Vulnerability in the Context of the COVID-19 pandemic: a Case study of Motorcycle-Taxi Drivers in Dar es Salaam

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ABSTRACT

The COVID-19 pandemic has exposed vulnerability among population groups in Tanzania. The study analysed vulnerability status during the pandemic, using motorcycle-taxi riders for the case study, since they are one of the most vulnerable groups to the COVID-19 crisis and commonly excluded from or underserved by social protections. The field survey was conducted in the Dar es Salaam Region, across five districts (Kinondoni, Ilala, Temeke, Kigamboni and Ubungo). Seven (7) enumerators administered the structured questionnaires to interview 462 respondents. The researcher analysed data using descriptive statistics, frequency tables and charts to analyse the vulnerability status of motorcycle-taxi riders. In analysing the impact of three factors (contact with people, wearing masks and age) on the likelihood of getting Covid-19, the study employs the logistic regression model (logistic transformation of the odds). The results suggest that the likelihood of motorcycle-taxi riders getting sick from Covid-19 increases with the number of passengers a driver is in contact with per day, age and their tendency to rarely wear a mask. The researcher also uses the cross-tabulation technique to illustrate the relationship between health insurance and vulnerability.

The Tanzanian Government can use the study results to better understand the vulnerability issues related to motorcycle taxis in the country and formulate practices and policies to minimize their vulnerability and maximize their benefits. This will include raising awareness of Covid-19 and related precautionary measures.

INTRODUCTION

A motorcycle taxi is a licensed type of transport that typically carries one passenger who sits behind the motorcycle rider. In Tanzania, motorcycle taxis (commonly known as *Bodaboda*) have multiplied since the early 2000s. The latest data from the World Health Organization (WHO), shows that in 2016, there were over 1,280,000 motorcycles in Tanzania (Bishop, 2018). Motorcycle taxis are spread across various areas in the country where the passengers are easily accessible. The business model uses direct contact, where the rider and passenger meet and agree on the price before the service is provided.

In the case of Dar es Salaam Region, a motorcycle taxi sometimes carries two or more passengers at a time, and helmets are rarely used in some areas. The passenger normally haggles with the driver over the fare before the trip, which usually ranges from TZS 1,000 to TZS 5,000 (about US$0.50 to US$2.00) for short trips. For longer trips, the passenger pays more than TZS 5,000. Because of traffic jams, motorcycle taxis are usually the fastest form of transport, particularly in big cities like Dar es Salaam. Most Tanzanians choose them over taxicabs, which are more expensive and slower.

Even though some motorcycle taxi riders own motorcycles, the most common business arrangement is called a hire-purchase agreement. This arrangement means that initially, the motorcycle is purchased by a better-off person (owner). The owner then agrees with the rider on weekly or monthly payments to the owner until the motorcycle's purchase price plus an additional amount (stipulated in the contract) is paid off, which is normally within 12 to 18 months. The average income for a motorcycle taxi rider in the region is usually above the minimum wage, which attracts many youths, both marginalized as well as university graduates.

Motorcycle taxis support livelihood activities, offer rapid door-to-door transport and facilitate essential services accessibility, such as markets, health and education. Most low-level educated youth support themselves and their families financially by working as motorcycle taxi riders. Thus, the motorcycle taxi service is vital in complementing mobility in the city's urban areas. However, the COVID-19 pandemic which entered the country in 2020, raised health and financial vulnerabilities for motorcycle taxi riders. Health vulnerability comes from the fact that riders have higher risks of contracting the virus and spreading it, because of their frequent and close interactions with passengers.

The financial vulnerability of motorcycle taxi riders in the context of COVID-19, comes from the nature of their business model. In the motorcycle taxi business, a rider's profit depends on the number of passengers and the distance of their trips. More passengers mean more income for the rider, and the case is the same for the trip distance. Now in 2020, at the peak of the pandemic, people decided to stay home for a greater percentage of their time, out of fear of contracting the virus and they only occasionally

made a few necessary trips using motorcycle taxis. Therefore, the COVID-19 pandemic led to fewer passengers and shorter trips for motorcycle taxi riders, which impacted or posed a challenge to their financial well-being.

RATIONALE FOR THE RESEARCH PROJECT

Motorcycle taxi riders are vulnerable to COVID-19 since they come into direct contact with their passengers, increasing their risk of infection. Also, the pandemic posed business challenges financially, as people reduced the number of trips and distances using motorcycle taxis. Meanwhile, the Tanzanian Government imposed several prevention measures such as hand washing, social distancing and wearing face masks. Such effective prevention measures for COVID-19 are achieved by improving the attitude, knowledge and practice of the overall community and, most importantly, vulnerable population groups such as motorcycle taxi riders. However, these control and preventive measures were not being applied all over the country. Hence, the justification of this study is to inform the government/policymakers and other, non-governmental institutions of the situation analysis on the vulnerability of motorcycle taxi riders in Dar es Salaam to COVID-19. The report from the study recommended policy changes and innovations to address the vulnerability and expand support forthwith. The study used the Dar es Salaam Region as a case study because of the high concentration of motorcycle taxis and passengers.

PROBLEM STATEMENT

As of September 2021, Tanzania recorded 1,367 confirmed cases of COVID-19 with 50 deaths reported to the World Health Organization**.** To a great extent, the country eschewed social distancing and mask-wearing along with the misinformation and conflicting opinions about coronavirus health impacts and vaccines, amid widespread indifference among younger generations in a country desperately attempting to contain the third wave of infections (WHO, 2022). This is a disaster in terms of health and finances, and some of the most vulnerable people are working as motorcycle taxi riders.

The health vulnerability comes from the fact that riders have higher risks of contracting the virus and spreading it because the motorcycle taxi business model requires direct contact between a driver and passengers. Now, COVID-19 can be transmitted through both direct contact (human-to-human transmission and droplets) and indirect contact (airborne contagion and contaminated objects) (Lofti, 2020). Therefore, the motorcycle taxi business model makes drivers vulnerable to contracting the virus, since they are frequently in direct contact (close interactions) with passengers. Empirically, the basis for the vulnerability claim is shown in this study. According to the results, a motorcycle taxi rider is usually in contact with up to 24 passengers per day. Also, six (6) out of ten (10) passengers did not wear masks during the peak of the COVID-19 pandemic (first half of 2020). Financial vulnerability comes from the fact that the pandemic posed a business challenge as people reduced the number of trips and traveling distances using motorcycle taxis, reducing riders' incomes.

Meanwhile, the study established that there is limited information on the health and financial vulnerability of these riders in relation to the pandemic.

OBJECTIVES OF THE STUDY

The main objective is to study the possibility of motorcycles taxi riders being exposed to and getting infected with coronavirus in Dar es Salaam. The following are the specific objectives:

- To analyse the vulnerability of motorcycle taxi riders to coronavirus in relation to the number of passengers in contact.
- To analyse the vulnerability of motorcycle taxi riders to coronavirus in relation to the frequency of wearing masks.
- To analyse financial vulnerability of motorcycle taxi drivers to the COVID-19 pandemic.

RESEARCH QUESTIONS

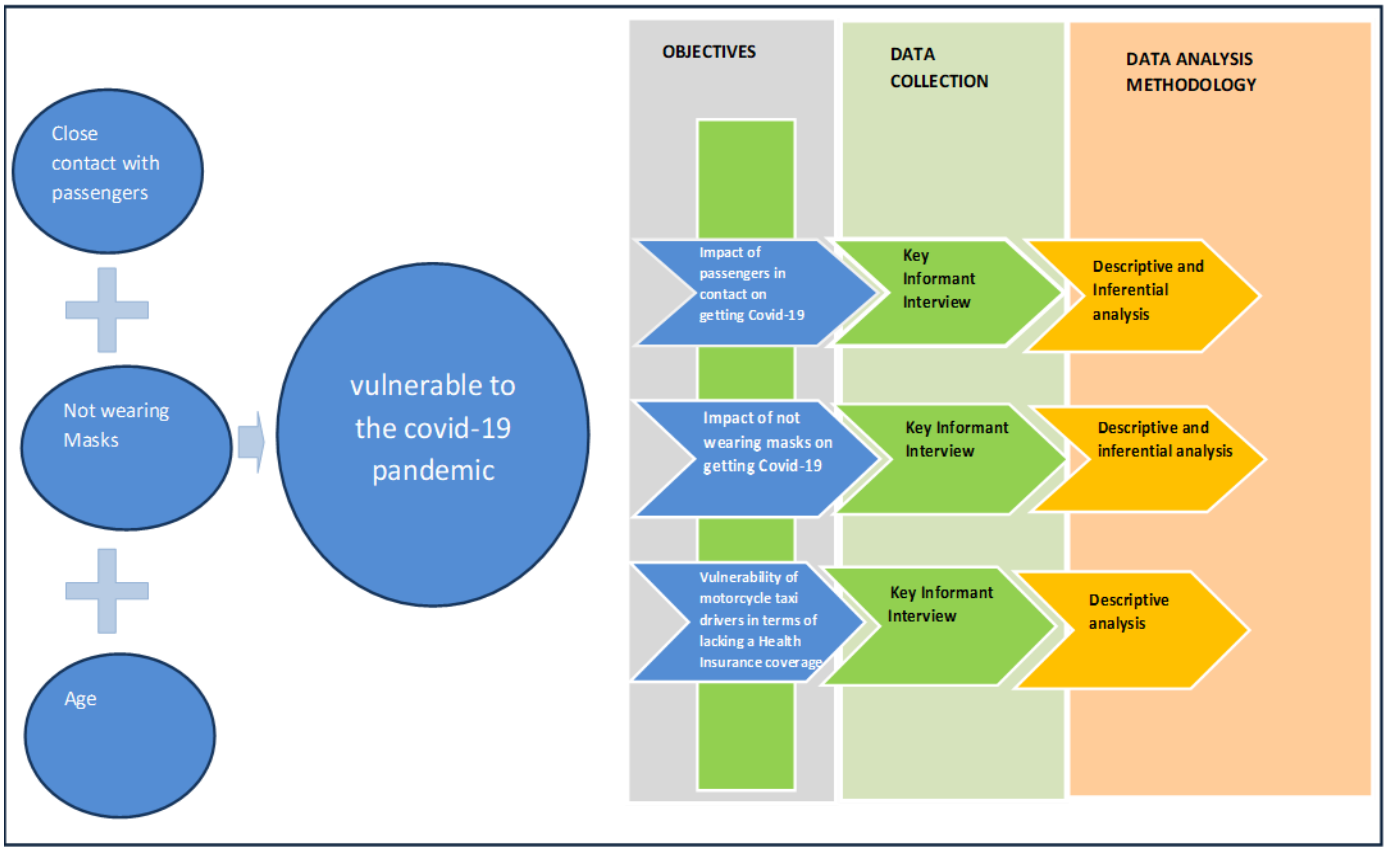
The following are the research questions of the study:

- How vulnerable are motorcycle taxi riders in Dar es Salaam to the COVID-19 pandemic in relation to the number of passengers in contact?
- How vulnerable are motorcycle taxi riders in Dar es Salaam to the COVID-19 pandemic in relation to the frequency of wearing masks?
- How financially vulnerable are motorcycle taxi riders as a result of the COVID-19 pandemic?

CONCEPTUAL FRAMEWORK

The framework will be based on factors affecting the vulnerability of motorcycle-taxi riders to the COVID-19 pandemic in Tanzania. In this framework, the study will focus on three factors causing motorcycle taxi riders to become vulnerable to the pandemic. These factors are close contact with people, not wearing a mask and lack of health insurance. The idea is presented in Figure 1 below, where these vulnerability factors have direct impact on motorcycle taxi riders in the context of COVID-19.

Figure 1: Conceptual Framework on the Vulnerability of Motorcycle Taxi Riders in the Context of COVID-19



Source: Author

THEORETICAL REVIEW

The study draws the theoretical framework from Fineman's Vulnerability Theory, introduced by Martha Fineman in 2008. According to Fineman, the human condition has a universal and constant vulnerability that is countered by the resilience upon which humans can build (Fineman, 2008). The universality implies that vulnerability is prone to all human beings as no one is guaranteed of avoiding illness, injury or other adverse life events. The physical state of human beings leaves them vulnerable to endless change across their lifespan. Fineman's idea of universal vulnerability gave a useful basis for discussing the impacts of and responses to the COVID-19 pandemic among motorcycle taxi riders in Dar es Salaam. Therefore, motorcycle taxi riders are vulnerable due to their human nature as Fineman argued and thus, this study empirically analysed the magnitude of the vulnerability that applies to these riders, in terms of health and finances.

Fineman's Vulnerability Theory also considers the role of social institutions and government in humans to build and exercise resilience (Fineman, 2008). Hence, this study informed the government/policymakers and other, non-governmental institutions of the situation analysis on vulnerability among motorcycle taxis drivers in Dar es Salaam during COVID-19. Also, the report from the study recommended policy changes and innovations to address the vulnerability.

EMPIRICAL REVIEW

Various studies have tried to assess the vulnerability of motorcycle taxi riders in different countries using different methodologies. Different studies come out with different results, and other studies come with the same conclusion, while others do not. Therefore, in this section, I will go through different empirical studies to explore what others have done and to offer a justification for this research. Ovie-Avwioro (2019), analysed COVID-19 knowledge, responsiveness and preventive practices among commercial motorcycle workers in the South-South Region of Nigeria, and the possibilities for public transmission of COVID-19. The results showed that all motorcycle workers were aware of the presence of COVID-19. 93.3 per cent of them did not believe it was in their state. Only 37.8 per cent of them wear facemasks when working, even though they know that they could be infected or infect others in society.

This study provided the basis for the government to provide education and awareness campaigns on COVID-19 to the motorcycle workers. Faiyetole (2022), examined the relationship between COVID-19 spread-mitigative procedures and the readiness to share trips with friends, family and strangers using ordinal logistic regression models. He found that the prevalence change rates were higher during the pandemic than in previous times, implying that the pandemic set an incentive for an average shift from public to private transport use, with a feasible effect on willingness to share trips post-COVID. The results correspond with other studies by Gaskin et al. (2020). They analysed how transportation was related to the virus quickness rate using Cox regression. The study revealed that the odds ratios for commuters using public transportation to work were associated with higher COVID-19 cases and deaths, respectively. The results provided the justification for safety measures and lockdowns implemented by the government. Gutiérrez et al. (2020) and Dong et al. (2021), studied passengers' perceptions of safety and the feelings of satisfaction using public transportation during COVID, declaring that its psychological effects (Parady et al., 2020) will probably remain in the post-Covid era.

The study was useful for public transport administrators and policymakers during the COVID-19 pandemic and for future virus-related pandemics to preserve public transport ridership. Abdullah et al. (2020) presented evidence of a substantial shift from public transportation to private and non-motorized means of transportation due to concerns of COVID-19 infections. The study was significant in planning for transport and related policymaking during plagues according to people's travel needs. Specifically, government could exploit such knowledge for partial lockdowns and planning. Musselwhite et al. (2020), also noted that this pandemic highlights the significance of reconsidering the important social and economic pliability design. This is particularly applicable for highly populated and overfilled states.

Mogaji, E (2020), recognizes the consequences of transportation in developing economies, where restrictions and lockdowns on movement may be unsuccessful, a nation with high population density, poor infrastructure and transportation and a large informal economy. This paper offered applied implications for private and public sector legislators, as they circumnavigate this hazardous time in Nigeria. Hetherington et al. (2021) assessed the transmission risk on a ride-sharing motorbike taxi—a prevalent choice of para transit in Sub-Saharan Africa and South and South-East Asia. It has been revealed that small and large particles pose different risk types. Conditional on the motorbike's speed, larger particles may transmit to the passenger. In contrast, smaller particles move between the riders and maybe are gasped by the passenger. The results were also found by Linka et al. (2020), who studied the link between movement and COVID-19 dynamics and showed disparities in local driving mobility. They found that maximal relationship between driving mobility and disease dynamics.

Kebirungi (2021), analysed the social-economic impact of the COVID-19 pandemic on motorcycle taxi riders in the Kira Town Council, Uganda. The study found that the COVID-19 pandemic negatively impacts the riders due to movement restrictions. The impacts include loss of employment and food insecurity. The results correspond to Krijn et al. (2021). They provided awareness of the impacts of COVID-19 on the urban motorcycle taxi sector across Sub-Saharan Africa. They used a mixed methods approach to conducting qualitative informant interviews with motorcycle taxi sector stakeholders and operators in urban areas. They found that COVID-19 harmed the motorcycle taxi operators. Arellana et al. (2020), analysed the short-term effects of Covid-19 on the transport system. They found that COVID-19 has decreased the demand for motorcycle transportation, reducing transit ridership due to national and local decisions. These studies provided justification for the government to step in and provide financial incentives to these motorcycle riders. Chinazzi (2020), used a global meta-population disease transmission model. The study found that global travel restrictions did help to slow the spread elsewhere in the world. Also, the study found that travel restrictions provide less mitigation than self-isolation, hand washing and home quarantine. Estrada et al. (2020) evaluated the impact of COVID-19 on tourism and air transportation.

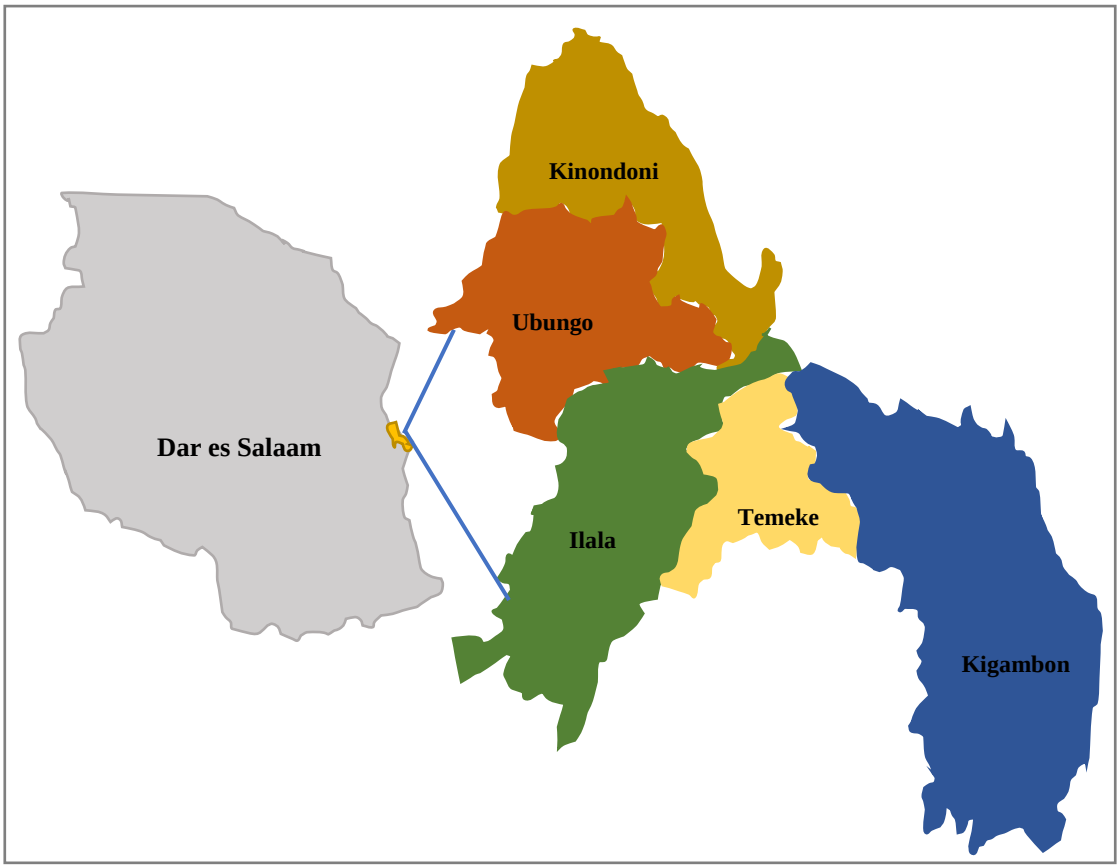
However, it is important to point out that these studies did not focus specifically on the vulnerability of motorcycle taxi riders in Tanzania. Therefore, in a case study of Tanzania, the vulnerability status during the pandemic using motorcycle taxi riders is empirically analysed to see if it corresponds to the results of empirical literature reviews.

METHODOLOGY

Research Design

The study used a case study design, since the research problem is well-known as the study's objective in the Dar es Salaam Region. Furthermore, the study adopted a descriptive design to provide enough protection against bias, while maximizing reliability with due concern for the economic completion of the research study. The study is conducted in Dar es Salaam Region across five districts (Kinondoni, Ilala, Temeke, Kigamboni and Ubungo) as shown in Figure 2 below.

Figure 2: Map Showing the Five Districts in Dar es Salaam Region



Source: Author

Data Collection Methods and Techniques

The researcher used questionnaires as a means of gathering primary data from respondents. This method is effective when conducting a case study survey approach as it is easy to analyse and simple to administer. This format is quite familiar to most respondents in Tanzania. Seven (7) enumerators administered questionnaires to interview 462 respondents. These respondents can be disintegrated by age as follows: 10 respondents were in the age range of 10-20 years, 194 respondents were in the age range of 21-30 years, 217 respondents were in the age range of 30-41, and 41 respondents were in the age range of 41-60 years. All respondents were males as there are no female motorcycle taxi riders in Dar es Salaam.

Sample, Sample Size and Sampling Procedure

The study used a stratified random sampling method. This sampling technique reflects the people being studied, precisely because the researcher stratified motorcycle taxi riders in the entire region before applying random sampling methods. In short, it ensured each motorcycle taxi rider within the districts in the Dar es Salaam Region receives proper representation in the sample. Thus, the research team divided the respondents into five districts (strata). In each district, the target was to get at least 90 respondents by dividing the total sample in equal proportion across five districts[1]. The respondents were engaged in one-to-one interviews, whereby the enumerator filled a structured questionnaire with the answers given by the respondent.

Sample Criteria and Assumptions

The researcher used sampling criteria based on the existing formula, which guided the sample size is as follows:

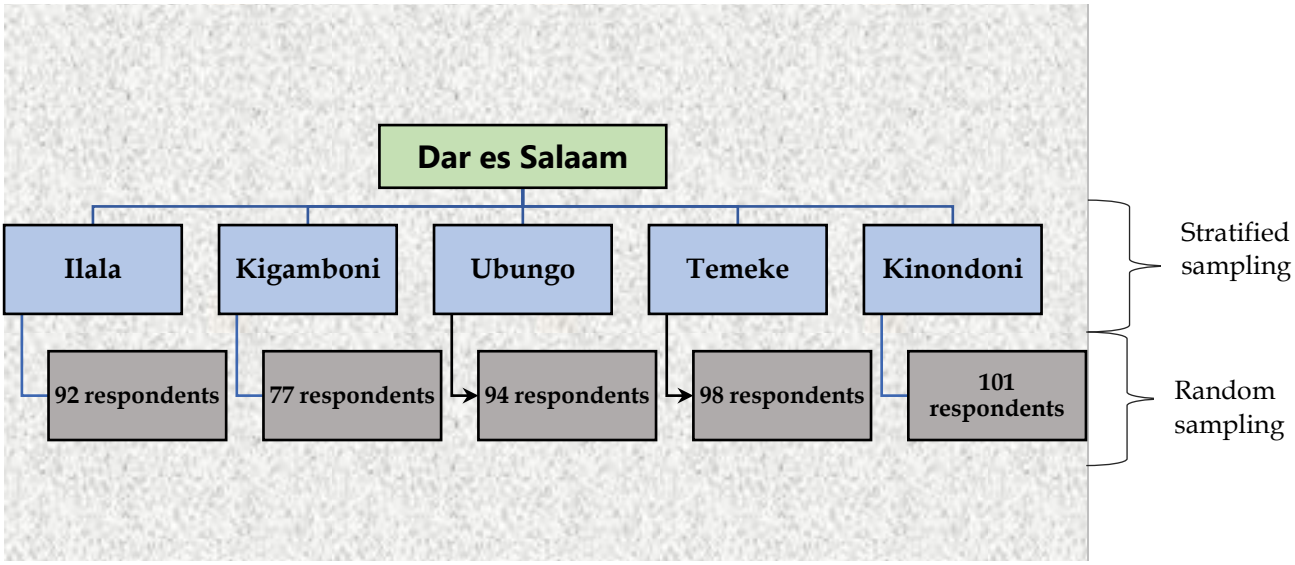
$$\textbf{Sample size (n)} = N/(1+N*e^2)$$

Whereby ***N*** is the project target number (total number of motorcycle taxi riders) and ***e*** is the 5% error. According to a WHO report of 2018, there are 1,280,000 motorcycles in Tanzania. Therefore, the study assumed that the number was still around 1,280,000 in 2020 and used it to calculate the sample size.

Sample Size

Based on the above formula, the sample size is at least 400 motorcycle taxi riders. The team randomly sampled 462 respondents by sampling respondents in each district as shown in Figure 3.

Figure 3: Sampling Design



Source: Author

[1] At Kigamboni district, 77 respondents were interviewed which is below the target due to the shortage of motorcycle taxi drivers in the area.

Reliability and Validity of Data

The researcher ensured the quality of consistency in the study by administering the questionnaires to respondents who are motorcycle taxi riders and have a clear understanding of the purpose of the activity. Enumerators conducted the pilot study, that is re-testing the questionnaires.

Data Management and Analysis

The researcher made sure that questionnaires were duly filled. Enumerators filled the questionnaires from the answers given by the respondent. The principal investigator ensured that all the required information was obtained and recorded appropriately, including removing questionnaires with errors and mistakes. The researcher analysed data obtained through questionnaires using descriptive statistics and frequency tables and charts. Using these approaches simplifies the interpretation and understanding of the findings, which is an essential quality of any good research work. The researcher also used the cross-tabulation technique to illustrate the relationship between health insurance and vulnerability. The Pearson Chi-Square Test was used to tell whether the findings of a crosstab are statistically significant.

The study employed a binary logistic regression to analyse the impact of three factors (contact with people, wearing masks and age) on the likelihood of being infected with COVID-19. The model is the best for analysing the relationship between a binary dependent variable, such as sex (male vs. female) (Dziwornu, 2013; Nisel, 2001).

Model Specification

In analysing the impact of three factors (contact with people, wearing mask and age) on the likelihood of contracting COVID-19, the logistic regression model (logistic transformation of the odds), with the depending variable and independent variables can be specified as follows:

$$\boldsymbol{logit(p) = ln\left(\frac{P}{1-P}\right) = \beta_0 + \beta_1 Mask_1 + \beta_2 Contact_2 + \beta_3 Age_3 + \varepsilon_4}$$

Table 1: Variable Name, Definition and Source and Priori Hypothesis

Variable	Definition	Data collection	Priori expectations
Sick	A binary variable on whether they have ever been sick form COVID-19 (1 means Yes and 0 means No)	Key Informant Interview	
Mask	A binary variable on how often a motorcycle taxi rider wears a mask (1 means occasionally and 0 means rarely)	Key Informant Interview	-
Contact	A continuous variable representing a number of passengers a motorcycle rider encounters daily	Key Informant Interview	+

Age	A binary variable on whether a motorcycle taxi rider is young or old (1 means young *(0-30 years)* and 0 means old *(31-60 years)*).	Key Informant Interview	+

Ethical Considerations

The research team ensured ethical considerations of social research ethics, according to the regulations of research. In data collection, the researcher ensured the voluntary participation of respondents, and none of the participants in this study was forced to participate. Research participants were informed about procedures involved in the study before giving their consent to participate. The researcher obtained a research clearance letter from the institution (University of Dodoma). The researcher also obtained a research permit from national and local authorities before conducting the research. The researcher ensured that all enumerators abide by stipulated health guidelines on protection against COVID-19. These guidelines involved washing hands with soap and running water, use of sanitizers and wearing a mask at all times in the field. The research team assured the respondents that all the information they give will remain confidential and will only be used for this study. The study did not take any sides/biasness during and after data collection. The researcher only delivered what is intended for the research.

RESULTS AND DISCUSSION

Sample Characteristics and Distribution

On average, 46 per cent (almost half) of all motorcycle taxi riders are on a contract (owning the motorcycle after paying the owner plus the agreed profit). 36 per cent of the riders are themselves owners, followed by 13 per cent who are employees, and the remaining 5 per cent are other categories as shown in **Error! Reference source not found.**. On average, 42 per cent of all motorcycle taxi riders are youth (21 to 30 years), and 47 per cent are youth aged 31 to 40 years. The remaining 9 per cent and 2 per cent represent drivers above 40 years and below 20 years, respectively, as shown in **Error! Reference source not found.** below.

Figure 5: Tenure categories of motorcycle taxi driver

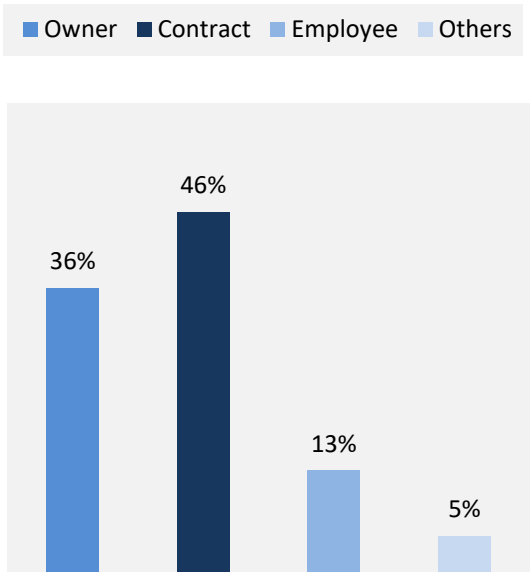
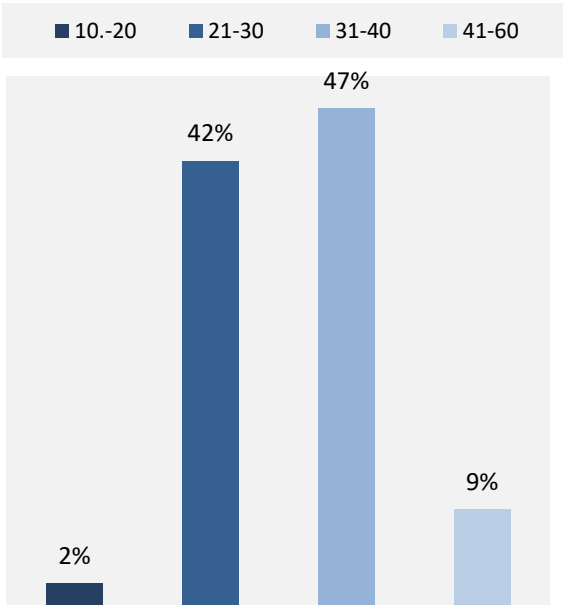


Figure 4: Age-group of motorcycle taxi drivers



On average, 68 per cent of all motorcycle taxi riders belong to an association, as shown in **Error! Reference source not found.**. These associations support them when encountering financial, professional and even personal problems. One respondent stated, "*I joined the association because unity is vital. My colleagues, in cooperation, can help me if I have a problem.*" The remaining 32 per cent did not belong to any association. One of them stated that "*I cannot join an association because there are fees, while it does not have any benefits to me.*" According to the study, the Makonde Drivers' Association has the highest percentage frequency of 19 per cent. In comparison, Kona Msikitini Association had the lowest percentage of 3 per cent, as shown in **Error! Reference source not found.**.

Figure 7: Percentage frequency of motorcycle taxi drivers that belong to an association

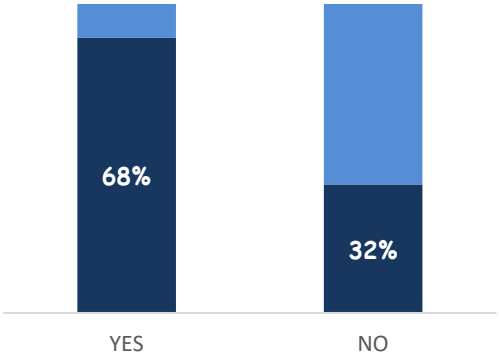
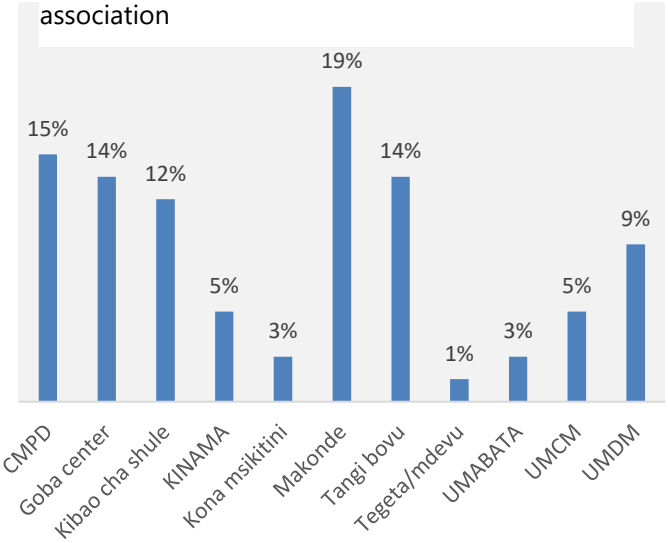


Figure 6: Percentage frequency for name of the association

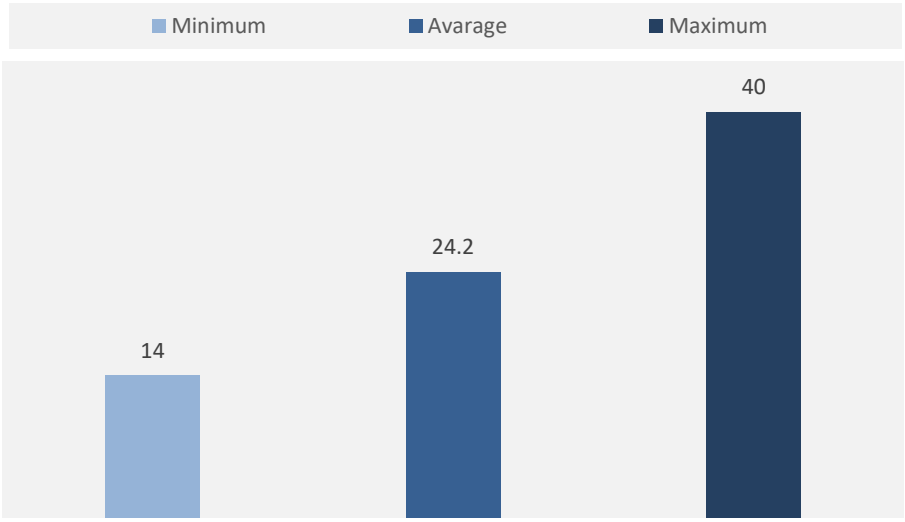


Objective I: Vulnerability of Motorcycle Taxi Riders to the COVID-19 Pandemic in Relation to the Number of Passengers in Contact.

Fact: On average, a driver is in contact with 24 passengers everyday

The study reveals that a motorcycle taxi rider is in contact with up to 24 different passengers per day, as shown in **Error! Reference source not found.**. This increases the chance of contracting the coronavirus, especially if no precautions, such as wearing masks and washing hands, are taken.

Figure 8: Number of People in Contact per Day



Objective II: Vulnerability of Motorcycle Taxi Riders to the COVID-19 Pandemic in Relation to Frequency of Wearing Masks.

Fact: 6 Out of every 10 motorcycle taxi riders and their passengers, few have very rarely or never worn a mask during working hours

The study found that on average, 60 per cent of all motorcycle riders have either rarely (40 per cent) or have never (20 per cent) worn a mask during working hours, even at the peak of the COVID-19 pandemic (first half of 2020), as shown in **Error! Reference source not found.**. This is a shocking statistic, considering the number of people they encounter daily, as stated above. One respondent stated that, "*I do not wear a mask because it is hard to breathe, especially when you're riding against the wind.*" This is the case for their passengers as well. The study shows that 64 per cent of all passengers rarely wear (51 per cent) or have never worn (13 per cent) a mask when using a motorcycle taxi, which increases the risk of contracting the coronavirus as shown in **Error! Reference source not found.**.

Figure 10: The percentage frequency of riders on wearing a mask

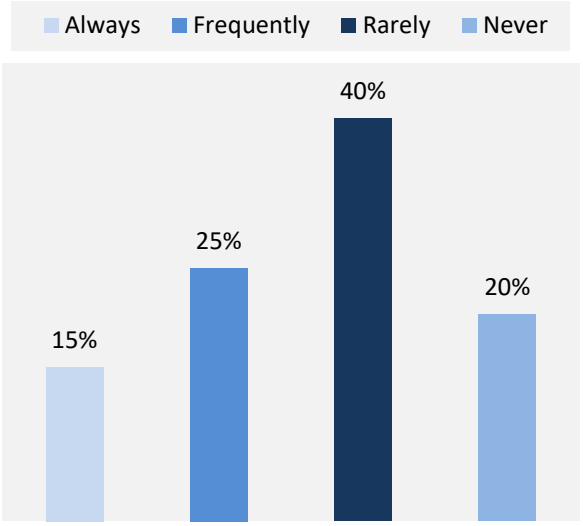
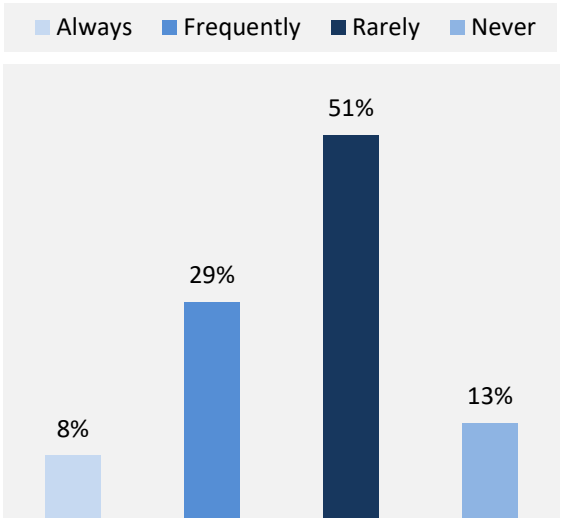


Figure 9: The percentage frequency of passengers on wearing a mask



Fact: 8 out of every 10 riders who have never worn a mask during working hours, also have passengers who rarely or never wore a mask

The study found that there is a positive correlation on percentage frequency of wearing a mask between motorcycle taxi riders and their passengers, as shown in Table 2. It seems that on average, 84 per cent of all motorcycle riders who have never worn a mask during working hours have passengers who also rarely (48.9 per cent) or never (35.1 per cent) wore a mask, even at the peak of the COVID-19 pandemic. Again, this shows how vulnerable these drivers are to contracting coronavirus, when neither they nor their passengers frequently wear masks.

Table 2: Relationship on the Percentage Frequency of Riders and Passengers on Wearing a Mask

How often do you wear a mask during working hours since the pandemic? * How often do your passengers wear a mask during working hours since the pandemic? Cross tabulation						
		How often do your passengers wear a mask during working hours since the pandemic?				
		Always	Frequently	Rarely	Never	Total
How often do you wear a mask during working hours since the pandemic?	Always	32.9%	32.9%	28.6%	5.7%	100.0%
	Frequently	7.8%	44.3%	47.0%	0.9%	100.0%
	Rarely	3.3%	23.5%	62.3%	10.9%	100.0%
	Never	0.0%	16.0%	**48.9%**	**35.1%**	100.0%

Note: The p-value for Pearson Chi-Square Test is 0.000 hence the difference is statistically significant

Objective III: Financial Vulnerability of Motorcycle Taxi Riders as a Result of the COVID-19 Pandemic

Fact: 7 out of every 10 drivers were negatively, financially impacted by the COVID-19 pandemic

The study found that 72 per cent of the motorcycle taxi riders were negatively, financially impacted by the pandemic, as shown in **Error! Reference source not found.**. One respondent stated that "*Business was very tough because people reduced their movements and money circulation was low, such that my friend who was a motorcycle taxi rider as an employee, lost his job because the owner sold his motorcycle.*" The remaining 28 per cent responded that their income did not change as a result of coronavirus. The study also found that COVID-19 had negative health impacts on the drivers, such that 10 per cent of all drivers got sick from the virus, as shown in **Error! Reference source not found.**. One respondent stated that, "*I got infected with the virus and I stayed home for one week, using traditional medicines.*"

Figure 11:The percentage frequency of riders who got sick from Covid-19

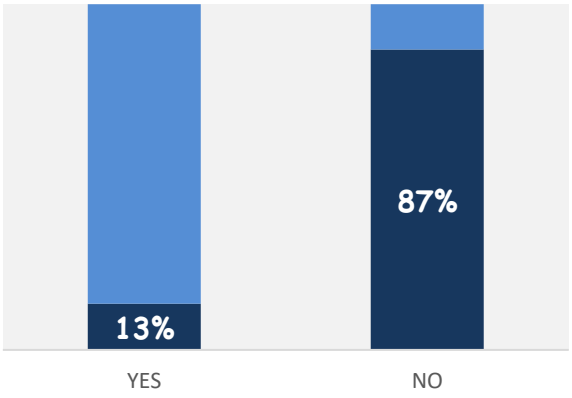
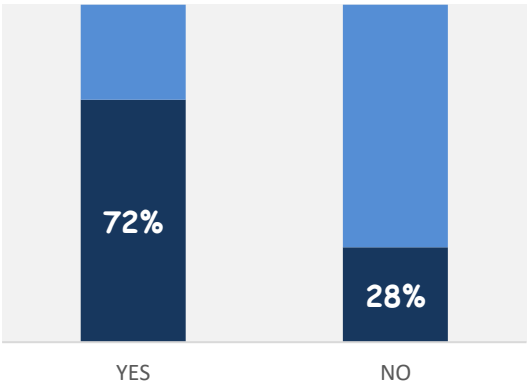


Figure 11: The percentage frequency of riders who were negatively, financially impacted by Covid-19



Fact: 9 out of every 10 drivers do not have health insurance

The study found that 88 per cent of the motorcycle taxi riders do not have health insurance coverage, which makes them financially vulnerable when they need to cover their healthcare costs, as shown in **Error! Reference source not found.**. The remaining 12 per cent of the drivers had health insurance as one respondent stated that, "*The insurance has benefits when you're sick or you have a bad accident which needs an operation that would cost you a lot of money, had you not been insured. I am speaking from my own experience when I had a terrible accident but fortunately, I had health insurance.*" Those who said they did not have insurance gave various reasons, namely high costs of getting the insurance, and this was the primary reason given by almost half of all riders (as shown in Figure), complete lack or insufficient knowledge of the insurance, too much bureaucracy which takes a lot of time and effort to acquire the insurance and others are in the process of getting insured. One respondent stated that, "*I do not see the importance of insurance now due to the difficulty of getting treatment with health insurance as high priority is given to those with cash and not insurance*".

Figure 13: The percentage frequency of motorcycle taxi drivers who do not have a health insurance

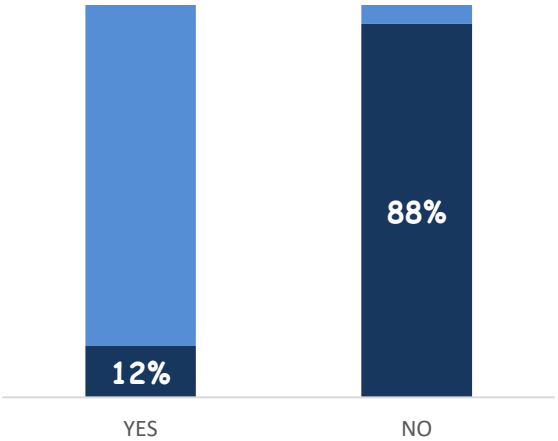
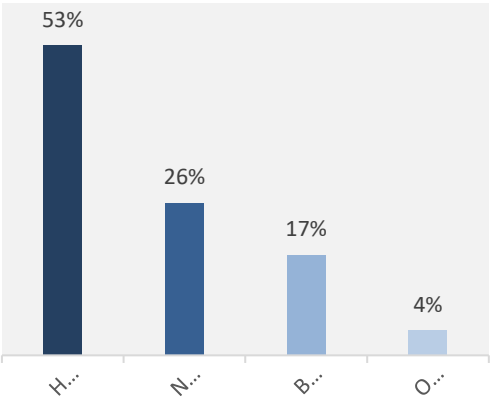


Figure 14: The percentage frequency of the reasons for not having a health insurance



Fact: 8 out of 10 drivers who got sick from Covid-19 did not have health insurance

The study found that 80.6 per cent of all motorcycle taxi riders who were infected with the virus did not have health insurance coverage, which put a dent on their finances.

Table 3: Relationship Between Drivers and Their Passengers on Wearing a Mask

Do you have health insurance? * Have you ever got sick from Covid-19? Cross tabulation			
		Have you ever got sick from Covid-19?	
		Yes	No
Do you have health insurance?	Yes	19.4%	11.0%
	No	**80.6%**	89.0%
	Total	100.0%	100.0%

Note: The p-value for Pearson Chi-Square Test is 0.061 hence the difference is statistically significant

Logistic Regression Results

The study developed a binary logistic regression model to analyse the vulnerability factors that could impact the likelihood of getting sick from COVID-19, among motorcycle taxi riders. The regression table is presented in Table 4, including the odds ratio, standard error and p-value for each significant independent variable, and model summary statistics.

Starting with the coefficient representing wearing masks, the odds ratio for the predictor variable (occasionally) is less than 1. This means wearing a mask occasionally is associated with a decrease in the odds of a motorcycle rider getting sick from COVID-19, compared to wearing a mask rarely. However, its p-value is not significant even at 10 per cent, which means that the results have no significant impact on the likelihood of motorcycle taxi riders getting sick from COVID-19.

The results for the next variable (contact) imply that the number of passengers in contact per day has a significant impact (at a 1 percent level) on the likelihood of a motorcycle taxi rider getting sick from COVID-19. The positive odds ratio implies that when all other factors remain constant, a motorcycle taxi rider in contact with one more passenger in a day, has higher odds of contracting the coronavirus (OR = 2.5). These results abide with the priori hypothesis and other studies by (A. Gutiérrez, 2020; Faiyetole, 2022). The results also imply that the age of motorcycle taxi riders has a significant impact (at a 1 per cent level) on the likelihood of them getting sick from COVID-19. The coefficient of odds ratio implies that when all other factors remain constant, the odds are a lot lower for young drivers (0.0001 times that of older). For ease of interpretation, calculate the odds of a younger rider surviving over an older

rider, using 1/0.0001 = 10,000. Older riders were 10,000 times more likely to get sick from COVID-19 than younger ones.

Model summary statistics show a p-value of 0.000, significant at a 99 per cent confidence level. We found the highest VIF value of 1.3, indicating no multicollinearity among the predictor variables. The Pseudo R-square value is 0.9788, indicating that the model would be able to explain 97.8 per cent of the variation in the likelihood of motorcycle taxi riders getting sick from COVID-19. In addition to that, the Pearson Goodness-of-Fit test shows a p-value of 0.8407. This was not found to be significant for this model at a 95 per cent confidence level (p-value > 0.05). All the model statistics indicated that the developed model fitted the data well.

Table 4: Logistic Regression: Dependent Variable is COVID-19 sickness

Factors	**Odds Ratio**	**std.error**	**p-value**
Constant	3.75E-06	0.0000179	0.009***
Wearing Mask (Ref. Rarely)			
Occasionally	0.0402958	0.1680726	0.441
Contact	2.545776	0.8079998	0.003***
Age (Ref. Old)			
Young	0.0001349	0.0003755	0.001***

Model Summary: n = 246, LR chi2(3) = 356.61, p-value = 0.0000, Log likelihood = -3.8568086, Pseudo R2 = 0.9788. **Pearson Goodness-of-Fit Test**: p-value = 0.8407, Pearson chi2(14) = 8.85. *** indicates significance at 1% level

CONCLUSION AND RECOMMENDATIONS

This study aims to empirically analyse the vulnerability status of motorcycle taxi riders in the context of COVID-19, due to the fact that these drivers account for a majority of youth employment, and they are one of the most vulnerable groups, since they come into contact with significant numbers of people in their line of work. The result for the first objective reveals that a motorcycle taxi rider is in contact with up to 24 different passengers per day. This increases the chance of contracting the coronavirus, especially if no precautions, such as wearing masks and washing hands, are taken. For the second objective, the study found that on average 60 per cent of all motorcycle riders rarely (40 per cent), or have never (20 per cent), worn a mask during their working hours, even at the peak of the COVID-19 pandemic (first half of 2020). This is also the case is the for their passengers. The study shows that 64 per cent of all passengers rarely (51 per cent) or have never worn a mask (13 per cent), when using a motorcycle taxi, which greatly increases the risk of contracting the coronavirus. Also, there is a positive correlation on percentage frequency of wearing a mask between motorcycle taxi riders and their passengers. For the third objective, the study found that 72 per cent of the motorcycle taxi riders were negatively, financially affected due to the pandemic. Also, the study found that 88 per cent of the motorcycle taxi riders do not have health insurance coverage, which makes them financially vulnerable when they need to cover healthcare costs. Lastly, the study found that 80.6 per cent of all motorcycle taxi riders who were infected by the virus did not have health insurance coverage, which put a dent on their finances.

The study also employed logistic regression, and the results imply that the number of passengers with whom the driver comes into contact per day has a significant impact (at a 1 percent level) on the likelihood of a motorcycle taxi rider getting sick from COVID-19. The results also imply that the age of a motorcycle taxi rider has significant impact (at a 1 per cent level) on the likelihood of that rider getting sick from COVID-19.

The following are recommendations made based on the study:

- There should be effective regulation of the motorcycle taxi subsector, involving collaboration between different players and different government departments. The government should collaborate with the private sector, for example, the insurance industry, driving schools and civil society, such as motorcycle taxi associations.
- The government is advised to encourage riders to join motorcycle taxi associations. These associations should be overseen and supported by Local Government Authorities.
- More research should be carried out on other aspects of motorcycle taxi riders' lives in both urban and rural areas.

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APPENDIX

Enumerators interviewing and filling the questionnaires from the answers given by the motorcycle-taxi drivers at Kinondoni district

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Enumerators interviewing and filling the questionnaires from the answers given by the motorcycle-taxi drivers at Ubungo district

Enumerators interviewing motorcycle-taxi drivers at Temeke district

Enumerators interviewing and filling the questionnaires from the answers given by the motorcycle-taxi drivers at Kigamboni district

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