

## USE OF HELMETS BY MOTORCYCLE RIDERS AND PASSENGERS IN RURAL AREAS OF RABAI SUB COUNTY, KILIFI COUNTY –KENYA

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### Abstract

**Objective:** To determine use of helmet among motorcycle riders and passengers in Rural Areas of Rabai Sub county, Kilifi county, Kenya

**Design:** Cross-sectional descriptive study.

**Setting:** Rabai Sub county, Kilifi, Kenya.

**Subjects:** 478 motorcycle occupants

**Results:** The occupants were selected from the four Wards in the Sub county. Riders from Rabai 121(57%),Ruruma150(72%),Mwawesa 110(53%) and 119(57%) were from Kambe Ribe. Similar proportion was computed for the Passengers on a 1:1 basis. Helmet use was 31.2% of which high proportion were Riders (88.6%) and the least (11.4%) were Passengers statistical significant ( $p=, .05$ ). Male occupants had higher use rate (91.3%) while females (8.7%) had the least. Having a driving license and Education Level ( $p<.05$ ) were significant among riders and passengers respectively. Non use was attributed to Helmet being expensive(60.4%) and not provided with (93.3%) by riders and passengers respectively, this is contrary to the Kenya Traffic Act. Requirements. Based on the study findings we conclude that the use of Helmet differed by motorcycle Occupant. The study therefore recommends the riders to be subjected to subsidized certified driving schools by county governance and consistent advocacy programs on helmet use among motorcycle occupants and further studies to explore gender disparity in use of helmet.

**Key words:** Helmet use, Rider, Passenger, Head injury

## Background

Helmets have a specific design as prescribed by the Minister and gazetted in the Notice but may vary from time to time (8) Effective enforcement of helmet laws can increase helmet wearing rates to over 90% (10). There are various types of Helmets depending on the type of Activity (4) The helmets ranges from athletes, Military, construction and motorcycle helmets among others. Thus the study focus on motorcycle helmet.

The motorcyclists are found to be susceptible to head injury in a crash; however, existing evidence reveals that the probability of sustaining head injury and mortality is minimized by wearing helmet in the event of an Accident by 70% and 40% respectively (10)

In developed countries, like USA, a study conducted in 2012 by NOPUS revealed a drastic decrease of helmet use among motorcycle passengers from 64% to 46% in 2011 and 2012 respectively (5). In addition, another survey showed 89% of motorcyclists observed had worn helmets in the United States where full universal helmets Laws are implemented, while in states with lack of helmet Law or Limited Laws (49%) had not worn helmets (6).

In developing countries, motorcycle transportation is becoming the most popular and accessible means of transportation. Motorcycle use is the preferred means of transport in underdeveloped and developing countries (9).

In Kenya, both the driver and passenger are expected to ride on a motorcycle with both the helmet and reflector jacket (8). The findings in a study in Thika town revealed only 4% of the drivers disclosed to have worn helmet at the time of the crash (2). In addition, (3) study findings reveals a low (<2%) use of helmet among passengers in Thika and Naivasha.

In rural and urban areas of a country the rate of helmet use varies, (1) in the study in Ghana, noted that the riders in the outskirts of Town centers, had a minimal tendency of wearing helmet than those within the town Centers. (42.3% and 48.9% respectively).

Rabai Sub county being a rural area, due to increase of motorcycle as a means of transportation and existence of three black spot roads in a population of 113,622 (7) the issue of helmet use cannot be ignored. Thus study intended to determine the use of helmet in Rabai Sub County.

## Methods

### *Study population*

The study was conducted in Stratified Wards of Rabai Subcounty. The Wards were further divided into parking Lots. The parking Lots were selected by Simple random sampling of Yes and No Choice (Table 1), The criteria of selecting the Parking Lot was defined as those with more than eight parking lots we selected 4 parking Lots (Rabai Wards) while those with less than eight we selected 2 per wards (Ruruma, Kambe Ribe and Mwawesa Wards) and this total to 10 parking lot. The parking Lots were purposively selected those proximal the road. The study population of 500 estimated motorcycle riders present within the one month of the period was used to compute the sample size of the study subjects. The sample size of the passengers was estimated at a ratio of 1:1 from the riders' sample. The sample size of 239 Riders and 239 Passengers in total 478 respondents attained by use of simple random sampling. The parking Lots were purposively selected those proximal the road. The Selection of subject was done into two categories with equal proportion per ward using simple random sampling whereby standardized estimated 40 pieces of papers were written 20 Yes or 20 No, riders and passengers were requested to pick after explanation per day. In case of non-response similar number were written to compensate. Data collection was done by use of a Key Informant, two structured Interviewer administered questionnaire for the Rider and Passenger and observation checklist. The Qualitative and quantitative techniques were employed using Key Informants,

observation checklist and Questionnaire. Simple random sampling and stratification was used to select the site and participant. The principal researcher recruited eight research assistants subjected to intensive training on the data collection tool, aims objectives and ethical considerations and administration of the tool to minimize response bias. Retrospective Explanation and signing of consent was sought from the respondents and county authority prior to data collection.

### *Study design*

A cross sectional study was used which employed both qualitative and quantitative data collection methods to enhance maximization in data collection and analysis by inferring the variables of interest in the population under study at a specific point in time. This design was considered of its cost effectiveness and ability to collect the defined population attributes and quantitatively test the hypothesis.

### *Data Analysis*

The questionnaires were sorted and organized as per the codes to ease data entry process, verification checks of completeness accuracy, relevance were done. Anonymity was enhanced by coding the questionnaires to avoid personalizing the respondent with the questionnaire and completed questionnaires were secured under a cabinet after data. The data was safeguarded by password in the database. Data analysis was done using the Statistical Package for social science (SPSS) Version 20. Chi-square test of independence and Logistic regression was used to test for association between dependent variable and eliminate confounding variables: Helmet use and independent variables: Age, sex, marital Status, Educational Level, gone to driving school and having a driving license. Presentation of data was displayed in form of Figures and Tables.

## **3.0 Results**

Majority of the occupants interviewed were from Ruruma ward 72 Riders and 72 passengers and the least were from Kambe Ribe ward 106 Riders and 106 Passengers respectively

**Table 1: Distribution by Ward and parking lot coverage**

Ward	parking Lot	Occupant	
		Riders	Passengers
Rabai ward	Bengo	11(19.3%)	11(19.3%)
	Shikaadabu	15(26.3%)	15(26.3%)
	Mazeras	16(28.1%)	16(28.1%)
	Kibaoni	15(26.3%)	15(26.3%)
	Total	57(100.0%)	57(100.0%)
Ruruma ward	Mkapuni	38(52.8%)	38(52.8%)
	Kwajauje	34(47.2%)	34(47.2%)
	Total	72(100.0%)	72(100.0%)
Mwawesa ward	Kwa Kijala	32(56.1%)	32(56.1%)
	Kwasafari	25(43.9%)	25(43.9%)
	Total	57(100.0%)	57(100.0%)
Kambe/Ribe ward	Kwamakini	29(54.7%)	29(54.7%)
	Kwakipara	24(45.3%)	24(45.3%)
	Total	53(100.0%)	53(100.0%)
Total		239(100.0%)	239(100.0%)

*Distribution by characteristic of the respondents***Table 2: Distribution of respondents by demographic characteristics**

characteristic	Occupant	
	Riders	Passengers
<b>Gender</b>		
Male	232(97.1%)	100(41.8%)
Female	7(2.9%)	139(58.2%)
<b>Age</b>		
<= 20 yrs	61(25.5%)	72(30.1%)
21 - 25 yrs	64(26.8%)	40(16.7%)
26 - 30 yrs	77(32.2%)	47(19.7%)
31 - 35 yrs	19(7.9%)	18(7.5%)
>= 36 yrs	18(7.5%)	62(25.9%)
<b>Total</b>	<b>239(100%)</b>	<b>239(100%)</b>

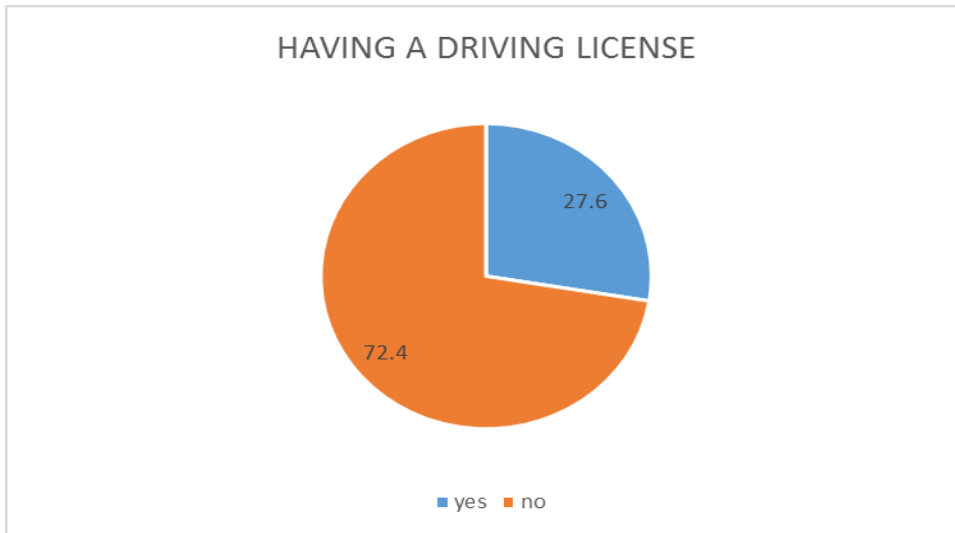
Majority of motorcycle riders were male (97.1%) while majority of the passengers were female (58.2%). Similarly, majority of the riders (32.2%) were age 26-30years and below ( $M=25.3\pm 6.1$ ) while 30.1% of passengers were age 20 years and below and 25.9% more than 35 years ( $M=29.8\pm 14.2$ ).

**Table 3: Socio demographic distribution of respondents**

Characteristic	Rider	Passenger
<b>Marital status</b>		
Single	130(54.4%)	107(44.8%)
Married	104(43.5%)	129(54.0%)
Separated/Divorced	5(2.1%)	3(1.3%)
<b>Educational Level</b>		
None	16(6.7%)	20(8.4%)
Primary	107(44.8%)	116(48.5%)
Secondary	104(43.5%)	72(30.1%)
Tertiary	12(5.0%)	31(13.0%)
<b>Total</b>	<b>239(100%)</b>	<b>239(100%)</b>

Most of the Riders were single (54.4%) whereas the passengers were mostly Married (54.0%). Both motorcycle occupants had primary education (44.8% and 48.5%) respectively.

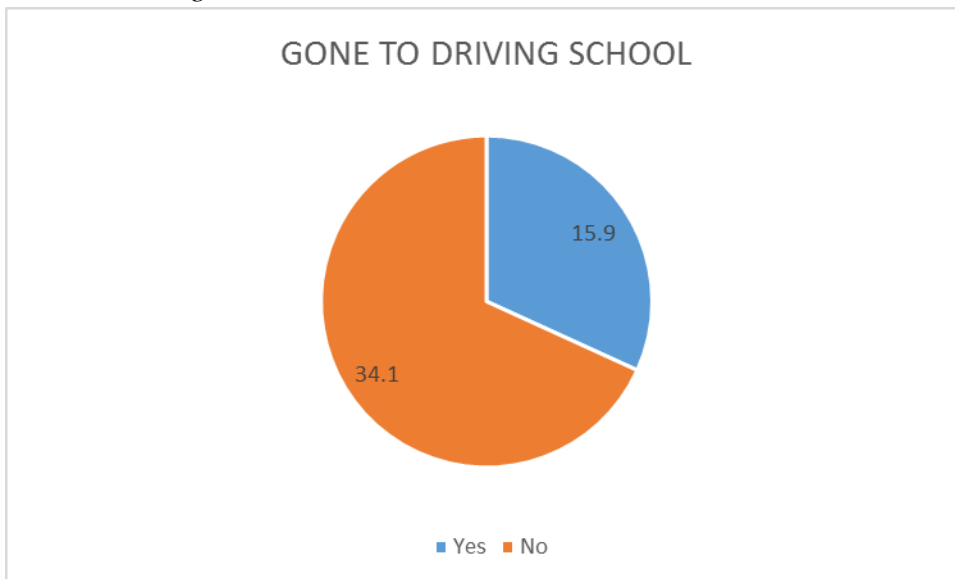
*Having a driving license*



**Figure 1: Riders having a driving license**

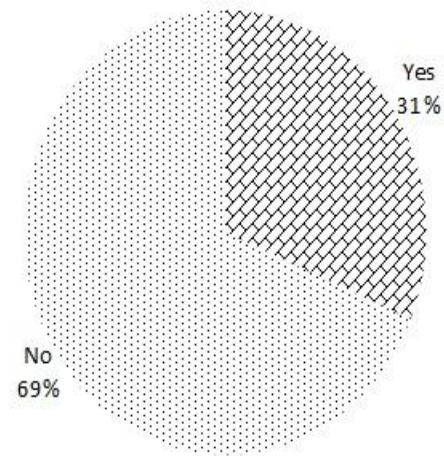
Majority of the riders had not obtained a driving license (72.4%) and the least (27.6%) . as shown in figure 1 above.

*Gone to driving school*



**Figure 2: Riders whether gone to driving school**

Majority of the Riders (34.1%) had not gone to driving school whereas only (15.9%) had gone to driving school. Statistically significant ( $p = .002$ ) as shown in fig 2 above.

*Having helmets for passengers***Fig 3: Having helmet for Passengers**

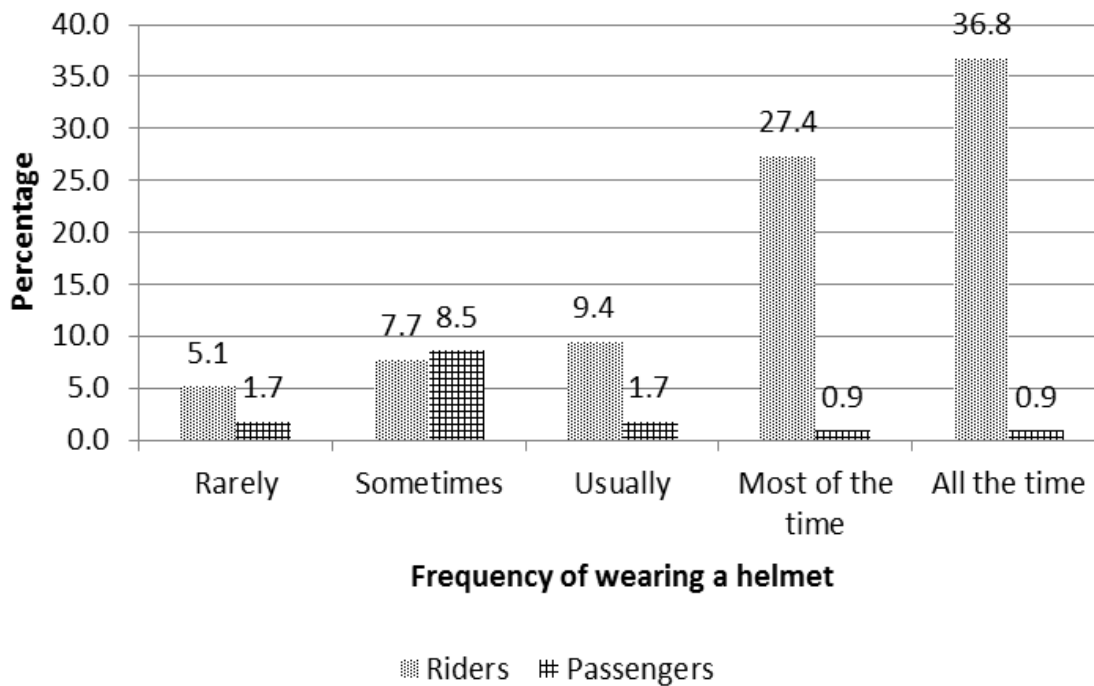
Majority (69%) of the motorcycle riders did not have helmets for their passengers while 31% had.

*Practice of helmet use***Table 4: Helmet use**

Helmet use	No of respondents	Percent
Yes	149	31.2
No	329	68.8
Total	478	100.0

Majority of the respondents did not use helmets, 329(68.8%) compared to 149(31.2%) who used as shown in table 4.

**Frequency of wearing a helmet**



**Figure 4: Frequency of use of helmet**

Majority of riders (36.8%) used a helmet all the time with 27.4% doing so most of the time. Passengers wore a helmet sometimes as shown in figure 5.

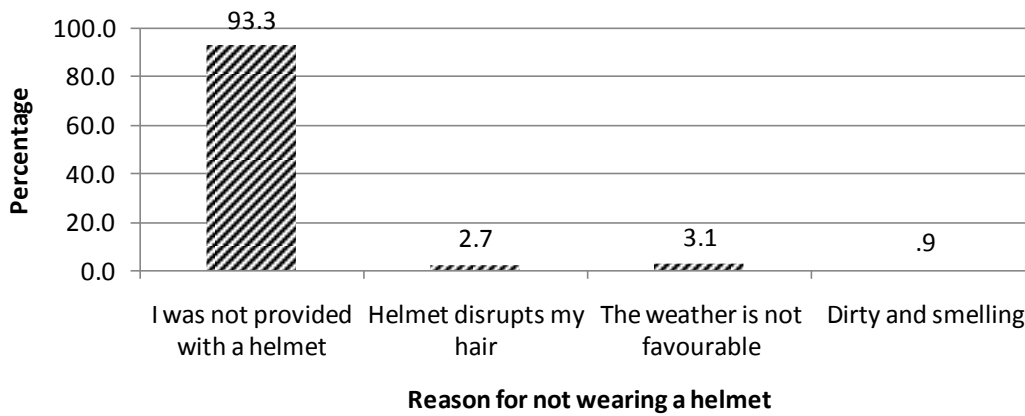
*Reason for non use by riders*

**Table 5: Reasons for non use of helmet by riders**

Reason	Frequency	Percent
It is expensive	99	60.4
I forgot to carry it	20	12.2
The weather is not favorable	11	6.7
It was broken	10	6.1
It is old	7	4.3
Not convenient to carry	6	3.7
It was stolen	4	2.4
It can transmit skin diseases	2	1.2
Some passengers have bigger heads	2	1.2
Passengers don't like it	1	.6
Destroys ladies' hair - they don't like it	1	.6
Some mothers have fearing babies	1	.6
Total	164	100.0

Majority of the riders cited the helmet being expensive (60.4%) as the cause for nonuse as shown in Table 5.

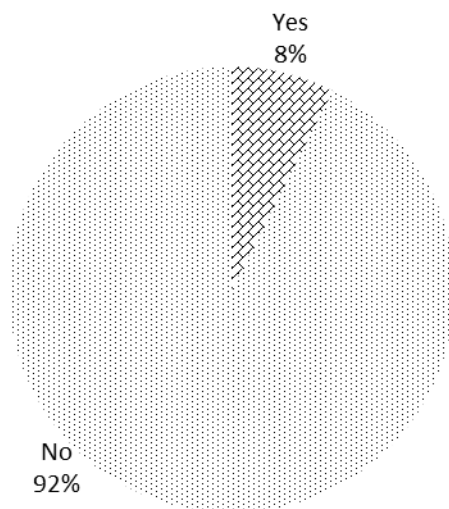
**Nonuse of helmet by passengers**



**Fig 5: Reasons for non use by Passengers**

Majority of the Passengers cited they were not provided with the helmet hence they did not use helmet as shown in figure 6 above.

**Whether passengers were offered helmet by riders**



**Figure 6: whether offered a helmet by the Rider**

Majority of the Passengers (92%) stated they had not been given a helmet by the riders

**Type of injury sustained by riders**

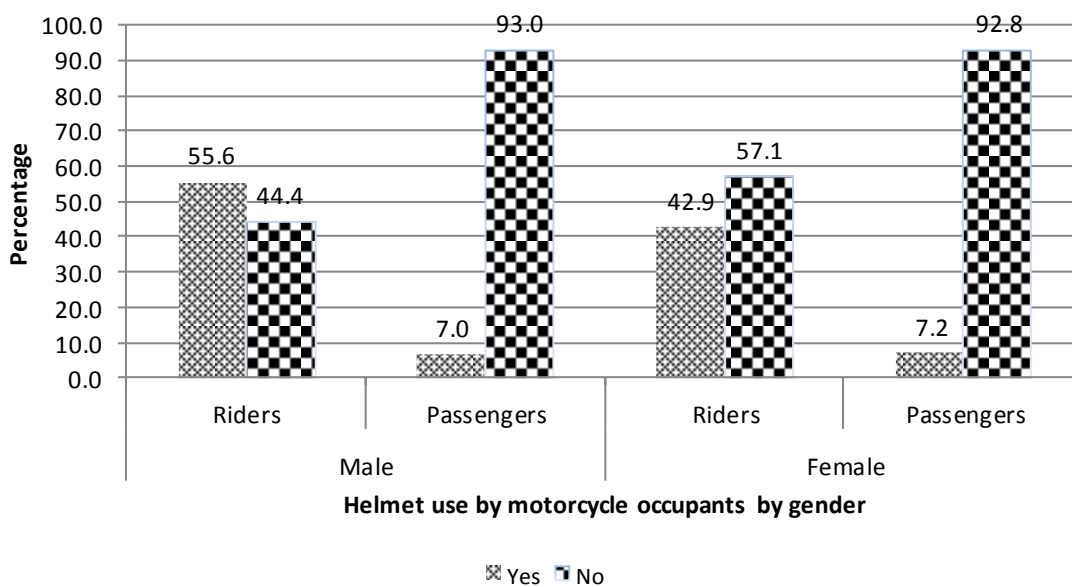


**Table 6: Type of injury sustained by Occupants (N=159)**

Type of injury	Occupant	
	Riders	Passengers
Face	15(13.4%)	4(8.5%)
Head	21(18.8%)	4(8.5%)
Limbs	67(59.8%)	36(76.6%)
All of the above	9(8.0%)	3(6.4%)
Total	112(100.0%)	47(100.0%)

Riders had sustained more injuries of the limbs (59.8%) followed by Head (18.8%) as compared to the Passengers who sustained injuries mostly injuries to the Lower Limbs (76.6%).

**Relationship between Use of helmet by gender and occupant**



**Figure 7: Helmet use and gender**

Use of helmet was higher among Riders(88.6%) proportion 55.2%,95% CI than Passengers(11.4%) proportion 7.1% CI 95%, mid population 4.7-10, 4 .Statistically significant (P= .000).

Correlation performed showed Gender was significant (P=less than .001) that majority of the male motorcycle riders (55.6%) used a helmet compared 7.0% of male passengers. Conversely, 57.1% of female riders and 92.8% of female passengers did not use a helmet.

**Table 7: Relationship between use of helmet and Demographic characteristics by riders**

Characteristic	Helmet use		Total	Significance Test
	Yes	No		
<b>Gender</b>				
Male	129(55.6%)	103(44.4%)	232(100.0%)	Fisher's Exact Test, p = .703
Female	3(42.9%)	4(57.1%)	7(100.0%)	
<b>Age groups</b>				
<= 20 yrs	28(45.9%)	33(54.1%)	61(100.0%)	$\chi^2 = 3.723$ df = 4 p = .445
21 - 25 yrs	36(56.3%)	28(43.8%)	64(100.0%)	
26 - 30 yrs	44(57.1%)	33(42.9%)	77(100.0%)	
31 - 35 yrs	12(63.2%)	7(36.8%)	19(100.0%)	
>= 36 yrs	12(66.7%)	6(33.3%)	18(100.0%)	
<b>Marital status</b>				
Single	62(47.7%)	68(52.3%)	130(100.0%)	Fisher's Exact Test = 6.652, p = .028
Married	67(64.4%)	37(35.6%)	104(100.0%)	
Separated/Divorced	3(60.0%)	2(40.0%)	5(100.0%)	
Total	132(55.2%)	107(44.8%)	239(100%)	

**Table 8 Relationship between use of helmet and Demographic characteristics by passengers**

The percentage of motorcycle passengers who used helmets did not differ by gender,  $p=.954$ , Majority were females (7.2%) as compared to (7.0%) use among males. There was no statistically significant relationship between age and marital status, and helmet use ( $p=.692$ ).

Characteristic	Helmet use		Total	Significance Test
	Yes	No		
<b>Gender</b>				
Male	7(7.0%)	93(93.0%)	100(100.0%)	$\chi^2 = .003$ df = 1 p = .954
Female	10(7.2%)	129(92.8%)	139(100.0%)	
<b>Age groups</b>				
<= 20 yrs	4(5.6%)	68(94.4%)	72(100.0%)	Fisher's Exact Test = 2.657, p = .615
21 - 25 yrs	5(12.5%)	35(87.5%)	40(100.0%)	
26 - 30 yrs	4(8.5%)	43(91.5%)	47(100.0%)	
31 - 35 yrs	1(5.6%)	17(94.4%)	18(100.0%)	
>= 36 yrs	3(4.8%)	59(95.2%)	62(100.0%)	
<b>Marital status</b>				
Single	9(8.4%)	98(91.6%)	107(100.0%)	Fisher's Exact Test = .707, p = .692
Married	8(6.2%)	121(93.8%)	129(100.0%)	
Separated/Divorced	0(0.0%)	3(100.0%)	3(100.0%)	
Total	17(7.1%)	222(92.9%)	239(100%)	

**Table 9: Relationship between use of helmet and socio-demographic characteristics by passengers**

The percentage of motorcycle passengers who used helmets differed by level of education,  $p=.021$  with the majority having reached tertiary education (19.4%).

Highest level of education	Helmet use		Total	Significance Test
	Yes	No		
None	2(10.0%)	18(90.0%)	20(100.0%)	Fisher's Exact Test= 8.690, $p = .021$
Primary	4(3.4%)	112(96.6%)	116(100.0%)	
Secondary	5(6.9%)	67(93.1%)	72(100.0%)	
Tertiary	6(19.4%)	25(80.6%)	31(100.0%)	
Total	17(7.1%)	222(92.9%)	239(100.0%)	

**Table 10: Relationship between use of helmet and Demographic characteristics by motorcycle occupant**

The percentage of motorcycle occupants who used helmets differed by gender,  $p=.000$ , Majority being males 136(91.3%) as compared to 13(8,7%) use among females. There was a statistically significant relationship between age and helmet use  $p=.006$  indicating a difference in the percentage of motorcycle occupants who used helmets by age ( $p=.006$ ), majority falling between ages 26-30 years of age. However, use of helmet by marital status had no significance ( $p=.809$ ).

	Helmet use		Total	Significance Test
	Yes	No		
<b>Gender</b>				
Male	136(41.0%)	196(59.0%)	332(100.0%)	$\chi^2 = 48.58$ df = 1 $p = .000$
Female	13(8.9%)	133(91.1%)	146(100.0%)	
<b>Age groups</b>				
<= 20 yrs	32(24.1%)	101(75.9%)	133(100.0%)	$\chi^2 = 15.744$ df = 4 $p = .003$
21 - 25 yrs	41(39.4%)	63(60.6%)	104(100.0%)	
26 - 30 yrs	48(38.7%)	76(61.3%)	124(100.0%)	
31 - 35 yrs	13(35.1%)	24(64.9%)	37(100.0%)	
>= 36 yrs	15(18.8%)	65(81.3%)	80(100.0%)	
<b>Marital status</b>				
Single	71(30.0%)	166(70.0%)	237(100.0%)	$\chi^2 = 0.424$ df = 2 $p = .809$
Married	75(32.2%)	158(67.8%)	233(100.0%)	
Separated/Divorced	3(37.5%)	5(62.5%)	8(100.0%)	
Total	149(31.2%)	329(68.8%)	478(100.0%)	

**Table 11 Helmet use among motorcycle riders and passengers**

Occupant	Helmet use		Total	Significance Test
	Yes	No		
Riders	132(55.2%)	107(44.8%)	239(100.0%)	$\chi^2 = 128.956$ df = 1 P = .000
Passengers	17(7.1%)	222(92.9%)	239(100.0%)	
Total	149(31.2%)	329(68.8%)	478(100.0%)	

There was a statistically significant relationship between helmet use and motorcycle occupant P=.000. The results show that of motorcycle occupants used helmets 132(55.2%) were riders while the least 17(7.1%) were passengers.

**Table 12: Type of injury sustained (n=159)**

Type of injury	Occupant		Total	Significance Test
	Riders	Passengers		
Face	15(78.9%)	4(21.1%)	19(100.0%)	$\chi^2 = 4.426$ df = 3 p = .219
Head	21(84.0%)	4(16.0%)	25(100.0%)	
Limbs	67(65.0%)	36(35.0%)	103(100.0%)	
All of the above	9(75.0%)	3(25.0%)	12(100.0%)	
Total	112(70.4%)	47(29.6%)	159(100.0%)	

Of the motorcycle occupants who sustained injury (159), majority were riders among whom 65.0% sustained injuries of the limbs compared to 35.0% of the passengers. This was not statistically significant  $\chi^2(3) = 4.426$ , p=.219. Riders were .334 times more likely to sustain injuries than passengers while increasing use of helmet was associated with increase in the likelihood of sustaining injuries (OR=.676).

**Table 13: Regression Analysis on helmet use and demographic characteristic Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.892	.337		2.646	.009
	Gender	.299	.191	.101	1.567	.119
	Age	.001	.006	.012	.149	.881
	Marital status	-.116	.071	-.126	-1.639	.103
	Highest level of education	-.012	.048	-.016	-.241	.810
	Whether gone to driving school	.346	.147	.324	2.358	.019
	Having a Driving License	-.091	.151	-.082	-.605	.546

a. Dependent Variable: Helmet use

Multivariate analysis showed gone to driving school and helmet use among Riders was the only significant variable (P<.05) .

## Discussion

### *Overall helmet use*

Based on the analysis of findings, the study revealed of the 100% motorcycle occupants, only 31.2% were had worn helmet. Majority of them were Riders (88.6%) and 11.4% were Passengers with a mean age of 29.6years. Majority (54.4%) of the riders was single while the same proportion (54.0%) of passengers was married. This study agrees with that of Kaukyet *al* (2015) in their observation reported that helmet use among riders was higher than passengers with 82.1% and 22.5% respectively. Most of the were males (69.5%) with least number being females (30.5%). Similar findings were reported by Grim and Treibich (2014) in their study in Delhi, that gender was a determinant of helmet use among passengers, of which Men were 25-40% likely to wear helmet than women.

### *Demographic characteristics*

Table 2 shows that Riders Were Male (97.1%) who were 25 -30 years ( $M=25.3\pm 6.1$ ) and the Passengers were dominated by Female (58.2%) majority being less than 20year ( $M=29.8\pm 14.2$ ). This shows the gender factor and age in the dominance of the motorcycle business. The age demonstrates the vulnerability of the group to injuries. These study findings agree with Mwakapasa (2011) and slightly differ by those of Grim and Treibich (2014) who found the ages for both the riders to be above thirty.

Table three shows that majority of the Riders were single (54.4%) and Passengers (54.0%) were married both of them had Primary level of education. This shows a low level of education among the motorcycle occupants this could be a challenge in helmet use. However, this disagrees with Akaateba *et al* (2015) who argued that educational attainment does not predict helmet use.

### *Reasons for nonuse of helmet*

Table 4 shows that riders had not used helmets because they were expensive (99%), while passengers had not been provided a helmet by rider (93.3%). This is displayed in figure 5 showing that the passengers (92%) had not been provided with the helmet by the riders. This could be due to the fact that most of the riders were young and had not gone to driving school (34.1), hence majority had not gotten a driving license (72.4%). This hence shows that the motorcycle business is being manned by amateurs not serious with the safety measures hence the reason for more injuries among the Riders category. Going to driving school is demonstrated as the key determinant of helmet use, Significant ( $X^2 = 9.419$  df = 1 p = .002). The low number of Riders had not gone to driving School, hence lack a driving license is major impediment in use of helmet. This is contrary to the Kenyan Traffic Act.

Further study findings demonstrate Riders had sustained more injuries of the limbs (59.8%) followed by Head (18.8%) as compared to the Passengers who sustained injuries mostly injuries to the Lower Limbs (76.6%). This was not statistically significant  $\chi^2 (3) = 4.426$ ,  $p=.219$ . Riders were .334 times more likely to sustain injuries than passengers while increasing use of helmet was associated with increased in the likelihood of sustaining injuries (OR=.676). The study findings agree with those of Dennis *et al* (2013), Mwakapasa (2011) and Kauky *et al* (2015) in their observation reported that helmet use among riders was higher than passengers with 82.1% and 22.5% respectively.

The study set to determine the use of helmet by motorcycle riders and passengers in Rural Rabai. A total of 478 motorcycle occupants were interviewed. They were from the randomly selected parking lots of the four Wards of which 239(50%) were riders while 239(50%) were passengers.

## 5.0 Conclusion

Based on the study findings and discussions, use of helmet among motorcycle Riders and Passengers in Rabai Sub county is very low as per the Requirements of Kenya Traffic Act, No 37 of 2012. The main challenge identified were Very few Riders had gone for driving school, hence majority did not have a driving license, the cost of the Helmet Contributing to Unavailability for the Riders and Passenger.

## Recommendation for further study

A further Cohort study to explore factors associated with gender disparity in both the motorcyclists and passengers need to be carried out under the same conditions as the current study.

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