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Human Errors Contributing to Commercial Motorcycle Crashes in Tanzanian Cities

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ABSTRACT

Commercial motorcycles have become an important source of employment for young men in developing countries in response to the lack of employment opportunities in the formal sector. However, while in major cities, the risk is dreaded as fatal because motorcycles are frequently involved in deadly crashes; studies on human errors accounting for such crashes are inadequate. To underpin policies that promote road safety, this paper analyses human errors contributing to the commercial motorcycle crashes in cities of Tanzania. It is based on qualitative data collected through observations and focus group discussions in the cities of Dar es Salaam, Mbeya, and Arusha. The findings revealed that inexperienced riders, as evidenced by 17 risky tendencies, are responsible for the crashes involving commercial motorcycles. Most motorcycle crashes result from a lack of experience, which is linked to low cognitive ability (i.e., 8 out of 17), while low performance (i.e., 4 out of 17) is associated with a few motorcycle crashes. Subsequently, while failure to manage the riding task due to excessive speed and overloading leads to a significant number of crashes, reckless riding behaviours such as quickly evading road potholes, ignoring red lights, and neglecting riding tasks result in fewer crash incidents. Therefore, it is important to reintroduce comprehensive training programmes for novice motorcycle riders; commercial motorcycle employers should also value the task of riding and help the riders operate the enterprise on reasonable terms.

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1.0 Introduction

Commercial motorcycles play a vital role in improving people's lives worldwide today. According to Zhang (2019), the current uses of motorcycles have surpassed the traditional ones, as in the past, they were used for leisure and cultural games. The tendency to use motorcycles for commercial purposes appears to be more common in the cities of low- and middle-income countries than in those of developed countries. The growing rate of unemployment among youth due to the scarcity of job opportunities in the formal sector is reported to account for this trend to a significant extent. However, as Wang (2022) puts it, motorcycle riding is a beneficial means of transport and improves their living standards, for it is less costly. In cities, commercial motorcycles are reported to be preferred to other vehicles for reasons such as low fuel consumption, convenience and agility, the ability to access destinations within streets, low maintenance expenses, and relatively low prices (Konlan & Hayford, 2022). Unfortunately, commercial motorcycles are increasingly perceived as a threat to people and property, as they are involved in quite a large number of accidents in cities and other urban areas.

A recent report by the World Health Organisation (2023) indicates that road traffic crashes contribute to the deaths of approximately 1.19 million people each year worldwide. However, while this figure shows a slight decline in the number of deaths from motorcycle-related crashes from 3.5 million people between 2016 and 2021, it highlights the contribution of transport research and calls for more research to promote road safety. The Global Status Report on Road Safety of the WHO indicates that, in 2018, deaths caused by motorcycle crashes accounted for more than 23% of all road traffic deaths, with youth aged 15 and 29 the most affected. The point is that motorcycle crashes claim more lives for young motorcyclists than for other road users, such as pedestrians, passengers, and bystanders (Konlan & Hayford, 2022). Nevertheless, this report appears to misrepresent the actual situation because it was based on only about 14% of all registered motorcycles, and not all motorcycles are formally registered in developing countries (Nambiza *et al.,* 2025). Consistent with the above reports, a study by Straus (2017) shows that motorcycles are involved in crashes more than other vehicles because of their ability to access in-street destinations, their high use in transporting people and cargo in congested cities, and their frequent use often due to low fuel consumption.

The occurrence of motorcycle crashes Several factors contribute to the occurrence of motorcycle crashes. to several factors. For instance, Santoso and Maulina (2019) point out vehicle defects, human errors, unfavourable conditions, and hazardous weather. However, other literature indicates that errors related to a driver or rider's failure to adjust to complex road situations, due to misjudgements in information processing or cognitive functioning, are more significant than other errors (Straus, 2017). This situation indicates a contestation over how to determine the causes of crashes. One serious problem likely related to this is that identifying the factors and circumstances that might have caused the crash tends to be challenging; detecting the factors and circumstances that might have caused crashes is difficult, as they often disappear before the crash is complete (Zhang, 2019). Thus, it appears reasonable to follow Gumel *et al.* (2017), who suggest that the factors and circumstances accounting for the occurrence of crashes can only be understood by tracing the tendencies of the drivers or riders involved. This study emphasises the necessity of analysing the human errors contributing to crashes involving commercial motorcycles in major cities and determining suitable strategies to address the problem. Nevertheless, previous studies have focused primarily on the general causes of crashes involving commercial motorcycles, resulting in limited attention to human-error information in the context of cities in Tanzania.

In Tanzania, a large number of youths engaging in commercial motorcycle riding makes them particularly vulnerable to road crashes (Nambiza *et al.,* 2025). In short, commercial motorcycle riding has become a way for many young men to make money, which helps to solve the problem of unemployment in the formal sector caused by urbanisation on the streets of major cities (Kasavaga et al., 2025). The increase in the number of commercial motorcycles and riders is partly due

to the relatively low purchase price, low fuel consumption, quick travel times, and the ability to access destinations directly on the streets. Thus, many people prefer the use of commercial motorcycles to other means of transport such as tricycles, taxis, or community buses (Salum *et al.,* 2019). However, the current report indicates that incidents of crashes due to commercial motorcycles are increasing. For instance, motorcycle crashes have accounted for between 21% and 23% of incidents in the five-year period from 2019 to 2024 (Tanzania Police Force, 2024). Nonetheless, according to Dangisso (2023), the incidents of crashes involving motorcycles are more numerous in the streets of the major cities than in those of the rural areas. The study by Kiwango *et al.* (2024) indicates that while commercial motorcycle riding has become a source of income for young men in cities, communities are worried about the rising incidents of crashes, which claim lives and leave many injured. However, one minor issue with the previous studies is that they focused on examining all factors associated with road traffic crashes involving commercial motorcycles, including vehicle defects, unfavourable road conditions, and adverse weather. The current study aims to identify the specific aspects of human error that contribute most to crashes involving commercial motorcycle riding in cities and to analyse the factors influencing riding behaviour, based on a review of literature from developing countries and a pilot study involving commercial motorcycle riders.

2.0 Literature Review

The term 'human error' refers to a driver or rider's failure to adjust to complex road situations due to misjudgements in information processing or cognitive functioning (Straus, 2017). Human errors are reflected in three major aspects, such as making decisions, performance and cognitive ability (Whittingham, 2004). Consistently, Santoso and Maulina (2019) argue that human errors result from mistakes made by a driver or rider in making decisions; performance and cognitive ability account for most road crashes. Hence, once a driver or rider makes mistakes in their decisions, performance, or a combination of these aspects, they can highly subject themselves to road crashes, as per Dangisso's (2023) statement. While accidents associated with human error are usually reported to occur under the influence of non-human error factors, such as motorcycle defects, poor road conditions, or unfavourable weather, this information seems insufficient and is based on findings from developed countries (Straus, 2017). Thus, this study provides intervention strategies primarily derived from data collected in developed countries. Therefore, as far as developing countries, including Tanzania, are concerned, this study leaves a knowledge gap specifically regarding which errors contribute to crashes and strategies for interventions.

In the cities of Indonesia (Aceh, Pekanbaru, Semarang, Pontianak, and Goronta), many motorcycle riders are reported to lack experience in handling the riding task, as evidenced by their deviant tendencies associated with poor recognition (Santoso & Maulina, 2019). This finding means the riders' errors associated with decision-making and performance contribute less to incidents of crashes than those related to cognition. It is further reported that motorists lack in-street riding skills and the ability to accurately estimate distance and time when they want to overtake due to insufficient training. It is important to note that the riders' lack of experience, coupled with exposure to non-human factors such as poor road conditions and hazardous weather, increases their likelihood of causing serious crashes on the streets. Nevertheless, Santos and Maulina (2019) maintain that the lack of overtaking skills, excessive speeding, and riding under time pressure are associated with fewer crashes than factors related to other aspects of human errors. Because of that, training novice motorcycle riders might be necessary to enhance their cognitive skills by raising their awareness of road safety.

Reports indicate that motorcycle crashes in cities across Taiwan are a result of factors beyond riders' inexperience in handling the riding task. According to Wang (2022), these include not wearing safety helmets, riding without a licence, being obstructed by roadside objects, misbehaving while riding, and purposely violating on-road rules. Nonetheless, the lack of valid riding licences overrides all the others. Hence, while they account for a lower rate

relative to other aspects, unlicensed riders seem more likely to cause crashes in Tanzanian cities because they do not undergo formal training.

In Nigeria, motorcycle riding is a serious problem too. According to Oluwadiya *et al.* (2009), it is the second main cause of crashes there. It is reported that most crashes result from riders' risky behaviours, which were identified through a review of literature from developing countries and pilot studies, including actions such as carrying more than two passengers, riding without headlights at night, and not wearing safety helmets. Riding without safety helmets is the primary cause of most motorcycle crashes, accounting for 96.5% of all 363 motorcyclists studied (Oluwadiya et al., 2009). Hence, as evidenced by the literature, the tendency to ride without a safety helmet is another major contributor to motorcycle crashes in different ways in Indonesia, Taiwan, and Nigeria.

In the Hawassa city of Ethiopia, it has been reported that most motorcycle crashes result from speedy riding, drunken riding, distracted riding, and road user negligence (Dangisso, 2023). In this list, speedy riding accounts for 78.5% of motorcycle crashes. His study shows that the aspects of human error that he highlights contribute more to street crashes compared with other factors, such as road conditions, unfavourable weather, and vehicle defects.

In Tanzania's major cities, commercial motorcycles are also associated with crashes. Hence, although it has become one of the important commercial activities, because of the low amount of fuel used, maintenance cost, capacity to access in-street destinations and relatively low price of motorcycles, commercial motorcycle riding seems to be a lethal enterprise associated with numerous incidents of crashes and deaths, as both Kinyaga (2017) and Nambiza *et al.* (2025) have pointed out. As the number of commercial motorcycles increases in cities, the motorcyclists without skills for handling the riding task are reported to increase as well (Kasavaga *et al.,* 2025). This situation continues to contribute to the rising number of injuries and deaths from street crashes each year, causing our communities to suffer from the loss of their people, property, and healthcare costs. Additionally, this study specifically examines the human errors that contribute to commercial motorcycle crashes in urban areas.

2.1 Theoretical Framework

This study is guided by Ajzen's (2005) theory of planned behaviour. This theory was derived from the theory of rational behaviour to offer unique insights into human intention to perform a specific behaviour from a psychological perspective (Shen *et al.,* 2020). The theory rests on the assumption that an individual's intention regarding behaviours can reveal whether the desired tendencies will occur. According to Ajzen (2011), the theory of planned behaviour is associated with three major tenets: attitude toward the behaviour, subjective norms, and perceived behavioural control variables. Wang (2014) explains that an individual's previous experience, along with information obtained from that experience and other environmental factors, forms their attitude. Hence, based on this attitude, an individual's behaviour can be evaluated as either positive or negative. They call the pressure placed on an individual to decide whether or not to perform a behaviour a subjective norm. It is therefore assumed that the expectations of family members and other important people are in question for an individual. Hence, the opinions of such influential groups determine the individual's decision to take action. Ajzen (2005) defines "perceived behavioural control" as people's perception of their ability to perform a particular behaviour. As such, an individual's perception determines their ability to achieve behavioural goals. This study analyses the factors contributing to the riding habits of commercial motorcycle riders in cities. Hence, the Theory of Planned Behaviour was selected to help determine the factors that influence the behaviour of commercial motorcycle riders. Shen *et al.* (2020) argue that even if the relationship between an individual's attitudes and intentions is positive, desirable behaviours may not be displayed if the individual's control over them is weak. Wang (2014) argues that time, convenience, and economic constraints can affect perceived control.

3.0 Methodology

3.1 Research Approach and Study Sites

This study employed a qualitative research approach. The rationale for selecting this qualitative research approach was its ability to provide in-depth, descriptive information about the phenomenon under study through multiple data collection methods (Hennink & Weber, 2019). Data were collected at three road junctions in major Tanzanian cities: Machinga Complex (Dar es Salaam), Uyole (Mbeya), and Mianzini (Arusha). These sites experience high rates of commercial motorcycle crashes compared to other city areas (Nambiza *et al.,* 2025). The researchers anticipated meeting resourceful informants (i.e., individuals who ride motorcycles commercially, use them regularly, and have direct experience with crash incidents). Ethical approval was obtained from the National Institute of Transport (NIT), Dar es Salaam. All participants provided verbal informed consent, and data were anonymised to ensure confidentiality.

3.2 Research Design

The current study employed a descriptive research design. The entire process of collecting and analysing the data and presenting the findings was done descriptively. data andrch, descriptive design iwasted for for its capacity to provide a thorough understanding of the phenomenon under investigation (Hennink, 2014).

3.3 Sampling and Data Collection

A purposive sampling was used to recruit participants. The sample size was determined by data saturation, the point at which no new insights emerged and information began to repeat (Hennink *et al.,* 2019). This yielded a final sample of 30 participants.

Data collection took place in two phases. First, researchers conducted observations over two weeks using a 20-item checklist of risky behaviours which was developed by reviewing literature from developing countries and piloting with 15 preliminary participants. The checklist captured behaviours such as overtaking, riding on congested roads, weaving between vehicles, and using a phone while riding. Participants recorded reflections and experiences in diaries.

Second, 16 purposively selected participants, chosen based on riding experience, knowledge of safe practices, and observed behaviours, engaged in three focus group discussions, each with 5–6 participants (one per site). A researcher facilitated each session. Data from all three sites were cross-checked by the research team to validate findings.

3.4 Data Analysis

The data was analysed thematically. Selection was based on allowing researchers to interpret their findings in relation to the study's research questions, as per Hennink (2014). The data from both sources were combined and organised into themes based on three categories of human error: cognitive, performance, and decision-making factors.

Table 1

Participants Involved in the Focus Group Discussion

Age	Gender	Education level	Marital status	Occupation	Total
18 – 25	male 02 female 01	High School = 1 Bachelor' degree=2 Master's degree=0	Single married	student, motorcyclist and garage work	03
26 -35	male 02 female 02	High School =0 Bachelor' degree=3 Master's degree =1	- married	police officer, motorcyclist, nurse, teacher	04
36 - 45	male 03 female 02	High School =0 Bachelor' degree=4 Master's degree = 1	 married	driver, nurse, motorcyclist, house wife, police officer	05
46 - 55	male 02 female 01	Bachelor' degree =3 Master's degree =0	married	police officer, motorcyclist, nurse, teacher	03
56- above	male 01	Bachelor' degree =1 Master's degree =0	married	driver, lecturer, tailor	01
		Total			**16**

4.0 Results and Discussion

The result indicated that, in Tanzanian cities, commercial motorcycle riding has become a life-endangering enterprise because most of the riders are involved in a large number of crashes.

Most riders struggle with in-street tasks due to their lack of experience, which is characterised by errors in in-street tasks due to a lack of experience because their riding is characterised by errors related to performance, decision-making, and cognition. Tables 2, 3, and 4 show the 17 human error aspects that the riders of commercial motorcycles were found to commit while riding at the investigated sites (i.e., Dar es Salaam, Mbeya, and Arusha cities).

Table 2

Human Error Risky Aspects by Frequency of Occurrences in Dar es Salaam

S/N	Human error	Rate	Category
1.	stuck behind a slowly moving vehicle	6	Cognition
2.	misjudging the distance of the oncoming vehicle while overtaking	8	decision making
3.	disregarding red lights	13	decision making
4.	trying to evade a road pothole quickly	3	Performance
5.	trying to give a piece of a message to misbehaved drivers or riders	4	Performance
6.	receiving a phone call while riding	9	Cognition
7.	rash riding and time pressure	12	Cognition
8.	disregard of riding task	4	Cognition
9.	show off and stylish riding	3	Cognition
10.	overloading	15	Cognition
11.	speedy riding	16	decision making
12.	lacking knowledge of street roads	10	Cognition
13.	failing to control inner-city roads	9	Cognition
14.	passing in spaces between moving vehicles without alert	14	decision making
15.	disregarding riding lanes on congested roads	14	decision making
16.	disregarding the signs given by fellow riders	11	decision making
17.	riding after taking in alcohol	4	decision making
	Total	**155**	

Table 2 shows that low cognitive ability (i.e., 8 out of 17) is the reason for most of the motorcycle crashes, while low performance (i.e., 4 out of 17) is associated with a few crashes in Dar es Salaam city. Subsequently, it can also be observed that failure to handle the riding task due to speedy riding (16 out of 155) and excessive overloading (15 out of 155) causes the largest number of crashes, while reckless riding in the form of trying to evade road potholes quickly (3 out of 155) and showing off and stylish riding (3 out of 155) are associated with the fewest incidents of road crashes. Hence, while the largest number of accidents occur due to the riders' low cognitive ability, low performance contributes to the fewest incidents of crashes involving commercial motorcycle riding in Dar es Salaam city.

Table 3

Human Error Risky Aspects by Frequency of Occurrences in Mbeya city

S/N	Human error	Rate	Category
1.	stuck behind a slowly moving vehicle	4	Cognition
2.	misjudging the distance of the oncoming vehicle while overtaking	8	decision making
3.	disregarding red lights	11	decision making
4.	trying to evade a road pothole quickly	4	Performance
5.	trying to give a piece of a message to misbehaved drivers or riders	4	Performance
6.	receiving a phone call while riding	9	Cognition
7.	rash riding and time pressure	12	Cognition
8.	disregard of riding task	3	Cognition
9.	show off and stylish riding	4	Cognition
10.	overloading	12	Cognition
11.	speedy riding	18	decision making
12.	lacking knowledge of street roads	8	Cognition
13.	failing to control inner-city roads	6	Cognition
14.	passing in spaces between moving vehicles without alert	6	decision making
15.	disregarding riding lanes on congested roads	10	decision making

S/N	Human error	Rate	Category
16.	disregarding the signs given by fellow riders	11	decision making
17.	riding after taking in alcohol	4	decision making
	Total	**134**	

Table 3 stresses that cognitive factors (8 out of 17) exhibited in speedy riding cause most crashes due to commercial motorcycle riding, while performance (i.e., 2 out of 17) contributes the least in the city of Mbeya. In the city of Dar es Salaam, the main contributor to crashes is a motorcycle rider's low cognitive ability, while low performance contributes the least. The incidents of crashes are only 134. However, while speedy riding (18 out of 134) causes the largest number of crashes, disregarding the riding task (i.e., 3 out of 134) causes the smallest number of crashes.

Table 4

Human Error Risky Aspects by Frequency of Occurrences in Arusha City

S/N	Human error	Rate	Category
1.	stuck behind a slowly moving vehicle	5	Cognition
2.	misjudging the distance of the oncoming vehicle while overtaking	11	decision making
3.	disregarding red lights	8	decision making
4.	trying to evade a road pothole quickly	5	Performance
5.	trying to give a piece of a message to misbehaved drivers or riders	7	Performance
6.	receiving a phone call while riding	10	Cognition
7.	rash riding and time pressure	12	Cognition
8.	disregard of riding task	10	Cognition
9.	show off and stylish riding	6	Cognition
10.	overloading	13	Cognition
11.	speedy riding	15	decision making
12.	lacking knowledge of street roads	8	Cognition
13.	failing to control inner-city roads	7	Cognition
14.	passing in spaces between moving vehicles without alert	8	decision making
15.	disregarding riding lanes on congested roads	6	decision making
16.	disregarding the signs given by fellow riders	7	decision making
17.	riding after taking in alcohol	6	decision making
	Total	148	

Table 4 makes it also obvious that while low cognitive ability (i.e., 8 out of 17) is the reason for most of the crashes, low performance (i.e., 4 out of 17) is associated with the fewest crashes in Arusha City. There were 148 incidents of crashes caused by commercial motorcycle riding. Speedy riding is the main cause (i.e., 15 out of 148), while getting stuck behind the slowly moving vehicles (i.e., 5 out of 148) causes the fewest incidents of crashes.

Therefore, the overall results for the three sites (i.e., Dar es Salaam, Mbeya, and Arusha) indicated that riders are involved with 17 risky tendencies. In this list, inexperience associated with low cognitive ability (i.e., 8 out of 17) is the reason for most motorcycle crashes, while low performance (i.e., 4 out of 17) is associated with relatively few motorcycle crashes. Subsequently, failure to handle the riding task due to speedy riding and excessive overloading (i.e., collectively accounting for 31 out of 155 in Dar es Salaam city, 30 out of 134 in Mbeya city, and 28 out of 148 in Arusha city) causes the largest number of crashes; reckless riding tendencies associated with trying to evade road potholes quickly, stylish riding, disregarding red lights, and the riding task generally (i.e., collectively accounting for 6 out of 155 in Dar es Salaam, 7 out of 134 in Mbeya, and 10 out of 148 in Arusha) cause the fewest crashes. Speedy riding and excessive overloading of a commercial motorcycle are found to cause the largest number of crashes, which seems unlikely compared to what is reported in the available literature. For instance, whereas previous studies show that in the cities of Indonesia (i.e., Aceh, Pekan, Semarang, and Goronta), the lack of in-street riding skills and failure to accurately estimate distance and time during the moment of overtaking are the causes of most motorcycle crashes, in the cities of Taiwan, unlicensed riding accounts for most of the motorcycle crashes (Santoso & Maulina, 2019; Wang, 2022). Various

factors appear to determine a rider's likelihood of causing a crash. These include exposure to the riding tasks, as attested by the rider's ability to respond to risky circumstances intelligently, ability to handle street riding properly, and overall use of a commercial motorcycle. In essence, commercial motorcycle riding requires two aspects: relevant skills to avoid the risk of crashes and the ability to ensure a motorcycle is safe and productive and is in a reasonable condition (Dangisso, 2023). Riders need to undergo formal training at colleges to learn to ride safely. Specifically, they have to learn how to handle their motorcycles effectively while riding, understand road signs, and interact with other road users, such as car drivers, pedestrians, and fellow motorcycle riders. Kinyaga (2017) argues that irresponsible motorists' behaviours contribute to crashes involving commercial motorcycles because they do not take road safety seriously. It is important to note that, in colleges, motorists are expected to have opportunities to learn how to handle on-street riding and ride defensively, which would inevitably minimise crashes. This assertion aligns with Kiwango *et al.'s* (2024) argument that awareness of riding safety is enhanced by training that covers cognitive skills, performance, and reasonable decision-making; as a result, a novice rider who completes the training may become a competent rider rather than merely receiving a certificate that permits him to start riding. Competence in managing riding tasks and engaging with other road users significantly decreases the likelihood of road crashes and accidents. Crashes occur because riders lack the skills. Therefore, they need safe riding skills, as Konlan and Hayford (2022) have also argued. Since riders have never undergone any formal training, they ride under time pressure on congested roads and depend on skills attained through trial-and-error learning. Highlighting the contribution of trained riders, Oluwadiya, *et al.* (2009) define a motorcycle rider who lacks skills as a road bomb. This conclusion is based on the fact that they will pose a potential threat to themselves and other road users. Thus, training can be a priority to ensure safety in commercial motorcycle riding.

The study revealed that some crashes occur because riders engage in reckless riding as well. Youth riders, aged 15 to 20, including those trained in colleges, commonly exhibit this aspect. This suggests that reckless riding practices result not only from a lack of training for the riders' experience but also from their age, as confirmed by one of the informants (a rider of a commercial motorcycle) who stated the following:

> *We offer our service to earn a living and ride to different places as demanded by our customers. We are paid soon after riding them. If they are giving you money, how can you refuse to offer your service? So, no matter speedy riding, disregarding lanes, or ignoring signs are associated with risk and crashes; we ignore them and help our customers, taking passengers, bags and sometimes both passengers and bags to meet our customers demands'. How can you ask whether we are trained or not?*

This statement verifies that both trained and non-trained riders are associated with reckless riding. Their riding tends to be influenced by age and time pressure. Thus, even though riders of commercial motorcycles are aware of the risks associated with ignorance of on-road safety, speeding, disregarding signs, or overloading, they can cause crashes due to recklessness. This observation align to the findings of Santoso and Maulina (2019), who found that riders who do not try to avoid risky tendencies, including speeding, alcohol consumption, and disregarding signs, tend to be involved in more serious motorcycle crashes. Authorities must ensure that commercial riders are of a reasonable age. These measures can help commercial riders take their responsibilities seriously, adhere to road signs, and avoid riding under pressure from themselves or customers, which can lead to crashes.

The discussion revealed that non-trained riders developed their riding skills through various methods. Riders have received training from colleges, family members, or self-training. Family members or self-training often equipped many of them with motorcycle riding skills. Hence, this group of riders significantly contributed to technical liability by making wrong decisions. Emphasising the importance of training riders, Konlan and Hayford (2022) argue that as a youth rider goes on street roads, which are full of congestion, riding without the necessary skills is likely to be highly associated with crashes and risk;

hence, a licensing system should be a priority to reduce threats due to motorcycle crashes. Therefore, this study underscores the need to raise awareness of safe riding among novice riders. Essentially, such training could inevitably contribute to raising cognitive ability, performance, and decision-making among commercial motorcycle riders and make the enterprise more productive, as Wang (2022) asserts.

In this study, reckless riding, including trying to evade road potholes quickly, passing between moving vehicles, and ignoring road signs, was also found to involve youth riders. This behaviour is associated with only a few incidents of crashes and is common on roads under reconstruction and on roads that have never been reconstructed. The findings corroborate Salum *et al.'s* (2019) argument that a few crashes occur due to inappropriate road designs, a lack of regular check-ups, and maintenance creating an unfriendly environment for drivers, riders, and other road users. Authorities must prioritise user-friendly road designs for riders and conduct regular safety checkups.

Passing spaces between moving vehicles without alerting drivers, disregarding riding lanes in congested roads, and disregarding red lights tends to increase the rate of crashes. Oluwadiya *et al.* (2009) report that speedy riding and overloading cause motorcycle crashes in Nigerian cities. However, while motorcycle crashes are mainly due to three aspects – speeding, overloading and reckless riding in Tanzania – only two, such as speeding and overloading, cause motorcycle crashes in Nigeria. A single motorcycle can carry more than two persons, as established by Oluwadiya *et al.* (2009). In Tanzania, the tendency of carrying more than two passengers is common, such that a single motorcycle can not only carry two passengers but also a large sack.

It was also found that some crashes occur because of reckless tendencies associated with standing on motorcycles, playing loud music, or receiving phone calls while riding. Other tendencies include not wearing safety helmets or night reflectors and consuming alcoholic drinks while riding. These tendencies are common among young riders aged between 15 and 25 years. It was observed that as they begin to feel capable of riding motorcycles after self- or in-group training, the young riders feel proud of themselves and go out on the streets to ride motorcycles for commercial purposes. These riders often ride unregistered motorcycles. As such, due to lack of training, they are highly prone to the risk of potential crashes, deaths, and injuries. Reports indicate that reckless riding, stemming from a lack of formal training, leads to crashes in cities across Taiwan, Ethiopia, and Nigeria. However, in the cities of Taiwan, reckless riding behaviours are connected with purposeful violations of road rules; in Ethiopia, these include riding without headlights at night and not wearing safety helmets (Wang, 2022; Dangisso, 2023). Therefore, it can be borne in mind that recklessness due to a lack of formal training is associated with a greater number of unacceptable aspects in the cities of these countries. In Tanzania, since just a few riders of commercial motorcycles wear safety helmets, ride at reasonable speeds, carry a proper number of passengers, or carry reasonable goods, the rate of crashes keeps increasing. As the incidents of crashes rise, people seem to be worried about the safety connected with commercial motorcycles, as one of the participants argued during the discussion that:

> *I wonder how much longer we will continue to lose our children, motorcycles, and money while also caring for the injured or witnessing our own children die due to motorcycle crashes. Are they a source of income or a source of threats in our communities?*

From these statements, it can be evident that while in the past motorcycles were perceived as a source of income, employment, and advantage, they seem to be regarded as a source of threat due to the alarming incidents of crashes accompanying them. As pointed out earlier, city dwellers prefer commercial motorcycles to other modes, such as taxis, minibuses, and private cars (Kinyaga, 2017). The major reason is its ease of use, especially in locations with severe traffic congestion as well as its affordability to purchase and hire. As such, the use of motorcycles has increased rapidly in recent decades. They act as a source of informal employment, helping communities to meet needs and facilitating transport, as Kasavaga *et al.* (2025) also noted. It is therefore very unfortunate that commercial motorcycle riding is associated with an

increase in the rate of crashes and live threats. The observation that motorcycles have become a threat to human life corroborates with the report from the WHO (2023) that every time a motorcycle crash occurs, it is the poor people (riders and pedestrians) who suffer socially and economically. This implies that motorcycle crashes can render some individuals unable to generate income due to disabilities or cause them to lose their jobs because of prolonged suffering from injuries, making both riders and pedestrians particularly vulnerable to the consequences. Entire communities can also experience this suffering. The cost of medication for those injured in crashes, property loss, and exposure to insecurity also burdens families. Others may also succumb to the financial burden of restoring motorcycles. Proper initiatives must be implemented to address the poor riding habits of motorcycle riders; otherwise, our cities will continue to suffer from motorcycle crashes.

Research Objective 2 sought to analyse the factors influencing the behaviour of commercial motorcycle riders. We collected data for this objective by conducting focus group discussions. Hence, the result indicated that the behaviour of the commercial motorcycle riders is influenced by two major factors, namely the community's wrong attitude towards the task of riding motorcycles and the riders' riding pressures. The community, including the owners (i.e., the employers of riders) of the commercial motorcycles, undervalues the exercise of riding motorcycles. This observation aligns with the Theory of Planned Behaviours, which states that an individual's decision to do something can be determined by the perceptions of influential groups of people (Shen *et al.,* 2020). Because of undervaluing the task of riding commercial motorcycles, the owners are found to hire any individual, including untrained ones, to go into the streets and ride motorcycles for commercial purposes. To them, the most important thing is judging a rider based on affording the daily target money. As such, this practice leads to the emergence of crashes and accidents. However, if the owners stop undervaluing the task of riding motorcycles and allow riders to take time to learn how to ride and maintain safety, they can contribute to making the enterprise productive. Participants' statements uncovered this revelation by stating that:

> *Mafunzo ya nini, umemaliza chuo halafu unataka kusomea hata kuendesha bodaboda tu? Acha kupoteza muda. Watu si watakushangaa?* "Why can one go just to learn how to ride a motorcycle after completing university studies? is this not wastage of time." [Researchers' translation]

This statement shows some of the riders of commercial motorcycles have acquired relevant skills (i.e., completed university education) but not riding skills. Correspondingly, the WHO (2023) report shows that the growing rate of unemployment among youths due to the scarcity of job opportunities in the formal sector explains the community's decision to commercialise motorcycles to earn a living in developing countries. Most motorcyclists have blowouts and lack proper lighting or sight mirrors due to inadequate formal training. The major reason is that the owners prioritise allowing riders to work and earning the targeted daily money over addressing these challenges.

The riders also perceive riding for commerce as the easiest task, leading them to devalue it. This tendency explains why they prefer wearing light clothes and sandals instead of heavy garments, shoes, and protective helmets, which can lead to serious injuries when crashes occur. The tendency to perceive the task of riding slowly is reported to account for the rising rates of crashes and accidents in Maseru, the city of Lesotho, as well. Manamolela (2013) argues that drivers are involved in crashes and accidents because their employers require them to achieve a particular target by the end of each day. In this study, it was observed that in attempting to meet the set target, riders of the commercial motorcycles are speedy or overloaded in congested street roads. Riding motorcycles commercially is complex, and owners should regularly maintain and inspect them. It can therefore be noted that unless communities stop ignoring the contribution of undergoing formal training, the incidents of crashes due to commercial motorcycle riding will persist in the streets of our cities.

Riding commercial motorcycles under pressures associated with time, profit-making, and maintaining a job influences the riders' behaviour

as well. Commercial motorcycle riders work under pressure associated with time management. This pressure stems from the need to meet the target pay set by the motorcycle owners in contracts. There are terms of agreement in these contracts, which state that once a motorcycle rider affords to collect a certain amount of money for a certain time, the ownership of a commercial motorcycle will be shifted to him. Thus, this statement significantly contributes to riders working under pressure, leading them to comply with these agreements by subjecting themselves to risks and crashes. The pressure associated with profit-making is due to a rider's desire to make more money than the target amount. Commercial motorcycle riders often keep this extra money a secret, leading them to overload their motorcycles and ride at high speeds. But even if they can profit, most are still at risk of crashes, injuries, death, and property loss. The pressure to retain employment opportunities also influenced the riders' riding habits. Riders face difficulties in securing jobs not only in the formal sector but also in the informal sector, particularly in positions related to riding commercial motorcycles. The owners of the commercial motorcycles often fire riders who do not collect the target money on time. Hence, this tendency compels motorcycle riders to constantly work to please their employers and maintain their job opportunities. During the focus group discussion, a participant clearly confirmed this observation by stating that:

> *Mjomba, nakimbiza mno? Kwa hiyo pesa inabidi tuende haraka. Labda uongeze pesa. Ujue mimi pia nipo kazini hesabu ya bosi isipotimia kesho hunioni barabarani...* "Uncle, am I too fast? If you want me to ride slowly, give me more money. This is my job. If my boss's target is not met, you won't see me on the streets tomorrow." [Researchers' translation]

In fact, these statements indicate that the owners of commercial motorcycles exert pressure on the riders to maintain their trust. Thus, given the fact that crashes caused by commercial motorcycles affect many families, there should be commitment to our communities to raise awareness of proper road use on the part of novice riders, drivers, pedestrians, and the entire community. At the same time, all novice riders must be strictly banned from riding commercial motorcycles unless they have undergone formal training first. This will compel them to seek training to acquire appropriate street riding skills and defensive riding techniques, as Dangisso (2023) properly argues. Strict enforcement of the existing road laws to ensure only licensed individuals engage in commercial motorcycle riding can also help to reduce reckless riding. This should include ensuring that each motorcycle on the road is formally registered so that riders can be held responsible when they cause accidents or ride recklessly. A relatively large number of riders were observed riding unregistered commercial motorcycles. Now, once they cause an accident, they run away, leaving no trace or clue to their whereabouts. Such behaviour is common in incidents where riders crash into bystanders or disregard red lights and run away, especially when their conditions are not serious. Skilful riding tendencies among riders should be promoted to reduce the risk of crashes, and blind spots should be known to drivers and riders. Regular police patrols should occur in locations where unlicensed riders commonly work.

Moreover, road engineers, planners, police, and other public agencies should also seek solutions to this problem of motorcycle crashes. These may include revisiting the speed limit and resetting it when necessary and re-examining the reasons for motorcycle crashes at different road locations to identify areas that require improvement. This can include sites such as roundabouts, zebra crossings, U-turns, etc. The agreement set in the contract by employers (i.e., owners of the commercial motorcycles) should be known to the authorities to ensure that riding is operated based on reasonable terms. This is because some of the reckless riding tendencies were found to be instigated by the unfriendly terms explained in the agreement forms.

5.0 Conclusion and Recommendations

This study has analysed aspects of human error that contribute to accidents involving commercial motorcycles in Tanzanian cities. Specifically, it aimed to determine the aspect of human errors contributing most to the crashes involving

commercial motorcycle riding in cities. The findings indicate that errors related to performance, decision-making, and cognition characterise commercial motorcycle riding, making it a life-threatening endeavour. Commercial motorcycle riders' lack of experience, which is associated with low cognitive ability, was found to be the reason for most motorcycle crashes, while low performance is associated with a few. Besides, whereas failure to handle the riding task due to speedy riding and excessive overloading (accounting for 31 out of 155 in Dar es Salaam city, 30 out of 134 in Mbeya city, and 28 out of 148 in Arusha city) causes the largest number of crashes, reckless riding tendencies in terms of trying to evade road potholes quickly, stylish riding, disregarding red lights, and riding tasks (accounting for 6 out of 155 in Dar es Salaam, 7 out of 134 in Mbeya, and 10 out of 148 in Arusha) cause the fewest crashes. The risky riding behaviour of commercial motorcycle riders results from the community's attitude towards motorcycle riding and the pressures faced by the riders.

Thus, given the fact that commercial motorcycle riding is highly associated with crashes, leading to communities' social and economic sufferings, awareness of motorcycle safe riding must be promoted at all costs. This can include raising awareness about proper road use, enforcing existing road laws, and promoting skilled riding tendencies among riders. Moreover, the riders' riding agreement set by the masters (i.e., employers of the commercial motorcycles) should be known to the authorities to ensure that the enterprise of commercial motorcycles is operated fairly.

6.0 Limitation of the Study

The present study has employed the qualitative methodologies. Nevertheless, a mixed-method approach would yield robust findings. Consequently, future research can examine human errors contributing to vehicular crashes through mixed methodologies to enhance the current body of knowledge.

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