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Road safety compliance among motorcyclists in Kawempe Division, Kampala, Uganda: a cross-sectional study

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ABSTRACT

Motorcyclists are vulnerable road users in Uganda and 21.7% (3912/18,016) experienced crashes in 2012. This study determined the prevalence of and factors associated with compliance to selected road safety measures (helmet use, retro-reflective jackets use, riding permit and carrying one passenger) among commercial motorcyclists in Kawempe, from April to June 2014 using interviewer administered questionnaires. Total compliance was 0.9% and 24.4% to at least 3/4 measures. Compliance by measure was; 7.6% retroreflective jackets, 28.8% riding permits, 69.4% helmet use and 86.1% carrying one passenger. The associated factors were; knowing that (training before one starts to ride prevents crashes, Adjusted-odds-ratio (AOR) = 2.38 (1.36–4.19), maintaining the motorcycle in good condition prevents crashes, AOR = 0.34 (0.15–0.77) and padding reduces impact of road traffic injury, AOR = 0.37 (0.15–0.89)). Prevalence to compliance is very low. Road safety messages should highlight the importance of all road safety measures to improve compliance.

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Road safety; compliance; motorcyclists; Uganda; helmet; retro-reflectors

Introduction

Globally, 1.25 million people die, and 20–50 million sustain non-fatal injuries due to road traffic crashes every year (Peden, 2016; World Health Organization, 2013). In majority of the East African countries, Uganda (Kigera and Naddumba, 2010; Tran et al., 2015), Tanzania (Bishop and Amos, 2015; Boniface, 2016; Chalya, 2010, 2012) and Rwanda (Twagirayezu, 2008), motorcycles account for the highest or second highest number of patients in the casualty wards. Road traffic crashes occur mainly among vulnerable road users and young adults of 15–49 years (Kumar, Lalwani, Agrawal, Rautji, & Dogra, 2008; Peden, 2004), who are the major breadwinners for their families. More than three quarters of road traffic crashes affect males (Boniface, 2016; Chalya, 2012; Khanbhai and Lutomia, 2012; Matheka, 2015; Twagirayezu, 2008). Some of the key risk factors for road traffic injuries among motorcyclists include speeding, drink-riding, non-use of protective wear, overloading, inadequate visibility and inadequate training in riding motorcycles. Majority of the road traffic crashes (70–90%) are due to human error (Treat, 1979; Uganda Police, 2013).

In Uganda, road traffic crashes are among the leading causes of all injuries for persons aged 14–65 years (Hsia et al., 2010; Hulme, 2010), especially in urban settings (Diamond et al., 2018; Kobusingye, Guwatudde, & Lett, 2001). In 2012, Kampala metropolitan area had the highest proportion of road traffic crashes, (11,153/19,870) 56% (Uganda Police, 2013). This could be attributed to the high population density, motorization and poor road designs that promote mixed traffic thus increasing the risk of crashes especially at peak hours. Motorcyclists usually have the advantage of being able to manoeuvre through narrow roads and spaces left between other vehicles. Such manoeuvring increases the risk of crashes. This risk is further increased by low visibility of motorcyclists to other motor vehicle drivers.

Several road safety measures are available to reduce the occurrence and severity of road traffic crashes among the motorcyclists. Some of the road safety measures are related to road design, motorcycle design and the motorcyclist himself (WHO, 2004). Some of the safety measures directly related to reduction of road traffic crashes among motorcyclists include use of retro-reflective jackets or vests to increase their visibility on the road, riding only one pillion passenger, adequate training before starting to ride motorcycles which is proven by possession of valid riding permit, maintain the motorcycle in good mechanical condition, driving within recommended speed limits and avoiding riding when drunk. Use of helmets by cyclists has been found to reduce the risk of road traffic fatality by more than 25% (Evans and Frick, 1988) and by 28% (Liu et al., 2008), and the risk of head injury by 69% (Liu et al., 2008) and 72% (Liu, Ivers, Norton, Blows, & Lo, 2004). In addition to helmets, other measures to reduce severity of injuries include use of protective clothes, knee pads and airbags on motorcycles (Uganda Legal Information Institute, 1998).

Although studies have been conducted about compliance to helmet use among commercial motorcyclists in countries like Kenya where 30.37% of 3075 motorcyclists used helmets in Thika, 21.29% of 3143 in Naivasha (Bachani et al., 2012), Nigeria 23.8% of 224 (Oginni, Ugboko, & Adewole, 2007), India, China (Xuequn, Ke, Ivers, Du, & Senserrick, 2011) as

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well as Uganda, 30.5% (Mutatina, Nakitto, Naumann, Roehler, & Dellinger, 2012), data on use of other safety measures like retro-reflective jackets is scarce (24.85% in Thika and 63.22% in Naivasha; Bachani et al., 2012), although they have been shown to reduce motorcycle crashes by 37% (Wells et al., 2004), as well as carrying one pillion passenger and having a riding permit. Studies looking at compliance to a combination of these measures are even less. In our study, we focused on four safety measures: helmet use, retro-reflective jacket use, possession of a riding permit and carrying only one pillion passenger to assess compliance because they are mandatory in Uganda, and are also directly controlled by the motorcyclists themselves (Nasasira, 2004). This study looked at compliance based on a combination of these measures and the factors associated with compliance to these measures in Kawempe Division, Kampala, Uganda.

Methods

Study settings

We conducted this cross-sectional study in Kawempe Division, a suburb in Kampala District between April and June 2014 among 340 commercial motorcyclists (CMCs) operating at registered stages (* stages are informal waiting areas where CMCs park and wait for passengers). Kawempe Division houses Uganda's national referral hospital (Mulago) and has the second highest prevalence of road traffic crashes in Kampala metropolitan area (Uganda Police, 2013). In Kawempe, there were 60 registered stages and about 2000 commercial motorcyclists at the time of our study. A total of 35 stages were randomly selected using ballot papers. We wrote the names of each of the 60 stages on a small paper, folded it and put them into a box. After that, we selected a paper from the box, one at a time and identified the stage for including in the sample until the desired number of 35 stages was acquired. We used probability proportionate to size to determine the number of motorcyclists to select from each stage. After determining the number of CMCs to select from each stage, the interviewers went to that particular stage to select those to participate in the survey. The interviewer selected the CMC to include in the study consecutively as they reported to the stage until the required number for that stage was achieved.

Sample size

We determined the sample size using Kish Leslie formula for simple random sampling of single proportion (Kish, 1965). We tolerated a maximum error of 5%, at 95% confidence level and adjusted the calculated sample size to cater for non-response of 10%. We used the prevalence of helmet use in Kampala at 30% (Mutatina et al., 2012) to estimate prevalence of compliance to road safety measures among commercial motorcyclists. Our total sample size was 340 CMCs.

$$N = \frac{z^2pq}{d^2} = \frac{z^2P(1-P)}{d^2}$$

where N = sample size; d = precision/error: a precision of 5% was used considering; z = standard normal deviation corresponding to 95% confidence interval which is 1.96.

$P = 30\%$ adapted from Mutatina et al. (2012).

Thus, $\frac{N = 1.96^2 \times 0.3 \times 0.7}{0.05^2}$

$= 322.6 \approx \mathbf{323.}$

With non-response rate of 10%, $N/1-d = 323/(1-0.05) = 340$

The sample size that was considered for this study was 340 respondents.

Data collection

We used a structured questionnaire with pre-coded responses based on our study objectives for data collection. We asked questions about socio-demographic variables, ownership of a helmet and its use, ownership of a retro-reflective jacket and its use, ownership of a driving permit and the number of passengers carried on the last trip. We pretested the structured questionnaire in Ntinda one of the suburbs in Kampala with similar characteristics as the selected study area. We trained five research assistants who were proficient in both English and Luganda (a language prominently spoken in the study area) to collect the data. At the end of each day, we conducted meetings with the research team to report and resolve any challenges encountered in the field. We kept all questionnaires safely in a waterproof cabinet with access limited to the principal investigator and data manager. Soft data were backed up on an external drive and PI's email after every update.

Study variables

Outcome variable

Compliance to road safety measures was determined based on helmet use, use of retro-reflector jacket/vest, training before one starts to ride (possession of a valid riding permit) and carrying only one pillion passenger at a time. We used reported use of retro-reflective jackets, and reported use of helmet on the last trip to approximate the prevalence of their use. (If the CMC reported to have used a helmet/retro-reflective jacket on the last trip but it was not seen by the interviewer, they would still be considered to be compliant since we are studying use and not ownership.) Only motorcyclists whose valid riding permit of Class A was seen at the time of data collection were considered to comply with the requirement of possessing a riding permit. We only considered CMCs who reported to have carried only one passenger on the last trip as compliant with the requirement for carrying only one pillion passenger.

A composite measure for CMCs that fulfilled at least three of the four selected road safety measures was developed to determine compliance. Each of the four road safety measures was equally rated. For a commercial motorcyclist to be considered compliant, the sum total of the four measures had to be at least 3. Any motorcyclist

whose sum total for the four measures was <3 was considered non-compliant.

Independent variables

The independent variables were selected based on literature review (Siviroj, Peltzer, Pengpid, & Morarit, 2012) and individual observation of the researchers. To determine the factors associated with compliance to the road safety measures, we included socio-demographic variables (sex, age, marital status, residence and level of education) and other variables like training in riding a motorcycle, motorcycle ownership, previous involvement in a crash, experience of riding a motorcycle, previous arrest or fines by the traffic officers.

Measuring knowledge:. To measure knowledge, we asked three different questions for the stages of crash management. Under each question, likely responses were listed. Each response that was mentioned by the CMC was ticked and awarded score one (1). Responses that were not mentioned were awarded zero. Each correct response was analyzed in relation to the outcome variable.

1. How can you prevent a crash?
   a. Training persons before they start riding a motorcycle
   b. Carrying only one pillion passenger
   c. Using retro-reflective jackets
   d. Maintaining the motorcycle in good mechanical condition
   e. Not over speeding.
   f. Avoiding riding when drunk
2. How can you reduce the impact/effects of the crash on victim in case a crash occurs?
   a. Training motorcyclists before they start riding
   b. Wearing a helmet
   c. Padding/wearing thick clothes on knees and arms to reduce impact in case of a crash
3. How can you increase visibility of the motorcyclist to other road users?
   a. Using a retro-reflective jacket
   b. Wearing bright coloured clothes
   c. Having a well-lit motorcycle
   d. Hooting

Other factors that we explored in this study that affect compliance to the road safety measures were previous experiences with traffic officers, perception of peers towards road safety and the time of the day one usually starts and stops to ride the motorcycle on a given day.

Data analysis

The data were entered in EPI-DATA version 3.1 (WHO, 2016) and analyzed using STATA 12 statistical package. We used univariate analysis to summarize continuous variables using means and standard deviations, and proportions for categorical data. We conducted bi-variate analysis and calculated odds ratios to determine the association between the independent variables and the outcome variable. We employed logistic regression with stepwise approach to build the model for factors affecting compliance to the selected road safety measures.

Only variables with a p value <0.2 were included in the final model for determining factors associated with compliance at multivariable analysis. We only considered p values <0.05 as statistically significant in the final model.

Ethical considerations

Approval to conduct the study was obtained from Makerere University School of Public Health Higher Degrees and Ethics Committee (MakSPH-HDREC) and the Uganda National Council of Science and Technology (UNCST). Permission was sought from Kawempe Division local government to fulfil the local requirements. We explained the purpose of the study to each participant and obtained written informed consent from them prior to each interview.

Results

Socio-demographic characteristics of participants

Our response rate in this study was 100%, all CMCs (340) were male of ages 18–50 years with a mean age of 29.5 ± 5.4 years. Motorcycle riding experience ranged between 1 and 20 years. The daily working time ranged from 3 to 20 h and their daily income ranged from Ugshs. 5000 to 60,000 (US$1.4–17.1). Other baseline characteristics are shown in Table 1.

Compliance to individual safety measures

Riding permits

Of all the 340 CMCs, 160 (47.1%) said they had a riding permit. Of the 160 CMCs that said they owned a riding permit, only 98 (61.3%) had their permits on site. Of the CMCs whose permits were seen, only 9(9.2%) reported to have gone through a riders school to learn how to ride a motorcycle. When asked about how they acquired their riding permits, 49 (50%) said they had gone to a riding school, done a test and were then given their permit. Thirty-seven (37.8%) said they were first taught to ride by a friend and later applied for a riding permit; they did a test and then got their permits. Only 12 (12.2%) said they had just paid someone to process their permits without being subjected to a test. Prevalence of ownership of a valid riding permits of Class A was 28.8% (98/340).

Retro-reflective jackets

Only 133 (39.1%) of CMCs reported owning a retro-reflective jacket and of the 133 CMCs that reported owning a retro-reflective jacket, only 44 (33.1%) of these were actually

seen by the interviewer and 26 (19.5%) of the 133 reported using it on the last trip. One CMC who did not report owning a retro-reflective jacket reported to have used it on the last trip. Of those whose retro-reflective jackets were seen (44), only 20 (45.5%) had used their retro-reflective jackets on the last trip. Prevalence of compliance to use of retro-reflective jackets was 7.6% (26/340).

Helmets

Majority of the CMCs 303 (89.1%) reported owning a helmet and of these, 251(82.8%) were seen by the interviewer. Of the 251 CMCs whose helmets were seen, 229 (91.2%) had used the helmet on the last trip. Some CMCs, 3% (7/236) of those that had used a helmet on the last trip, did not have their helmets on site at the time of data collection. Prevalence of compliance to use of helmets was 69.4% (236/340).

Pillion passenger

Majority of the CMCs 86.1% (296/340) reported carrying only one pillion on the last trip. Table 2 shows the details of compliance to the four selected individual safety measures.

Table 1. Baseline characteristics of participants.

Variable	Frequency	Percentage
Highest level of education		
Never went to school	27	7.94
Primary	142	41.76
Secondary	156	45.88
Tertiary	15	4.41
Taught to ride by		
A friend/relative	159	46.8
Myself	161	47.3
Driving school	20	5.9
Motorcyclists have another job		
No	236	69.4
Yes	104	30.6
Experience of riding motorcycle		
≤3 years	128	37.7
4–6	114	33.8
7–9	49	14.4
≥10 years	48	14.1
Ownership of the motorcycle		
Employer	135	39.7
Relative	21	6.2
Friend	14	4.1
Myself	170	50.0
Marital status		
Single	108	31.8
Married	200	58.8
Divorced	32	9.4

Compliance to the composite road safety measures

Out of the 340 CMCs, only 3 (0.9%) complied with all the four selected road safety measures, 80 (23.5%) complied with only three of the four selected road safety measures, 160 (47.1%) complied with only two road safety measures, 85 (25%) complied with only one of the four selected road safety measures and 12 (3.5%) did not comply with any road safety measure at all. We defined compliance as having at least three of the four selected road safety measures and it was at 24.4%

Factors associated with compliance to at least three of the four road safety measures

After controlling for the following – training, owner of the motorcycle, daily income, knowing that reducing the speed one rides reduces occurrence of road traffic crashes and knowing that reducing consumption of alcohol reduces likelihood of occurrence of road traffic crashes – the following factors were associated with compliance to at least three of the four road safety measures: knowing that training before CMCs start to ride a motorcycle reduces likelihood of crashing increased compliance by 238%, OR = 2.38 (1.36–4.19), $p = 0.002$, knowing that padding reduces the impact of injury reduces compliance by 63%, OR = 0.37 (0.15–0.89), $p = 0.026$ and knowing that maintaining a motorcycle in good mechanical condition reduces occurrence of crashes reduced compliance by 66%, OR = 0.34 (0.15–0.77), $p = 0.01$ (Table 3).

Discussion

The main objective of our study was to determine the prevalence of and factors associated with compliance to selected road safety measures among commercial motorcyclists in Kawempe Division, Kampala, Uganda.

Compliance to at least three of the four road safety measures

Reported compliance to at least three of the four selected road safety measures was 24.4%. This is generally low as the motorcyclists are required to totally abide by all these measures (Nasasira, 2004). As compliance is a composite variable, its low prevalence indicates that not many motorcyclists comply with all the road safety measures, which compromises their safety on the road.

Table 2. Compliance to the individual safety measures.

Safety measure studied	Reported ownership, *n*/340 (%)	Safety measure seen and checked by the interviewer, *N*/*n* (%)	Rider complied with safety measure on last trip, *N*/340 (%)
Ownership of a valid riding permit	160 (47.1)	98 (61.3)	98 (28.8)
Ownership of a proper rider helmet	303 (89.1)	251 (82.8)	236 (69.4)
Ownership of a retro-reflective jacket	133 (39.1)	44 (33.1)	27 (7.9)
Carrying one passenger on last trip	NA	NA	296 (87.1)

Table 3. Factors associated with compliance to at least three of the four road safety measures.

	Comply to at least three measures				
Variable	Yes $n = 83$(%)	No $n = 257$(%)	Crude odds ratio	COR p value	Adjusted odds ratio
Taught to ride by					
A friend	34 (41.0)	125 (48.6)	Ref		
Myself	39 (47.0)	122 (47.5)	1.18 (0.7–2.0)	0.5456	0.88 (0.5–1.6)
Driving school	10 (12.0)	10 (3.9)	3.68 (1.4–9.8)	0.0052	2.13 (0.8–6.2)
Who owns the motorcycle					
Myself	48 (57.83)	122 (47.47)	Ref		
A friend	1 (1.20)	13 (5.06)	0.2 (0.02–1.6)	0.087	0.15 (0.12–1.25)
A relative	4 (4.82)	17 (6.61)	0.6 (0.2–1.9)	0.3734	0.52 (0.15–1.81)
Employer	30 (36.14)	105 (40.86)	0.73 (0.43–1.23)	02326	0.77 (0.44–1.36)
Daily income					
>/=10,000/=	10 (12.05)	53 (20.62)	Ref		
10,001–20,000/=	50 (60.24)	140 (54.47)	1.89 (0.89–4.03)	0.0919	2.01 (0.91–4.46)
20,001–30,000/=	21 (25.30)	53 (20.62)	2.1 (0.89–4.94)	0.0824	2.16 (0.88–5.32)
>30,000/=	2 (2.41)	11 (4.28)	0.96 (0.18–5.08)	0.9654	1.52 (0.27–1.36)
Knowing that the following help prevent crashes					
Training before starting to ride[a]					
No	45 (54.22)	190 (73.93)	Ref		
Yes	38 (45.78)	67 (26.07)	2.39 (1.42–4.04)	0.0007	2.38 (1.36–4.19)
Maintaining the motorcycle in good mechanical condition[a]					
No	75 (90.36)	204 (79.38)	Ref		
Yes	8 (9.64)	53 (20.62)	0.41 (0.19–0.91)	0.0236	0.34 (0.15–0.77)
Reducing the speed one rides					
No	79 (95.18)	229 (89.11)	Ref		
Yes	4 (4.82)	28 (10.89)	0.41 (0.14–1.22)	0.0988	0.56 (0.18–1.74)
Reducing consumption of alcohol					
No	70 (84.34)	198 (77.04)	Ref		
Yes	13 (15.66)	59 (22.96)	0.62 (0.32–1.21)	$p = 0.1579$	0.64 (0.32–1.28)
Knowing that padding reduces impact of injury[a]					
No	76 (91.57)	213 (82.88)	Ref		
Yes	7 (8.43)	44 (17.12)	0.44 (0.19–1.04)	$p = 0.0543$	0.37 (0.15–0.89)

[a]Factors that were significant in the model.

Compliance to individual measures

Ownership of a given safety device does not always translate to the direct requirement of using it (Sumner et al., 2014). This was very evident where some CMCs reported using a helmet or retro-reflective jackets though they did not own one while still others reported not using a helmet or retro-reflective jacket yet they owned one. There is a possibility that motorcyclists share their protective gears. One could lend out his helmet or retro-reflective jackets thinking that he will not be having a passenger coming soon. Unfortunately, a passenger may come before the helmet he lent out is returned. Not wanting to lose the money from the customer, he ends up riding without the safety gear.

Permits

A higher proportion of CMCs reported owning a riding permit (47.1%) than were actually seen (28.8%). This could be explained by the fact that sometimes CMCs forget their permits at home, or they were actually lying to the interviewer as some may have thought that the information was being collected on behalf of the traffic police. In Tanzania, a study by Bishop and Amos 2015 indicted that only 0.7% of motorcyclists had a road service license (Bishop and Amos, 2015). This could be due to the fact that this requirement of having motorcyclists licensed by the transport board had only been in place for only three years prior to their study. A study by Nasong in Kenya indicated that less than half 42% (25/60) of the motorcyclists had a permit (Nasong'o, 2015).

Retro-reflective jackets

As the study was conducted during the day, fewer CMCs (7.6%) reported to have used retro-reflective jackets. Some CMCs do not find it necessary to use retro-reflective jackets during the day because they think that retro-reflective jackets are for enhancing visibility in the dark. There remains a responsibility upon authorities and scientists to demonstrate the value of retro-reflective jackets to the motorcyclists at all times of the day. A study by Nasong in Kenya indicated that 57% (34/60) of the motorcyclists said they always used a reflective jacket (Nasong'o, 2015), which is much higher than that reported in our study, though comparable to retro-reflector use in Naivasha, 63.2% (Bachani et al., 2012).

Helmets

The importance of helmets to the CMCs cannot be over emphasized. Helmet use in our study was higher (69.4%) than that in the study by Mutatina (30%) (Mutatina et al., 2012), which could have been due to absence of political influence. Our study was conducted during a period where enforcement was stricter compared to the period of Mutatina where presidential campaigns were ongoing. During such political seasons, CMCs are left to do whatever they want so that they can elect the politician who is not harassing them with regulations as highlighted by Tendler that people are used as vote banks (Tendler, 2002). Politicians need not to interfere with the safety practices, but instead promote them because lives lost due to unsafe practices can never be replaced. Another reason that could have contributed to higher prevalence in our study could be

that we asked for reported use rather than direct observation of use. Reported responses are subject to response bias due to the CMC's desire to look compliant before the interviewer. A study by Nguyen in Moshi indicated that 73.3% of motorcyclists used helmets consistently (Nguyen et al., 2016). Another reason could be that due to increased publicity on importance of helmet use and enforcement of their use, helmet use trends are steadily increasing in some countries (Phillips et al., 2017), Tanzania 73.3% (Nguyen et al., 2016), 82.1% (Kauky, Kishimba, Urio, Abade, & Mghamba, 2015), Uganda 69.4%, though in some countries like Kenya prevalence of helmet use is still low, 22% (13/60) in Kitale (Nasong'o, 2015) which is comparable to helmet use in Naivasha 21.29% (669/3143) (Bachani et al., 2012), irrespective of the time lag of three years between which the studies were conducted.

Pillion passenger

Overall, carrying one pillion passenger at a time was mostly well complied with as in other countries (Xuequn et al., 2011). This factor is mainly dependent on the passenger's preference though the final decision to carry one pillion passenger lies with the CMCs. Some passengers prefer to sit alone on the pillion as it is usually uncomfortable and unsafe to share the small seat. This finding indicates that compliance is not a one-way affair, but it takes into account other individuals in the community. It is therefore important that efforts to improve compliance are spread to other community members as well. The lower prevalence of compliance to requirement of carrying only one pillion passenger in Kenya, 3% (Nasong'o, 2015) and 25.2% (Karau, Ogeng'o, Okoro, Muia, & Saumu, 2015), could be an indicator of the inadequate public transport system forcing people to compete for what is available irrespective of whether their safety is compromised or not. It is therefore important for the responsible authorities to improve the public transport to overcome the challenge of overloading by the motorcyclists.

Factors associated with road safety compliance

Knowing that training before one starts to ride a motorcycle reduces likelihood of road traffic crashes increased compliance to road safety measures due to the fact that such training could lead to exposure to importance of using these safety measures.

Knowing that maintaining a motorcycle in good condition prevents road traffic crashes reduced compliance could indicate that as the CMCs think that the motorcycle is in a safe condition, other safety precautions are then not necessary. Some CMCs could even think that riding a faulty motorcycle keeps them prone to road traffic crashes irrespective of the protective gear one is wearing. This finding further shows us that motorcyclists are ignorant of the fact that human error accounts for 90% (Uganda Police, 2013) of the road traffic crashes irrespective of condition of the motorcycle.

Knowing that padding reduces the impact road traffic crashes resulted in less compliance to at least three of the four selected road safety measures. This could be due to the fact that it reduced the relevance of other safety measures to the motorcyclists. This finding further shows that in most cases, CMCs will take decisions based on what they know.

It is therefore important for the road traffic control police to give comprehensive safety information the CMCs in order for them to take more informed decisions.

Study limitations

Our study depended on self-reports from the respondents regarding use of the safety measures and represents only day-time compliance to the road safety measures. Other studies to consider night-time compliance could be conducted for comparative purposes. Another study limitation is that though this study aimed at looking at compliance to all the four selected road safety measures in totality, the prevalence of 0.9% was extremely low to make meaningful association with the independent variables. We therefore considered compliance to at least three of the four selected road safety measures for our study. Other studies could be conducted in future with a larger sample size to detect a meaningful association between compliance and the independent variables among the motorcyclists.

Conclusion

Our study showed that the prevalence of compliance to all the four selected road safety measures was <1%. The factors associated with compliance to at least three of the four selected road safety measures were knowing that training before CMC starts to ride a motorcycle reduces chances of being involved in a crash, knowing that maintaining a motorcycle in good condition prevents road traffic crashes and knowing that padding reduces the impact of injury due to road traffic crashes.

Disclosure statement

No potential conflict of interest was reported by the authors.

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