SAFETY/RISK PERCEPTION OF COMMERCIAL TRICYCLES AS A MODE OF TRANSPORT IN GHANA.

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Introduction

- The emergence of the tricycle business has been a notable development in the realm of urban mobility (Graaf et al., 2021).

- Tricycles, also known as "**auto-rickshaw**s" or "**tuk-tuks**" in some areas, have become a popular mode of transport due to their
  - ✓ Affordability, and
  - ✓ Ability to navigate through congested urban streets

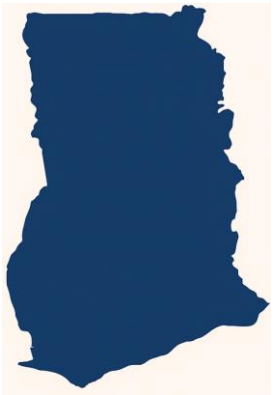
Introduction. ctd

An estimated **270 million** two- and three-wheelers are in use globally (WHO, 2023). In **Asia**, tricycles serve over **35% of daily trips** in cities like Dhaka and Manila.

Tricycles and motorcycles account for over **28% of road traffic deaths globally** (WHO, 2023).

In sub-Saharan Africa, informal transport modes including tricycles carry **up to 70–80%** of urban commuters (Graaf et al., 2021).

Tricycles are especially prevalent in West African countries like **Nigeria and Ghana** due to their **low cost and maneuverability** on poorly maintained roads.



- ✓ **Over 50,000 commercial tricycles operate in Ghana as of 2023**, primarily in regional capitals and peri-urban areas (Kombat et al., 2022).
- ✓ In cities like Tamale and Wa, tricycles have displaced taxis as the dominant transport mode.
- ✓ Despite their popularity, 17.9% of Ghana's road traffic fatalities involve tricycles or motorcycle users (WHO, 2018).

Introduction. ctd

- While tricycles have revolutionized urban mobility in low- and middle-income African countries by filling the gaps left by under-resourced public transport systems, they also pose **serious road safety concerns**.

- Unlike conventional vehicles, tricycles lack critical safety features such as **seatbelts, airbags, or crash-resistant cabin.**

✓ More critically, **perceptions of safety among users are not uniform,** they differ significantly across **gender and age groups.**

How can we design transport policies that account for these diverse risk perceptions, while ensuring the mobility benefits of tricycles are not undermined by preventable safety failures?

Method and Setting

• The study was conducted in **Winneba** and **Kasoa**, two growing urban centers in Ghana.
✓ Both locations are key tricycle hubs with high passenger volumes
✓ Common routes for informal transport and high traffic activity

• Target population included **commercial tricycle riders and passengers**

• Using Krejcie and Morgan sample size formula for a finite population sample size framework, **264 respondents** were engaged for the survey
✓ **Winneba (132 Riders and 384 Passengers)**
✓ **Kasoa (132 Rides and 384 Passenger)**

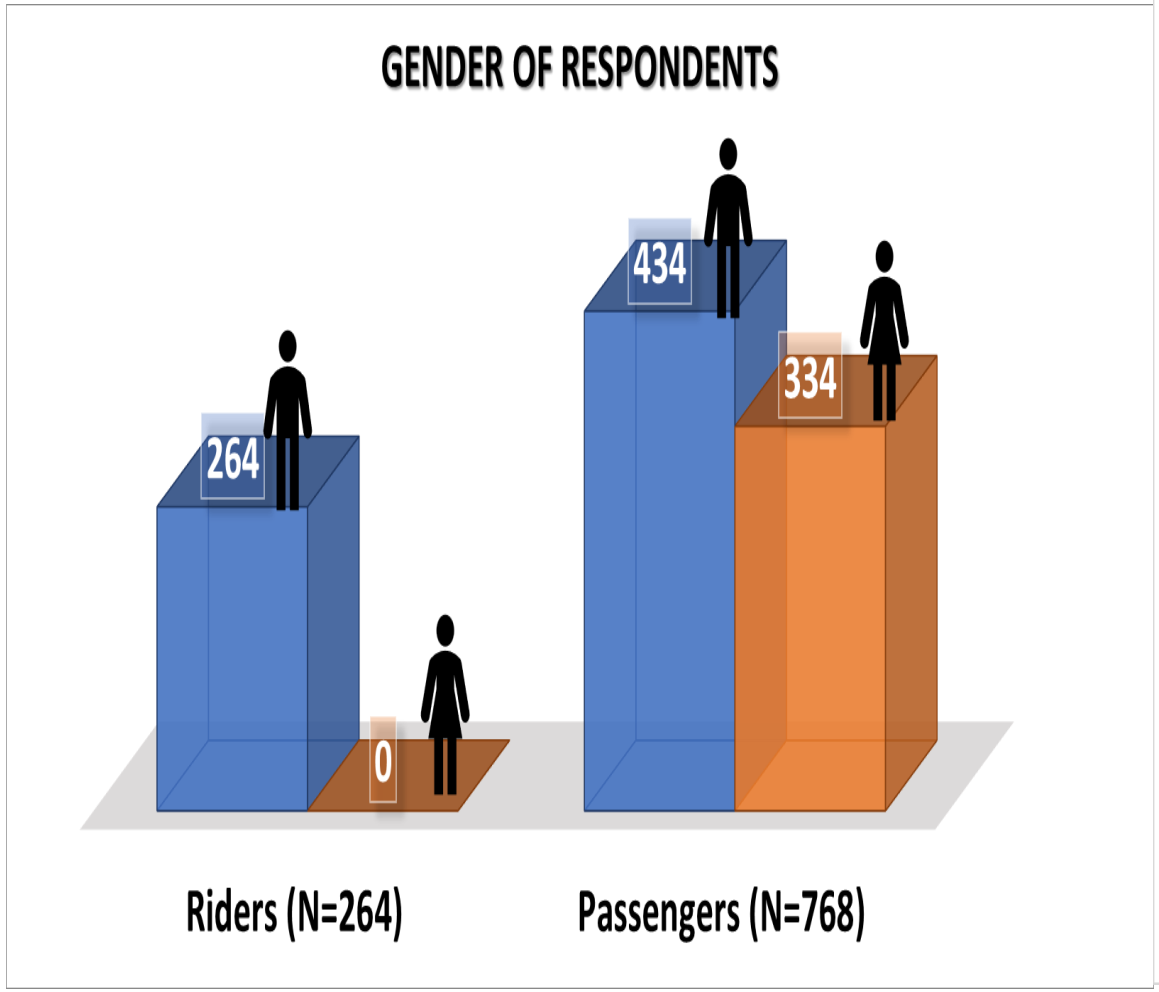
• Additionally, **4 transport officers** were interviewed to provide institutional perspectives

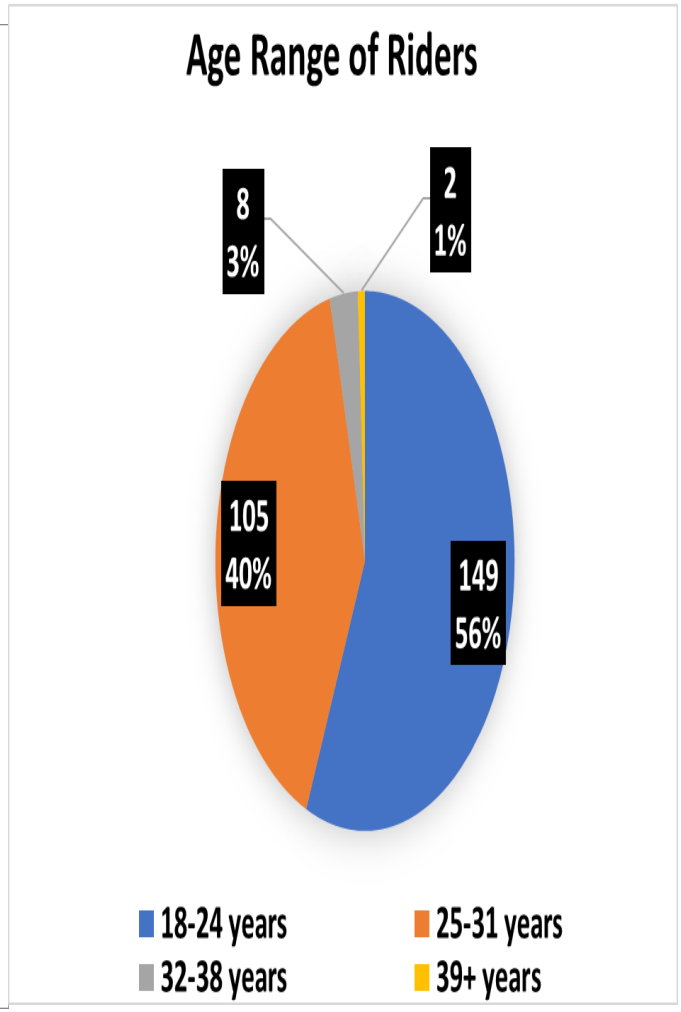
• Participants were **conveniently (On-the-spot) sampled** from:
✓ **Winneba Market**
✓ **Kasoa Station**

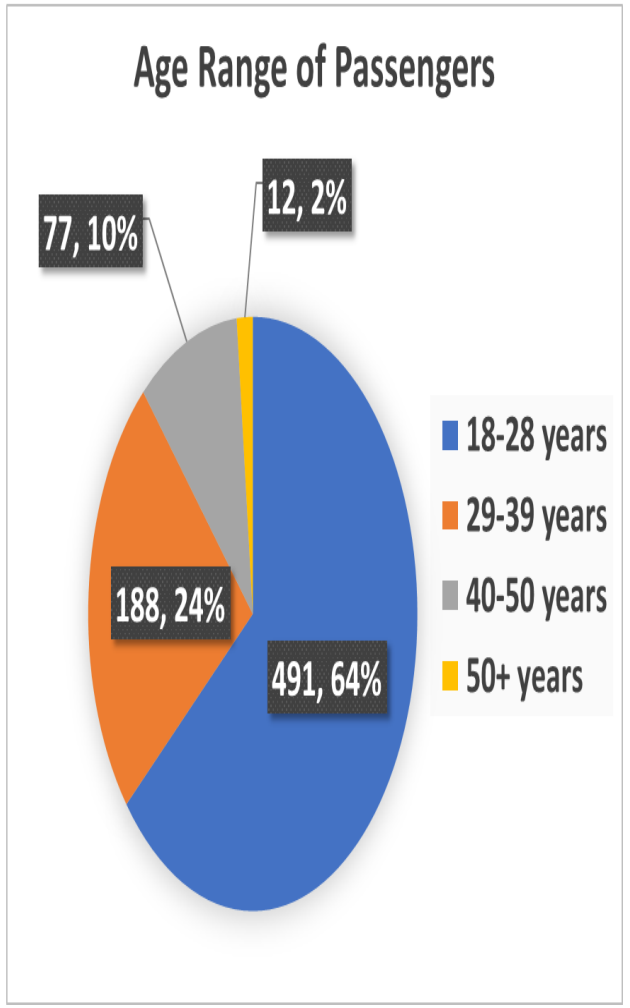
• A **mixed-methods approach** was employed using structured questionnaires and interview guides

• The **questionnaire was deployed via Kobo Toolbox**

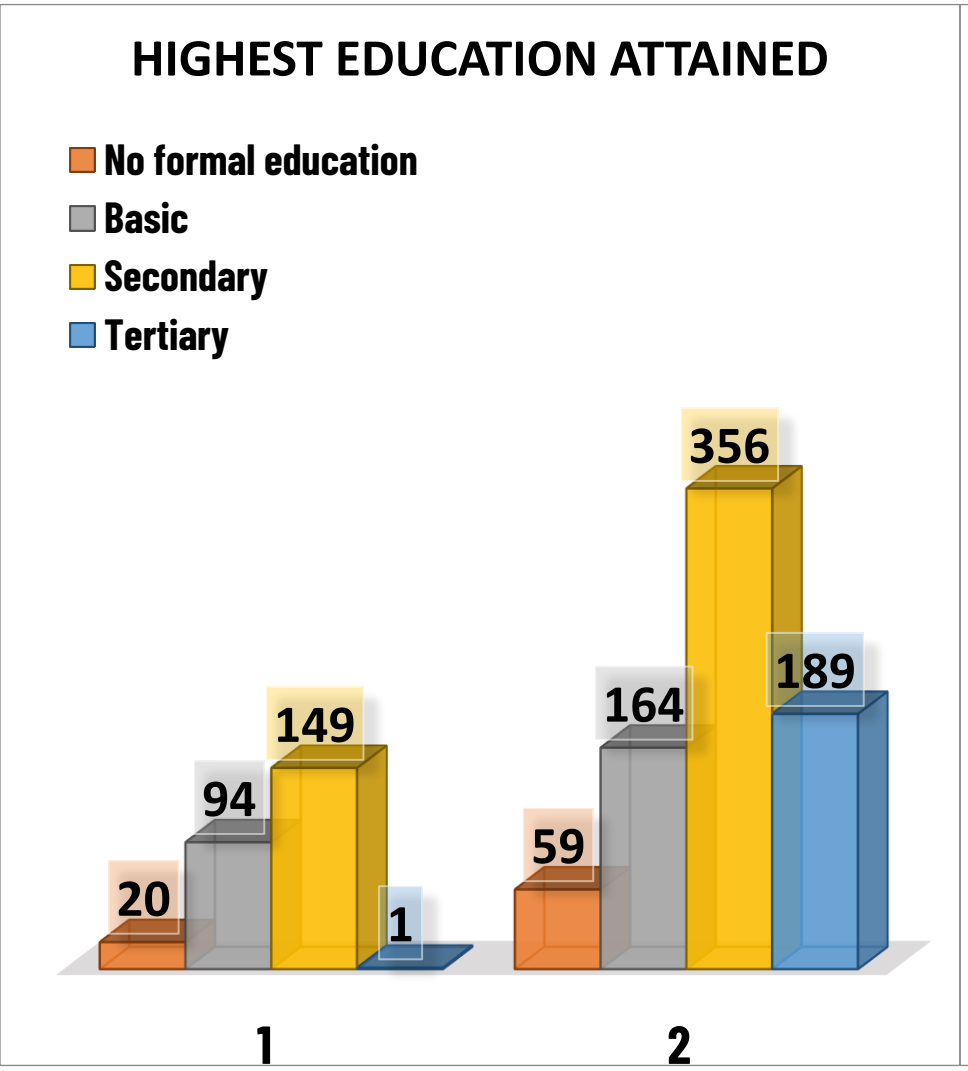
Profile of respondents

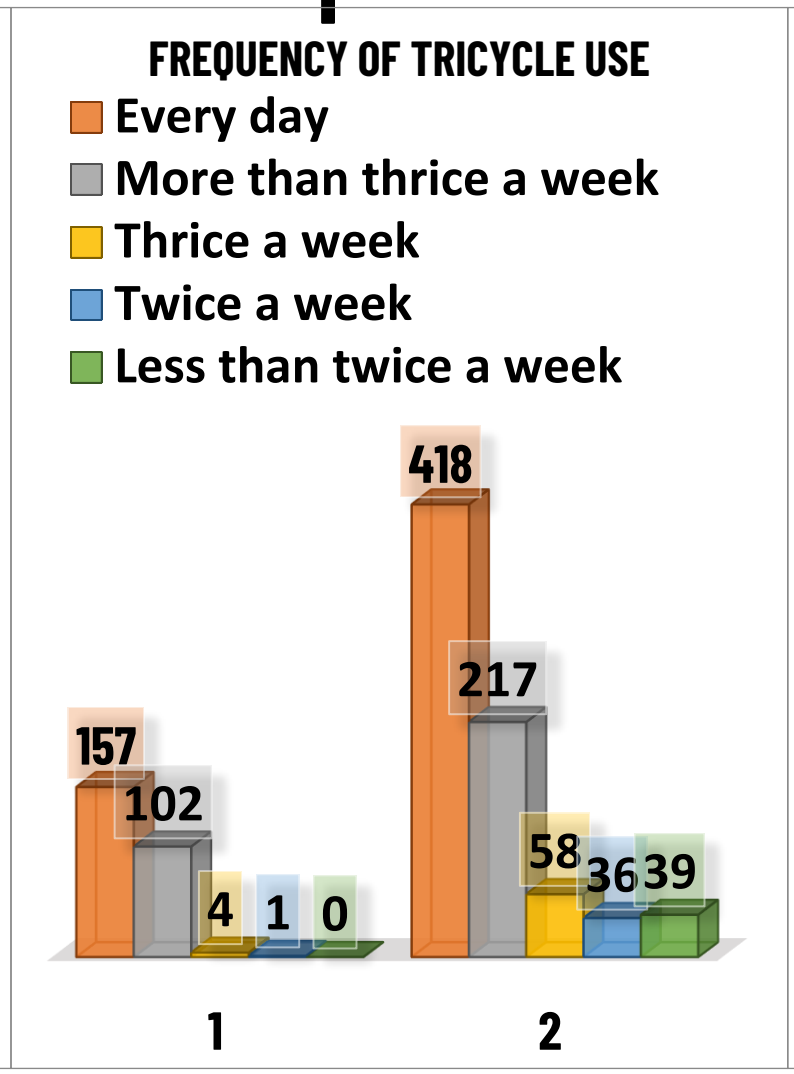


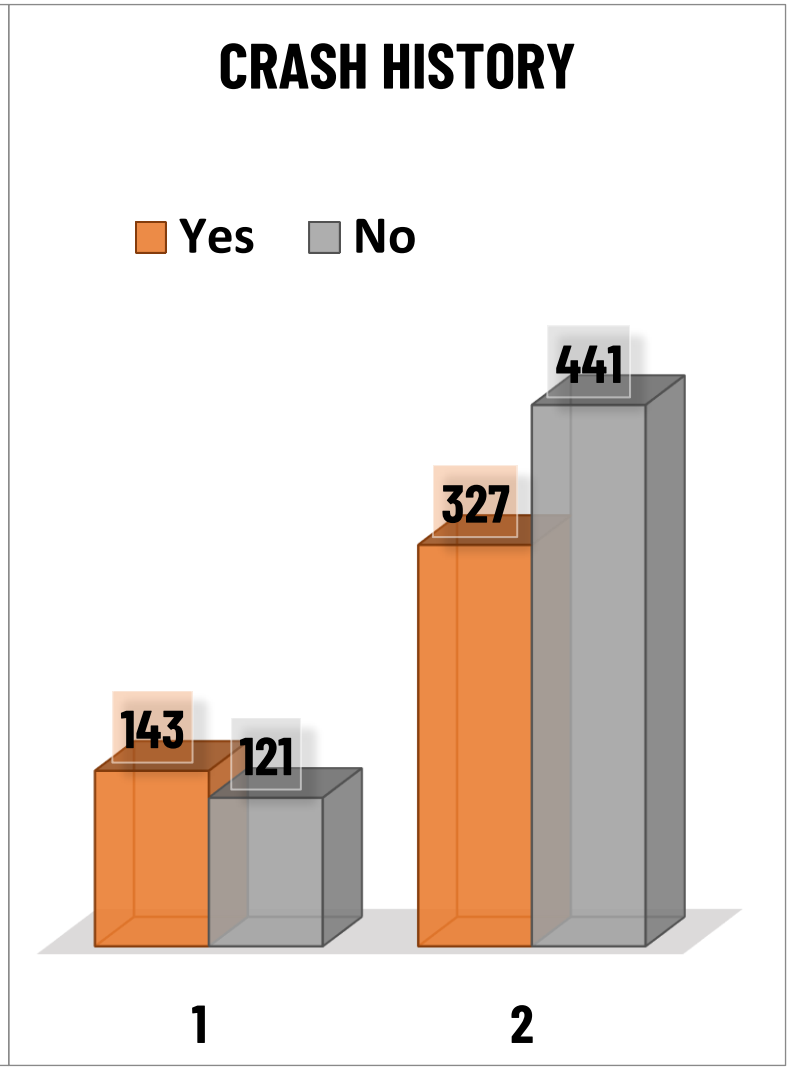




Profile of respondents. ctd







Safety/Risk Perception – Riders

Reliability of Scale

✓ 11 items used; Cronbach's Alpha = **0.730**

Kruskal-Wallis H Test Results

✓ **Significant differences across age groups:** tipping risk, braking system, airbags, crash vulnerability

Safety/Risk Perception – Passengers

Reliability of Scale

✓ 12 items used; Cronbach's Alpha = **0.762** (Moderately reliable)

Mann-Whitney U Test: Gender Differences

✓ **Males** perceived **higher risk** in:
- Accident likelihood on highways ($p = .04$)
- Structural integrity ($p < .001$)
- Absence of airbags ($p = .01$)

✓ **Females** perceived **higher risk** in:
- Tipping risk ($p = .01$)
- Braking system ($p = .001$)
- Adverse weather safety ($p = .02$)
- Crash protection ($p = .001$)
- Low height/collision risk ($p < .001$)
- Occupant ejection ($p = .002$)

Results / Findings

Kruskal-Wallis H test of Riders' safety/risk perception of tricycle as a mode of transport

Riders' safety/risk perception	Kruskal-Wallis H	d f	*p*
Tricycles are more prone to tipping over than buses.	11.10	3	0.01
The absence of airbags in tricycles makes riding tricycles risky during collisions	15.14	3	0.00
The braking system of a tricycle is less effective than that of cars or buses.	27.83	3	0.00
vehicle in the event of crash, leading to severe injuries than car or bus.	16.05	3	0.00

Results / Findings. ctd

Pairwise Comparisons of age

Sample1-Sample2Pairwise Comparisons of AGE	Test Statistic	Std. Error	Std. Test Statistic	*p*
Tricycles are more prone to tipping over than buses 25-31 years <> 18-24 years	28.59	8.79	3.25	0.01
The absence of airbags in tricycles makes riding tricycles risky during collisions 25-31 years <> 18-24 years	32.30	9.29	3.48	0.00
The braking system of a tricycle is less effective than that of cars or buses. 25-31 years <> 18-24 years	44.50	9.30	4.79	0.00
Tricycle occupants are more likely to be ejected from the vehicle in the event of crash, leading to severe injuries than car or bus. 25-31 years <> 18-24 years	32.48	9.04	3.60	0.00

Results / Findings. ctd

Mann-Whitney U test of passengers' safety/risk perception of tricycle as a mode of transport

Passengers' safety/risk perception	Gender	Mean Rank	Mann-Whitney U	Z	p
Tricycles are more likely to be involved in accidents than buses on a highway.	Male Female	397.1 368.1	67008.5	-2.07	0.04
Based on structural integrity, bus is safer than a tricycle in case of a collision.	Male Female	423.1 334.3	55713.0	-6.28	0.00
Tricycles are more prone to tipping over than buses.	Male Female	367.7 406.3	65191.0	-2.73	0.01
The absence of airbags in tricycles makes riding tricycles risky during collisions.	Male Female	400.0 364.4	65770.5	-2.58	0.01
The braking system of a tricycle is less effective than that of cars or buses.	Male Female	364.5 410.5	63810.0	-3.24	0.00
Riding a tricycle in adverse weather conditions is less safe than a car or bus.	Male Female	370.5 402.8	66381.0	-2.26	0.02

Results / Findings. ctd

Mann-Whitney U test of passengers' safety/risk perception of tricycle as a mode of transport

Passengers' safety/risk perception	Gender	Mean Rank	Mann-Whitney U	Z	p
Tricycles offer little protection for its occupants in the event of a crash than a car or bus.	Male Female	364.5 410.5	63803.5	-3.19	0.00
Tricycles are smaller and lower to the ground making it hard for other road users to see, increasing the risk of collisions than a car or bus.	Male Female	361.9 413.9	62661.5	-3.62	0.00
Tricycle occupants are more likely to be ejected from the vehicle in the event of crash, leading to severe injuries than car or bus.	Male Female	364.6 410.4	63829.5	-3.16	0.00

Findings cnt....

"…The tricycle's structure isn't strong enough to protect us in an accident, especially since it lacks features like airbags. I understand that it's cheaper and helps me save, but the safety concerns are always there." **(25 year old female tricycle passenger at Kasoa)**

"…The brakes don't work as well as those on buses, and we lack protection during accidents. I often feel the risk, especially when carrying passengers in heavy traffic or on uneven roads where tipping over is a concern." **(18 year old male tricycle rider at Winneba)**

"….Tricycles' smaller size makes them difficult to see, especially for larger vehicles, increasing the risk of collisions. They're also more prone to tipping, and with no airbag protection, occupants are at greater risk of severe injury." **(34 year old male MTTD Officer at Kasoa)**

Conclusion

- The study revealed that age and gender significantly influence perceptions of tricycle safety.
- Younger riders (18–24 years) expressed greater concerns about tipping, braking, and the lack of airbags.
- Older riders showed lower risk perceptions, possibly due to experience and familiarity with tricycle operations.
- Female respondents perceived tricycles as more dangerous than males, especially regarding structural safety and occupant ejection.

Recommendations

- ✓ The Ghana Standards Authority (GSA), in collaboration with the Driver and Vehicle Licensing Authority (DVLA) and the Ministry of Transport, should establish and enforce minimum safety standards for tricycle manufacturers and importers.

- ✓ These standards should include stable braking systems, reinforced frames, and passenger safety features to ensure that all commercial tricycles meet essential roadworthiness and safety criteria.

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Thank you!

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