

Motorcycle Taxis Accident Patterns In Accra

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ABSTRACT

There has been a significant increase in the use of motorcycles as taxis in countries in sub-Saharan Africa, Asia, and, Latin America. Motorcycle taxis however contribute to many road traffic accidents in many cities in Ghana. The objective of this research is to establish the injury severity and pattern among motorcycle taxis in Accra. A ten-year (2011-2020) accident data from Ghana was analysed. A descriptive analysis was used. During the period, 3197 motorcycle casualties occurred in Accra of which 77% were fatal, 74% were serious (hospitalised) and 72% were minor injuries. Eighty-Five percent of motorcycle accident victims were males. Motorcycle collisions with pedestrians resulted in a majority (30%) of fatalities, 20% of fatalities were a result of a right-angled collision and 17% of fatal cases were head-on collisions. Motorcyclists were not at fault in 22% of their casualty injuries while 47% and 20% were attributable to inattentiveness and riding too fast on the part of the motorcyclists. Also, no apparent fault was associated with 18% of all motorcycle fatalities, while 39% and 30% were attributable to riders' inattentiveness and riding too fast. Motorcycle injuries constitute a major public health problem and there is the need for enforcement of L. I 2180, which prohibits the use of motorcycles for commercial activities especially in cities.

Keywords: motorcycle taxis, crash severity, safety.

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I. Introduction

In the past years, there has been a significant increase in the use of motorcycles as taxis in countries in sub-Saharan Africa, Asia, and, Latin America. (Kumar, 2011). Motorcycle taxis offer some advantages in the form of easy maneuverability, the ability to travel on poor roads, and demand responsiveness. These peculiar characteristics of a motorcycle, a paratransit mode, have made it a favored transport mode for both operators (drivers) and users for relatively short distances (Aluko, 2018). Motorcycle has played an important role as a mode of transport over the recent past and is still an inevitable mode of transport in contemporary times.

Globally, over 770 million motorcycles are on the roads and engage in various activities (Johnson, 2012). Low and middle-income countries have high usage of motorcycles and also have high motorcycle-related fatalities (Hagan, Tarkang, and Aku, 2021). Motorcycle operations, however, are one of the most dangerous forms of motorised transportation. (Road, 2012). Motorcycle accidents increase every year in developing countries. Regarding design and balance, motorcycle is always considered as a vehicle having the great potential of accident among other vehicles (Beheshti, Salkhordeh and Amini, 2009). Motorcycle accidents form a fatal category of motor traffic accidents (Kumar and Barrett, 2008). Motorcycle injuries vary around the world from 22.8% in China to as high as 62% in Vietnam (Wanjala *et al.*, 2019).

In Ghana, public transportation has for a long time been dominated by shared taxis and low capacity mini-buses (Tuffour, 2014). More recently, public transportation services in some cities in Ghana, especially Accra have expanded to include motorcycle taxis. (Tuffour, 2014). This is as a result of the socially unacceptable decline in organised public transport (Oteng-Ababio and Agyemang, 2015). The use of motorcycles for commercial purposes involved non-passenger services such as the delivery of goods and messenger services. However, motorcycle taxis have emerged in the country especially Accra as a form of informal public transportation. The operations of motorcycle taxis in Accra have been characterised by speeding, careless driving, and wanton disregard for traffic regulations. Ghana has recorded over 2000 crashes involving motorcycle in the first quarter of the year 2021 (NRSA, 2021). Ghana's Road Traffic Regulations 2012 (Legislative Instrument [L.I] 2180, prohibits the use of motorcycle for commercial activities. However, there has been blatant disregard for this regulation for many years, mainly due to challenges in enforcement and difficulty in distinguishing private from commercial use. Motorcycle taxis have therefore heightened in Accra due to their convenience, affordability, easy maneuverability, and ability to navigate through poor road networks and traffic congestions compared with four-wheeled vehicles

This study, therefore, sought to establish the injury severity and pattern among motorcyclists in Accra.

II. Materials and Methods

2.1 Study Site

The research was conducted in Accra, the capital of Ghana. It covers an area of 225.67 km² (87.13 sq mi) with an estimated population of 2,052,341 (Ghana Statistical Service, 2019a). The city is part of the Greater Accra Metropolitan Area, which is home to 4.9 million people (Ghana Statistical Service, 2019a) and is one of the fastest growing cities in West Africa. Its rapid growth and unplanned expansion have created numerous challenges, including highly congested traffic, housing shortages, urban sprawl, and informal settlements that are not connected to essential services and infrastructure (Postel *et al.*, 2020).

2.2 Data source and quality

The data was obtained from the Building and Road Research Institute (BRRI) of the Council for Scientific and Industrial Research Institute accident data bank. The source of the data is Ghana Police Service. A standard police accident form developed by the Transport Research Laboratory (TRL), UK is used to extract information from the police dockets and electronically entered into Micro- Accident Analysis Package (MAAP) software developed by TRL. The police work hand-in-hand with the surviving accident victims, eyewitnesses, and hospitals to determine the severity and circumstances leading to the accidents (Damsere-Derry and Bawa, 2018). The data contains information about motorcycle crashes such as crash severity, time of collision (daytime or night- time), collision type (head- on, rear end, right angle, side swipe, ran off road, hit object off or on road, hit parked vehicle and hit animal), collision partner (Heavy Goods Vehicle, Car, Tractor, Bus, Minibus, Motorcycle, Pickup, Bicycle, Tricycle, Rickshaw and other). The data recorded has four types of motorcycle injury severities, namely; Fatal Injury, Hospitalised Injury also known as Serious Injury (this is when the victim was hospitalised for more than 24 hours for medical attention), Injured Not- Hospitalised also known as minor injury (this is where victims were hospitalised for less than 24 hours), and damage only(where no death or injury is recorded) (Wahab, 2019).

2.3 Study Period

Accident statistics involving at least one motorcyclist between 2011 and 2020 in Accra was retrieved from the national accident database and analysed.

2.4 Data Analysis

This research predominantly used basic descriptive statistical analysis.

III. Results

During the period, i.e., 2011-2020, there were 4352 motorcycle related accident victims of which 73% were motorcycles, 20% were pedestrians and 3% were car occupants. The analysis was based on only motorcycle victims (n= 3197).

In terms of injury severity, 77% was fatal, 74% was hospitalised or serious injuries and 72% was minor injuries. Among the motorcycle casualties, 85% were males whilst 15% were females. Evidently, 90% of the males died in the motorcycle crash whilst 10% of females died. In the same vein, 86% of male motorcyclists suffered serious accidents requiring hospitalisation whilst 14% of female motorcyclists suffered serious accidents requiring hospitalisation, see table 1.

Table 1: Distributions of motorcycle accident severity by selected variables

Variable	Motorcyclists Injury Severity			
	Minor (%)	Serious (%)	Fatal (%)	Total (%)
Age				
6 – 15	4	4	3	4
16 – 25	27	42	26	26
26 – 35	43	40	36	41
36 – 45	17	19	16	18
46 – 55	5	7	6	6
56 – 65	3	3	5	3
66 – 75	1	2	4	1
76 – 85	0	0	3	0
86 – 95	0	0	0	0
Gender				

Male	84	86	90	85
Female	16	14	10	15
Time(24hrs)				
00 - 6	3	4	4	3
6 – 12	32	28	23	30
12 – 18	44	41	27	41
18 – 24	21	28	46	26
Collision Type				
Head On	3	11	17	7
Rear End	15	25	15	19
Right Angle	19	17	20	18
Side Swipe	20	17	9	18
Ran Off Road	2	1	7	2
Hit Object On Road	0	0	0	0
Hit Object Off Road	0	0	2	1
Hit Parked Vehicle	2	1	0	1
Hit Pedestrian	38	27	30	33
Other	0	0	0	0
Driver Error				
None	21	23	18	22
Inexperience	3	3	3	3
Inattentive	49	45	39	47
Too Fast	18	19	30	20
Too Close	2	2	1	2
No Signal	0	0	0	0
Improper Overtaking	1	1	2	1
Improper Turning	0	1	1	1
Fatigued/Asleep	0	0	0	0
Other	3	3	3	3
Unknown	2	2	3	2
Casualty class				
Pedestrian	21	22	19	20
Car	1	2	5	3
HGV	0	0	0	0
Tract	0	0	0	0
Bus	0	0	0	0
Minibus	0	1	2	2
Motor Cycle	77	74	72	73
Pickup	0	0	0	0
Bicycle	0	0	0	0
Other	0	0	0	0
Tricycle	0	0	0	0

The modal age group which suffered motorcycle accidents the most was the 26 to 35-year-olds constituting 41% of all motorcycle accident victims. The age groups, 16 to 25, who are mostly young adults constitute 26% of motorcycle accident victims. The modal age group 36-55-year-olds and the aged (56-95 year-olds) constitute 23% and 5% of motorcycle accident victims respectively. Children under the age of 16 years old constitute the minority (4%) of motorcycle accident victims in Accra. In terms of accident severity, the modal

age group 26-35 year- olds suffered the most fatality (36%). Also, 26% and 16% of the 16 to 25-year-olds and 36 to 45-year-olds respectively died as motorcycle accident victims. Also, children under the age of 16 years constitute the minority (3%) of motorcycle fatality in Accra. Similarly, 40% of the modal age group 26 to 35-year-olds suffered serious injury requiring hospitalisation in a motorcycle accident, 42% of 16 to 25-year-olds suffered serious injury while the aged (56 to 95-year-olds) constitute 5% of serious injury requiring hospitalisation in motorcycle accident in Accra.

Most of the motorcycle accidents (41%) occur within the hours 12-18 (24 hours), 30% occur the 6-12 (24 hours), whilst 26% and 3% occur within the hours 18-24 and 00-06 (24 hours) respectively. Interestingly, most (46%) of the motorcycle fatalities in Accra occur in the nighttime, 18-24 (24 hours), 27% of motorcycle fatalities occur within 12-18 (24 hours), whilst 23% and 4% of motorcycle fatalities occur within 6-12 and 0-6 (24 hours) respectively as shown in table 1.

Among the motorcycle accident victims, 47% of the casualty injury was a result of inattentiveness on the part of the motorcyclist while 20% was a result of motorcyclists being too fast and 22% was through no fault of theirs as shown in table 1. Motorcyclists' inattentiveness and riding too fast resulted in a fatality of 39% and 30% respectively. Also, no apparent fault was associated with 18% of all motorcycle fatalities. With regard to serious injuries, 45% and 19% were as a result of riders' inattentiveness and riding too fast respectively.

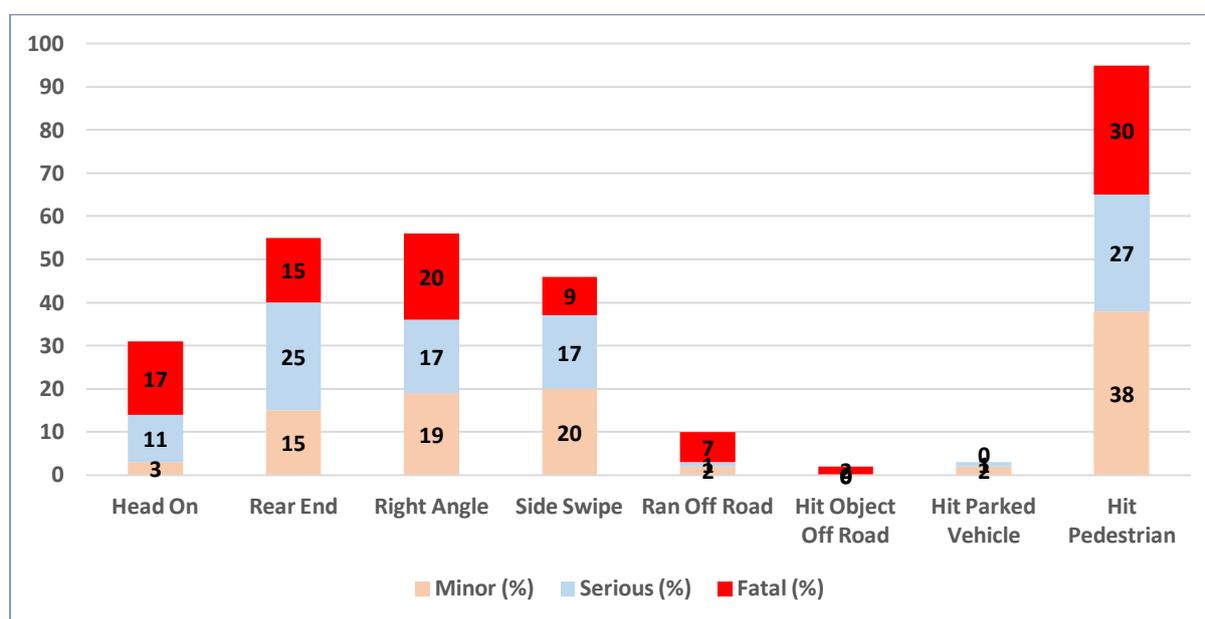


Figure 1: Road traffic injury severity among motorcyclists by collision type.

With regard to collision types in which at least a motorcycle was involved, 33% was hit pedestrian, 19% was rear end, 18% was right-angled and 18% was side swipe collision as shown in figure 1. The vast majority (30%) of casualties of hit pedestrian collisions was fatal, 20% of the right-angled collision was fatal, 17% of head-on, and 15% of rear-end collisions were also fatal. See figure 1. All these show the level of vulnerability of motorcycles in road traffic accidents with other vehicles.

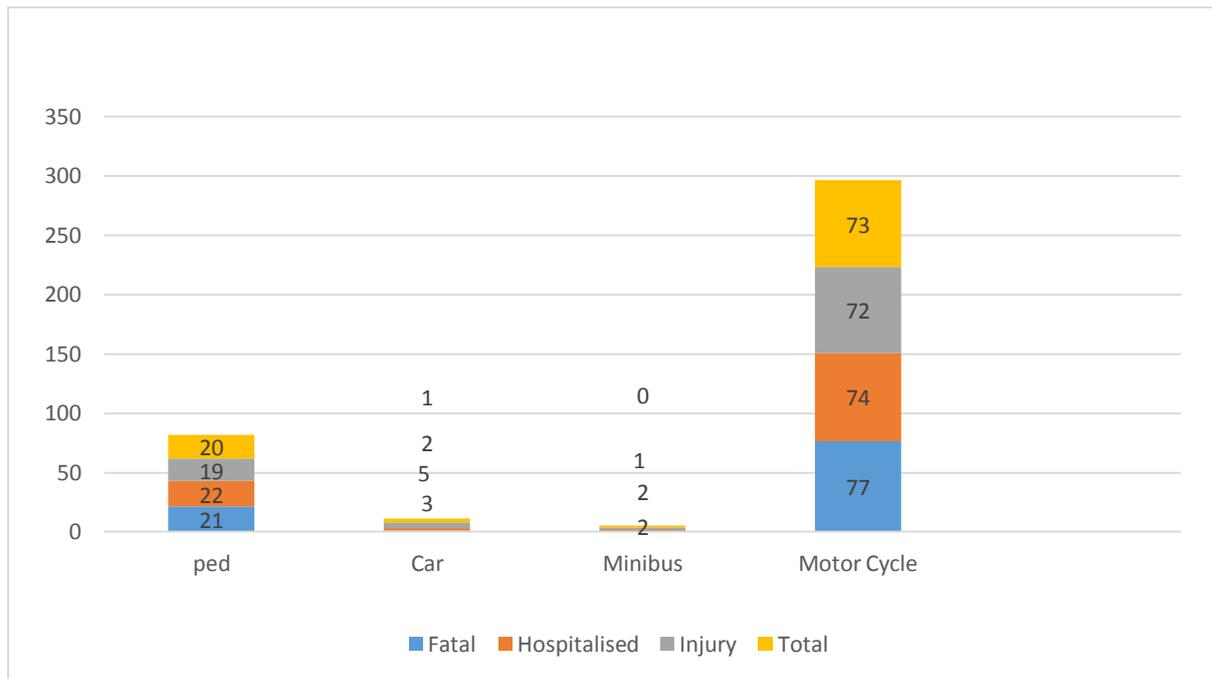


Figure 2: Distribution of motorcycle injury severity by road users they collided with.

In figure 2, motorcycle collision with at least a motorcycle had the highest severity (73%). As high as 77% of motorcyclists died in accidents involving a collision with at least one motorcycle. Also, 21% died when motorcycle collided with pedestrians, 1% died when motorcycle collided with car and there was no fatality when motorcycle collided with minibuses.

IV. Discussion

Motorcycle taxis, though not legalised in Ghana, have increased dramatically in Accra over the past years. Interestingly, the number of motorcycle fatalities and injuries has also increased dramatically. Table 1 shows motorcycle injury severity by some selected variables in Accra from 2011- 2020. Motorcycle injuries of 73% in Accra in this present study is higher than that recorded in studies in Western Nigeria, 45.3% (Owoaje et al., 2005), Benin City, Nigeria, 18% (Nzegwu et al., 2008) and India, 56.1% (Fitzharris et al., 2009). This may be as a result of a large number of commercial motorcyclists in Accra and their riding habits.

The incidence of motorcycle injury fatalities was found to be high among the younger generation. The highest percentage of fatality (36%) was among the age group 26-35 years, followed by 16-25 years (26%) and 36-45 years (16%). This is similar to the findings of other studies (Lin *et al.*, 2003; Nyagwui *et al.*, 2016). This could be attributed to their low compliance to road safety regulations which was affirmed by Olumide and Owoaje (Olumide, Medicine and Medicine, no date) in their study, and also inexperience in operating a motorcycle (Chesham, Rutter and Quine, 1993). A possible explanation for their low compliance with road safety regulations is that motorcycle taxis operations are illegal in Ghana and most of them try to avoid being accosted by the Police.

The data showed that rear-end collisions accounted for 19% of all motorcycle injury crashes, right angle and side swipe collisions accounted for 18% of motorcycle injury crashes, while motorcycle hitting a pedestrian accounted for 33% of motorcycle injuries. The findings of this study are similar to a study by (Ariffin *et al.*, 2016) where motorcyclists were involved in 24.8% of killed and severely injured crashes involving a collision with pedestrians. Risky riding behaviours such as speeding, tailgating, red light turning, inter alia are the causes of such high injuries of motorcycles with its collision types. There is therefore the need for targeted campaigns and law enforcement programs.

The data showed that 47% of motorcycle accident injuries were a result of inattentiveness, 22% was through no fault of theirs and 20% was a result of the motorcyclists riding too fast. This is largely because in Ghana, motorcycle taxis are not legal and therefore most riders ride under duress and are also not recognised by car drivers. The study showed that 85% of motorcycle taxi injuries were males whilst 15% of motorcycle taxi injuries were females. In the same vein, 90% of fatalities were males whilst 10% were females as shown in table 1. The results of this study are similar to a study by (Skalkidou *et al.*, 1999; Jain *et al.*, 2009) where most of the victims of motorcycle fatal crashes were males.

Time of accident is seen from table 1 as a predictor of motorcycle taxi accident fatality in Accra. Most of the motorcycle accident fatalities (46%) happened between 6 pm and 12 am and 27% of motorcycle taxi accident fatalities happened between 12 pm and 6 pm. The findings of the study contradict a study by (Valent *et al.*, 2002; Verzosa and Miles, 2016), where there is a high correlation between early AM crash time and fatality outcome. However, according to a study conducted in the United Kingdom, the number of deadly crashes per 100 crashes is higher during the night time than daytime (Plainis, Murray and Pallikaris, 2006). The high fatality crashes in the night could be attributed to some factors such as riders' riding too fast, riders' inattentiveness, and poor visibility at night.

V. Conclusion

The high incidence of accidents among motorcyclists is attributed to the use of motorcycle as a mode of transport in Accra. It is established from the findings that speed and inattentiveness are major risk factors for motorcycle taxis crashes resulting in injuries and fatalities. Motorcycle injuries constitute a major public health problem and there is the need for enforcement of L. I 2180, which prohibits the use of motorcycles for commercial activities especially in cities. Again, the National Road Safety Authority with the support from Driver and Vehicular Licensing Authority (DVLA) and Motor Traffic and Transport Department (MTTD) must intensify public education on road traffic rules and regulations to reduce risky traffic behaviour and accidents involving motorcycle taxis in Accra.

References

- [1]. Aluko, O. O. (2018) 'Commercial Motorcycle Safety in Nigeria: The Past and Opportunity for Future Improvement', *The International Journal of Engineering and Science*, 7(3), pp. 35–41. doi: 10.9790/1813-0703013541.
- [2]. Ariffin, A. H. *et al.* (2016) 'Pedestrian-motorcycle collisions: Associated risks and issues', *MATEC Web of Conferences*, 90, pp. 1–8. doi: 10.1051/mateconf/20179001066.
- [3]. Beheshti, A., Salkhordeh, S. and Amini, H. (2009) 'Studying the Causes and Affecting Factors of Motorcycle Accidents A Case Study on the Road Accidents in Zanjan Province (IRAN) - 2007', pp. 484–489.
- [4]. Chesham, D. J., Rutter, D. R. and Quine, L. (1993) 'Motorcycling safety research: A review of the social and behavioural literature', *Social Science and Medicine*, 37(3), pp. 419–429. doi: 10.1016/0277-9536(93)90272-6.
- [5]. Damsere-Derry, J. and Bawa, S. (2018) 'Bicyclists' accident pattern in Northern Ghana', *IATSS Research*. Elsevier Ltd, 42(3), pp. 138–142. doi: 10.1016/j.iatssr.2017.10.002.
- [6]. Hagan, D., Tarkang, E. E. and Aku, F. Y. (2021) 'Compliance of commercial motorcycle riders with road safety regulations in a peri-urban town of Ghana', *PLoS ONE*, 16(3 March), pp. 1–12. doi: 10.1371/journal.pone.0246965.
- [7]. Jain, A. *et al.* (2009) 'Two wheeler accidents on Indian roads - a study from Mangalore, India', *Journal of Forensic and Legal Medicine*. Elsevier Ltd and Faculty of Forensic and Legal Medicine, 16(3), pp. 130–133. doi: 10.1016/j.jflm.2008.08.019.
- [8]. Johnson, O. (2012) 'Prevalence and pattern of road traffic accidents among commercial motorcyclists in a city in Southern Nigeria', *Educational Research (2141-5161)*, 3(June), pp. 537–542. Available at: <http://search.ebscohost.com/login.aspx?direct=true&profile=ehost&scope=site&authtype=crawler&jrnl=21415161&AN=77592819&h=UbOPLk1MuclyOk03jHHFRjdAWlmkLx5cKdCGc2DWIW9uQZAnFGARPSA8/5FLiouVLEkO8f4PRv1f2WrsQKfg==&crl=c>.
- [9]. Kumar, A. (2011) 'Understanding the emerging role of motorcycles in African cities: a political economy perspective. Sub-Saharan Africa Transport Policy Program (SSATP)', *Sub-Saharan Africa Transport Policy Program, Urban Transport Series*, 1(13), pp. 1–32. Available at: <http://documents.worldbank.org/curated/en/391141468007199012/Understanding-the-emerging-role-of-motorcycles-in-African-cities-a-political-economy-perspective>.
- [10]. Kumar, A. and Barrett, F. (2008) 'Stuck in Traffic: Urban Transport in Africa Africa Infrastructure Country Diagnostic', (January). Available at: <http://siteresources.worldbank.org/EXTAFRSubSAHTRA/Resources/Stuck-in-Traffic.pdf>.
- [11]. Lin, M. R. *et al.* (2003) 'A longitudinal study of risk factors for motorcycle crashes among junior college students in Taiwan', *Accident Analysis and Prevention*, 35(2), pp. 243–252. doi: 10.1016/S0001-4575(02)00002-7.
- [12]. Nyagwui, A. E. *et al.* (2016) 'Motorcycle injury among secondary school students in the Tiko municipality, Cameroon', *Pan African Medical Journal*, 24, pp. 1–8. doi: 10.11604/pamj.2016.24.116.5069.
- [13]. Olumide, A. O., Medicine, C. and Medicine, C. (no date) 'ACCEPTED MANUSCRIPT', pp. 1–33.
- [14]. Oteng-Ababio, M. and Agyemang, E. (2015) 'The Okada War in Urban Ghana: A polemic issue or policy mismatch?', *African Studies Quarterly*, 15(4), pp. 25–44.
- [15]. Plainis, S., Murray, I. J. and Pallikaris, I. G. (2006) 'Road traffic casualties: Understanding the night-time death toll', *Injury Prevention*, 12(2), pp. 125–128. doi: 10.1136/ip.2005.011056.
- [16]. Postel *et al.* (2020) 'Mayors Dialogue on Growth and Solidarity: city profiles', 341, pp. 3–4. Available at: <https://odi.org/en/publications/mayors-dialogue-on-growth-and-solidarity-city-profiles/>.
- [17]. Road, G. (2012) 'Chapter One', pp. 1–99.
- [18]. Skalkidou, A. *et al.* (1999) 'Factors affecting motorcycle helmet use in the population of Greater Athens, Greece', *Injury Prevention*, 5(4), pp. 264–267. doi: 10.1136/ip.5.4.264.
- [19]. Tuffour, Y. A. (2014) 'Motorcycle Taxis in Public Transportation Services within the Accra Metropolis', *American Journal of Civil Engineering*, 2(4), p. 117. doi: 10.11648/j.ajce.20140204.12.
- [20]. Valent, F. *et al.* (2002) 'Risk factors for fatal road traffic accidents in Udine, Italy', *Accident Analysis and Prevention*, 34(1), pp. 71–84. doi: 10.1016/S0001-4575(00)00104-4.
- [21]. Verzosa, N. and Miles, R. (2016) 'Severity of road crashes involving pedestrians in Metro Manila, Philippines', *Accident Analysis and Prevention*. Elsevier Ltd, 94, pp. 216–226. doi: 10.1016/j.aap.2016.06.006.
- [22]. Wahab, L. (2019) 'Exploring Factors Affecting Motorcycle Crash Severity in Ghana Using Multinomial Logit Regression Model', *International Symposium on Safety of Vulnerable Road Users, Changsha, China*, (February).
- [23]. Wanjala, P. *et al.* (2019) 'Determinants of Commercial Motorcycle Related Injuries In Butula Subcounty, Busia County, Kenya', *Journal of Nursing and Health Science*, 8(1), pp. 60–72. doi: 10.9790/1959-0706094759.