the level of the predisposing-personal factors associated with passenger safety and safe riding behaviors among bodaboda riders in Kampala city, Uganda. This study is however limited to the eligible and consenting group of riders in the municipality without identifying and characterizing them to either freelance group or organized group to which they belong which could have also helped to better explain the level of safe riding behaviors across the two different groups of riders and therefore leaves floor for subsequent studies to explore.

Conclusions:-

The level of predisposing-personal factors associated with road safety and safe riding in terms of knowledge about passenger safety, perception of risk on road accidents and health consequences as well as attitudes toward safety rules and safe riding among respondents in the study is relatively high but the level of their safe riding behaviors is low and quite unsatisfactory. Thus, this calls for education and training exercises by the regulatory agencies on the

use of safety measures like protective gears and the initiation of safe riding behaviors among riders for knowledge without practice is useless. This may help to fill the major knowledge gaps in the predisposing-personal factors and behavioural factors among riders as this will be a step towards tackling road accidents and reducing its specific mortality.

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