



Research Article

Passenger Drivers' Behaviour, Car Maintenance Practices, Safety Procedure Knowledge, and Motor Vehicle Crash Involvement in a Selected Region of Ghana

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Abstract

Background: Motor vehicle crash involvement normally results in a wide range of injuries and often in permanent disability.

Objective: In line with this, the current study attempts to investigate the extent to which passenger drivers' behaviour, car maintenance practices, and safety procedure knowledge influence motor vehicle crash involvement in a selected region of Ghana.

Methods: The study made use of a cross-sectional descriptive design and lends itself to a positivist approach. Data were solicited from 720 participants and were processed with SPSS version 27. Frequency distribution, chi-square test, and binary logistic regression were used to summarise the data. The frequency distribution was used to summarise participants' responses into proportions, and the chi-square test was used to test the hypotheses postulated in the study, either to confirm or reject the null hypotheses. However, the binary logistic regression was used to assess the effects of the explanatory variables on the outcome variable.

Results: The study found that ensuring headlights and other indicators function correctly was positively correlated with motor vehicle crash involvement in the selected region of Ghana. It emerged that a relationship existed between passenger drivers' behaviour ($p < 0.001$), car maintenance practices ($p < 0.001$), as well as drivers' safety procedure knowledge ($p < 0.001$), and motor vehicle crash involvement in the selected region of Ghana.

Conclusion: The current study established a significant relationship between motor vehicle crash involvement and factors such as functional headlights and their indicators, drivers' behaviour, car maintenance practices, and safety procedure knowledge in the selected region of Ghana. Based on this, the study recommends that targeted interventions should be implemented to improve vehicle maintenance, enhance driver education on road safety procedures, and promote responsible driving behaviour to reduce motor vehicle crash involvement in the region.

Introduction

Roads are shared throughout the world by cars, buses, trucks, motorcycles, mopeds, pedestrians, animals, taxis, and other travelers [1,2]. Travel made easy by motor vehicles supports economic and social development in many countries [1]. Yet, in 2021, these vehicles were involved in crashes responsible for 1.19 million deaths [2]. Fatal and nonfatal crash injuries are estimated to cost the world economy approximately \$1.8 trillion (in 2010 USD) from 2015–2030 [1]. Evidence suggests that road traffic crashes are the world's leading cause of death for children and young adults aged 5–29 years [1]. In Africa, traffic deaths account for about one quarter of the global number of victims, even though the continent has barely 2% of the world's vehicle fleet [3–5]. However, in sub-Saharan Africa, the fatality rate is 27 per 100,000 inhabitants [3]. That is three times higher than Europe's average of 9% and well above the global average of 18% [3–5].

Globally, it has been established that the causes of motor vehicle crash involvements include driver behaviour (speeding, drunk driving, distracted driving, inexperienced driving, failure to use seat belts), vehicle condition, and awareness of safety practices [6–9]. However, in an attempt to limit some of these damages, laws in places around the world have been enacted specifically to improve road safety. For example, some governments impose fines on automobile drivers and passengers who do not use seat belts [8,10–13]. Accidents involving buses are also responsible for injuries to large numbers of people, and this has led to mandatory seat belt use in some places [8,14]. Preventive measures, such as campaigns on the dangers of drunk driving, enforcement of speed limits, the use of cameras to catch traffic law violators, and education of children about road safety, have helped raise public awareness about the importance of safety precautions on the road [15–18].

In Ghana, evidence suggests that there has been an increase in road traffic accidents between January and May 2025, compared to the same period in 2024, during which 1267 lives were lost [19,20]. In total, 6,111 road traffic crashes were recorded nationwide, up from 5609 in 2024 [19,20]. These involved 10378 vehicles, of which the dominant was private (41%), followed by commercial (34%), and motorcycles (25%), and resulted in 8278 casualties, including 1267 deaths and 7011 injuries [19,20]. Of the 1267 killed, 140 (or 11%) were children under the age of 18, while 1127 (89%) were adults—highlighting a 7:1 ratio of adult to child deaths [19,20]. Regionally, the evidence quotes a complex regional picture. For instance, the Greater Accra reported the highest number of crashes (1908 with fatalities of 161), followed by the Ashanti Region (1850 with fatalities of 325), and the Eastern Region (842 with fatalities of 268). The Savannah Region recorded the highest increase (52%) in crash incidents, while the Northern Region had the largest decrease (51.16%). The Ashanti, Eastern, and Greater Accra regions remain the most critical areas for crashes, injuries, and deaths. [19,20].

However, a number of interrelated factors influence the risk of road traffic accidents, including driver behaviour, vehicle

condition, and awareness of safety practices. Reckless driving, speeding, fatigue, and disregard for traffic rules are commonly reported behavioural issues among passenger vehicle drivers [21–24]. Similarly, poor vehicle maintenance—such as faulty brakes, worn tires, or non-functional headlights—can significantly increase the likelihood of crashes. Knowledge and implementation of safety procedures, including seat belt use and adherence to speed limits, are also critical in preventing accidents and mitigating their severity [25,26]. Despite the implementation of road safety policies in Ghana, regional disparities in enforcement, vehicle conditions, and driver education persist [8,27–31]. In line with this, the current study aimed to investigate the combined effect of passenger drivers' behaviour, car maintenance practices, and their level of safety knowledge on motor vehicle crash involvement in a selected region of Ghana.

Specifically, the study seeks to: Analyse if passenger drivers' behaviour influences motor vehicle crash involvement in the selected region of Ghana; Ascertain whether drivers' car maintenance practices influence motor vehicle crash involvement in the selected region of Ghana.

Examine if passenger drivers' safety procedure knowledge influences motor vehicle crash involvement in the selected region of Ghana.

The study further hypothesised that passenger drivers' behaviour, car maintenance practices, and safety procedure knowledge do not influence motor vehicle crash involvement in the selected region of Ghana.

Methods

Study setting and population

The study was conducted in one of the 16 regions in Ghana (Identity of the region is concealed to ensure strict anonymity). In the study area, three transport stations were selected for the study. Those stations were selected based on the fact that they serve as key transit points for both intercity travel and inner-city commuting, which makes them host a huge number of commercial vehicles. The study enrolled 750 participants out of approximately 7000 registered commercial vehicle drivers in the region [32], who willingly agreed to participate in the study after we had explained the purposes of the study to them.

Study design and data source

The study was conducted cross-sectionally and made use of a positivist worldview. Hence, this body of knowledge asserts that authentic knowledge is derived from sensory experience, preferably through scientific methods [33]. The cross-sectional descriptive design was carefully chosen because it allows researchers to examine the relationship between variables by observing them at a single point in time [34].

Primary data were used for the study. These data were solicited from the field with a questionnaire from 750 participants. Primary data were preferred because the researcher becomes the first person to use the data [35].

Questionnaire was preferred, hence the study was structured in a positivist approach, and due to that questionnaire was the ideal instrument [36]. Further, the questionnaire also enables a large amount of data to be collected [37].

Sample and sampling procedure

A sample of 750 participants was enrolled in the study with the help of Krejcie and Morgan's [38] sample size determination Table. The sample size determination Table asserts that for a population of 7500, the ideal sample size a researcher can use is 365, thus, after carefully considering a 95% confidence level and a margin of error of 5.0% [38]. Based on Krejcie and Morgan's sample size calculation formula, the ideal sample for the study was 365. Assuming 2% non-response rate, a design effect of 2, the sample size became: $= 365 \times 2 + 2\%$ of $730 = 730 + 14.6 = 744.6$ approximately 745. This brought the estimated sample size to 745, and this was rounded up to a sample size of 750. This is based on the fact that the more the sample size increases, the result becomes more accurate [39].

To reach the participants, a systematic sampling technique was used. We were enabled to select the study participants at a predetermined interval based on this technique [40]. Since the region has a sample frame of 7000 [32], and we needed 750 to participate in the study, every 15th passenger driver from the list, sorted in random order, was selected to be part of the study sample. Therefore, passenger drivers included in the study were the following numbers (15, 30, 45, 60, 75, 90, etc.) [40]. Each of the three selected transport stations has a proportion of 25% which translates to 250 participants. Therefore, the selection criteria were repeated at each transport station until the last participant was reached. This method ensures that each member of the population has an equal opportunity of being selected, while still maintaining a systematic sampling pattern [40].

Inclusion and exclusion criteria

To be part of the study, one must be a passenger vehicle driver with an age limit of 21 years, must hail from the selected region, must be in operation for three years, must be present at their various stations at the time of data collection, and be willing to participate in the study. However, drivers who did not meet the above criteria were excluded from the study.

Measures

In the study, passenger drivers' behaviour, car maintenance practices, and safety procedure knowledge were the Independent Variables (IVs) and also served as indicators for measurements, while motor vehicle crash involvement was the Dependent Variable (DV) and also served as an indicator for measurement [41–44]. The IVs were deemed appropriate for this study because we aimed to ascertain their combined effect on the DV in the region. Also, studying them would inform targeted intervention in the transport industry to encourage and strengthen road safety compliance. We studied these variables; hence, previous studies looked at them in pairs [41–44].

Data collection procedure

Data collection commenced on July 1, 2022, and ended on July 21, 2022, after the Research Committee of the University of Health and Allied Sciences reviewed and unanimously approved the research protocol with ID (UHAS-REC A. [018]) 21–22. Four research assistants were hired and trained on the purposes of the study to assist in the data collection. In the field, research assistants were assisted with tablet computers to collect the data. In all, three weeks were used to collect the data.

Reliability and validity

An effort was made to ensure data reliability and validity. To achieve this in the study, we created a strong research design, chose appropriate methods and samples, participants were not pressured in any way to select specific choices among the predetermined options, and we also conducted the research with utmost care and consistency [45–50].

Data processing and analysis

Data analysis was based on the completed questionnaire from the field. These data were first edited and cleaned. Items that requested multiple responses were recoded to enhance easy entry. Finally, data were processed with SPSS version 27. Frequency distribution, chi-square test, and binary logistic regression were used to summarise the data. The frequency distribution was used to aggregate participants' responses into proportions, and the chi-square test was used to test the hypotheses postulated in the study, either to confirm or reject the null hypotheses. However, the binary logistic regression was used to assess the effects of the explanatory variables on the outcome variable.

Ethical consideration

A number of steps were taken to ensure that the study adheres to ethical standards. Given this, ethical clearance was obtained from the University of Health and Allied Sciences with ID (UHAS-REC A. [018]) 21–22. However, in the field, confidentiality, anonymity, and privacy were ensured. On confidentiality, participants were told that the information they provided would be kept confidential and would be used for academic purposes, such as publishing it online by a reputable journal, just to add to the literature. Concerning anonymity, anything that could identify a participant in a questionnaire/data was devoid, such as name, contact, and house address. On privacy, participants were made to choose a befitting place they deemed appropriate for the structured interview to be carried out. Participation was made voluntary. Under no circumstance was a participant coerced to partake in the study. Further, participants were informed that they have the right to withdraw from the study at any point they feel uncomfortable. Furthermore, in the field, before a participant took part in the study, oral consent was taken.

Results

To identify drivers who had ever been involved in a crash in the selected region of Ghana prompted us to ask a *yes/no*

question used globally, thus (ever involved in a crash during the last 24months). After analysis, the results revealed that 640(88.9%) reported that they had never been involved in a crash during the last 12months, while 80(11.1%) answered in the affirmative.

To find an answer to research objective one, which is “to analyse if passenger vehicle drivers’ behaviour influences crash involvement in the selected region of Ghana,” prompted us to ask a single-item question, thus drivers’ common behaviours that could cause an accident. The results revealed that 22.2% of the drivers reported either speeding: exceed the limit in built-up areas; distracted driving: use a mobile phone while driving; or seatbelt use and able to avoid potential hazards on the road while 16.7% said either defensive driving: maintain a safe driving distance; or obey traffic lights, signs, and lane markings (Table 1).

Table 2 has Pearson’s chi-squared test of independence results on passenger vehicle drivers’ behaviour and crash involvement in the selected region of Ghana. This analysis was necessary to test the hypothesis that there is no statistically significant relationship between passenger vehicle drivers’ behaviour and crash involvement in the selected region of Ghana. A statistically significant relationship was found between passenger vehicle drivers’ behaviour [$\chi^2 = 112.500$, $p < 0.001$] and crash involvement in the selected region of Ghana (Table 2).

To unearth car maintenance practices of drivers, participants were asked to indicate their vehicle maintenance practices, and the results revealed that 27.8% of the drivers reported that they do maintain and inspect the vehicle regularly, while 11.1% said they often ensure that their vehicle headlights and other indicators function correctly (Table 3).

Table 4 presents Pearson’s chi-squared test of independence results on drivers’ maintenance practices and motor vehicle crash involvement in the selected region of Ghana. This analysis was necessary to test the hypothesis that there is no statistically significant relationship between drivers’ car maintenance practices and motor vehicle crash involvement in the selected region of Ghana. A statistically significant relationship was found between drivers’ car maintenance practices [$\chi^2 = 193.500$, $p < 0.001$] and motor vehicle crash involvement in the selected region of Ghana.

Table 1: Passenger Drivers’ Behaviour in the Selected Region in Ghana.

Variable	Frequency	Percentage
Driver’s behavior		
Speeding: exceeding the speed limit in built-up areas	160	22.2
Distracted driving: use a mobile phone while driving	160	22.2
Seatbelt use and able to avoid potential hazards on the road	160	22.2
Defensive driving: maintain a safe driving distance	120	16.7
Obey traffic lights, signs, and lane markings	120	16.7
Total	720	100.0

Source: Fieldwork (2022).

Table 2: Relationship between Passenger Drivers’ Behaviour and Motor Vehicle Crash Involvement in the Selected Region of Ghana.

Variable	No (%)	Yes (%)	Total n (%)	χ^2	p - value
Drivers’ behavior				112.500	<0.001
Speeding: exceeding the speed limit in built-up areas	100.0	0.0	160(100.0)		
Distracted driving: use a mobile phone while driving	75.0	25.0	160(100.0)		
Seatbelt use and able to avoid potential hazards on the road	75.0	25.0	160(100.0)		
Defensive driving: maintain a safe driving distance	100.0	0.0	120(100.0)		
Obey traffic lights, signs, and lane markings	100.0	0.0	120(100.0)		

Note: Row percentages in parentheses, Chi-square significant at (0.001), (0.05), (0.10)

No: Never involved in a crash; Yes: involved in a crash

Source: Fieldwork (2022).

Table 3: Drivers’ Vehicle Maintenance Practices in the Selected Region of Ghana.

Variable	Frequency	Percentage
Vehicle maintenance practices		
Vehicle is regularly maintained and inspected	200	27.8
Ensures tires are in good condition and inflated	160	22.2
Ensures brakes are always in good working order	160	22.2
Ensures headlights and other indicators function correctly	80	11.1
Clean the windshield and wipers effectively	120	16.7
Total	720	100.0

Source: Fieldwork (2022).

Table 4: Relationship between Drivers’ Car Maintenance Practices and Motor Vehicle Crash Involvement in the Selected Region of Ghana.

Variable	No (%)	Yes (%)	Total n (%)	χ^2	p - value
Vehicle maintenance practices				193.500	<0.001
Vehicle is regularly maintained and inspected	80.0	20.0	200(100.0)		
Ensures tires are in good condition and inflated	100.0	0.0	160(100.0)		
Ensure brakes are always in good working order	100.0	0.0	160(100.0)		
Headlights and other indicators function correctly	50.0	50.0	80(100.0)		
Clean the windshield and wipers effectively	100.0	0.0	120(100.0)		

Note: Row percentages in parentheses, Chi-square significant at (0.001), (0.05), (0.10)

No: never involved in a crash; Yes: involved in a crash

Source: Fieldwork (2022).

Further analysis was conducted with binary logistic regression on drivers’ car maintenance practices and motor vehicle crash involvement in the selected region of Ghana. This analysis was done to ascertain the influence of vehicle maintenance practices on motor vehicle crash involvement among passenger drivers in the selected region of Ghana (Table 5). After processing the data, the logistic regression model was significant at $-2\text{LogL} = 311.065$; Nagelkerke R^2 of 0.464; $\chi^2 = 191.254$; $p < 0.001$ with a correct prediction rate of 88.9%. Significantly, the Model Summary, which shows

a Nagelkerke R^2 of 0.464, suggests that the model explains 46.4% of the variance in the likelihood of passenger drivers' motor vehicle crash involvement in the selected region of Ghana. With this percentage contribution to the entire model, the results confirmed that the whole model significantly predicts passenger drivers' motor vehicle crash involvement in the selected region of Ghana.

It emerged in Table 5 that ensuring headlights and other indicators function correctly was significantly related to motor vehicle crash involvement at $p = 0.001$ (OR = 4.000, 95%CI [2.288–6.993]). This factor labels those passenger drivers to have 4.0times more likely to get involved in a crash compared with their counterparts who indicated they do maintain and inspect their vehicle regularly (Table 5). However, the rest of the variables (ensure tires are in good condition and inflated, ensure brakes are always in good working order, and clean the windshield and ensure that wipers are effective) were not significant, which could be a result of chance. This suggests that passenger drivers' motor vehicle crash involvement in the selected region of Ghana is not dependent on them (Table 5).

To analyse research objective three, which is “to examine if passenger drivers' safety procedure knowledge influences motor vehicle crash involvement in the selected region of Ghana,” prompted us to ask participants to indicate the safety procedures they know and understand. The results revealed that 33.3% of the passenger drivers reported that they know what to do in an emergency in case of an accident, while 11.1% indicated they do understand and comply with traffic laws (Table 6).

Table 7 has Pearson's chi-square test of independence results on passenger vehicle drivers' safety procedure knowledge and motor vehicle crash involvement in the selected region of Ghana. This analysis was conducted to test the hypothesis that there is no statistically significant relationship between passenger drivers' safety procedure knowledge and motor vehicle crash involvement in the selected region of Ghana. A statistically significant relationship was found between passenger drivers' safety procedure knowledge ($\chi^2 = 112.500$, $p < 0.001$) and motor vehicle crash involvement in the selected region of Ghana.

Table 5: Binary Logistic Regression Results on Drivers' Vehicle Maintenance Practices and Motor Vehicle Crash Involvement in the Selected Region of Ghana

Variable	B	Wald	Sig.	Exp(B)	95% CI	
Vehicle maintenance (Vehicle regularly maintained and inspected = 1.0)						
Ensures tires are in good condition and inflated	-19.817	0.000	0.995	0.000	0.000	0.000
Ensure brakes are always in good working order	-19.817	0.000	0.995	0.000	0.000	0.000
Ensures headlights and other indicators function correctly	1.386	23.653	0.000	4.000	2.288	6.993
Clean the windshield and ensure that the wipers are effective	-19.817	0.000	0.996	0.000	0.000	0.000
Constant	-1.386	61.498	0.000	0.250		

Source: Fieldwork (2022). Significant at 0.05.

Table 6: Passenger Vehicle Drivers' Safety Procedure Knowledge in the Selected Region of Ghana.

Variable	Frequency	Percentage
Knowledge level		
Understand and comply with traffic laws	80	11.1
Familiar with common road signs and their meanings	120	16.7
know what to do in an emergency in case of an accident	240	33.3
Aware of pedestrians' and cyclists' safety rules	160	22.2
Participated in any road safety campaigns	120	16.7
Total	720	100.0

Source: Fieldwork (2022)

Table 7: Relationship between Passenger Drivers' Safety Procedure Knowledge and Motor Vehicle Crash Involvement in the Selected Region of Ghana.

Variable	No (%)	Yes (%)	Total n (%)	χ^2	p - value
Drivers' knowledge level				112.500	<0.001
Understand and comply with traffic laws	100.0	0.0	80(100.0)		
Familiar with common road signs and their meanings	100.0	0.0	120(100.0)		
Know what to do in an emergency in case of an accident	83.3	16.7	240(100.0)		
Aware of pedestrians' and cyclists' safety rules	100.0	0.0	160(100.0)		
Participated in any road safety campaigns	66.7%	33.3%	120(100.0)		

Note: Row percentages in parentheses, Chi-square significant at (0.001), (0.05), (0.10)

No: Never involved in a crash; Yes: involved in a crash

Source: Fieldwork (2022).

Discussion

This current study attempted to investigate passenger drivers' behaviour, car maintenance practices, safety procedure knowledge, and motor vehicle crash involvement in a selected region of Ghana. The findings reveal that ensuring headlights and other indicators (such as signal lamps) function correctly tends to have a higher likelihood of motor vehicle crash involvement. This finding refuted a previous study, which found no association between turn signal colour and the odds of being struck in a turn-signal-relevant maneuver [51]. On the contrary, the finding was consistent with a previous study, which found that a reduction in the useful field of view increases crash risk in older drivers [52]. This finding suggests passenger drivers over-rely on their headlights, brakes, good tire condition, and so forth, and drive recklessly without adhering to the recommended speed limit and road traffic lights [53]. Further, it could imply that the passenger drivers are inexperienced, get distracted while driving (e.g., texting, eating, etc.), drive while drunk, and do not comply with the 30-minute rest after a long-distance drive [54,55]. The plausible explanation for this finding could be a result of road designs that include sharp curves, narrow lanes, or inadequate signage. Additionally, it could be that these drivers suffered certain medical conditions such as epilepsy, dementia, or sleep apnea, which invariably impaired driving ability [56,57].

The study found that a relationship exists between passenger drivers' behaviour and motor vehicle crash involvement in the selected region of Ghana; due to this, the null hypothesis was not confirmed. This finding agrees with previous studies, which found that positive driving behaviours do increase errors, inattention errors, and violations in driving [23,58,59]. A p-value of <0.001 indicates a stronger correlation, which means that passenger drivers' behaviour is an independent predictor of motor vehicle crash involvement in the selected region of Ghana. This finding suggests a comprehensive education of passenger vehicle drivers on road safety guidelines and code of conduct in the transport industry in the selected region to help curb the menace [60]. The plausible explanation for this finding could be that passenger drivers do engage in certain behaviours that do not favour driving. It could also mean that they do not inspect the vehicles to ensure that every part, including the brakes, tires, and so forth, is functioning correctly before putting them on the scale [61–64].

The study found that a relationship exists between drivers' car maintenance practices and motor vehicle crash involvement in the selected region of Ghana. Therefore, the null hypothesis was ignored. This outcome refuted previous studies, which found that proper car maintenance can significantly reduce the likelihood of an accident [65,66]. A p-value of <0.001 found is an indication that both the explanatory and the outcome variables are not independent of each other and that they are interdependent. This relationship suggests that irregular vehicle maintenance behaviour among drivers can lead to accidents [65]. For instance, malfunctioning brakes, worn tires, and faulty lights are just a few examples of issues that can cause accidents on the road [65]. The plausible explanation for this finding could probably be that these passenger drivers, having failed to maintain their vehicles, over-rely on them and engage in reckless driving coupled with unnecessary speeding [60]. Further, it could be that these drivers are not qualified, drive while drunk, make phone calls, or do not pay particular attention to road safety protocols [60,67].

The research found that a relationship exists between passenger drivers' knowledge level of safety procedures and motor vehicle crash involvement in the selected region of Ghana. As a result of this, the null hypothesis was disproved. This finding was in line with a previous study, which found that with 80% of road accidents occurring due to driving error, lack of safe driving knowledge was found to be the root cause of accidents in India [44]. A p-value of <0.001 indicates that the variables tested are not independent of each other; hence, they interact. The finding suggests that the more and more passenger vehicle drivers claim to be knowledgeable of road safety procedures, it is the more and more they encounter motor vehicle crashes in the selected region of Ghana [65]. The plausible explanation for this finding could probably be that what these passenger drivers thought might be, might not opt to be what they think.

The study found that 22.2% of the passenger drivers reported either speeding: exceeding the speed limit in built-up areas; distracted driving: using a mobile phone while driving;

or seatbelt use and being able to avoid potential hazards on the road to be behaviours of drivers. This finding is in line with previous studies, which also found some of the leading causes of distracted driving accidents to be using a cell phone while driving, as well as eating food or drinking from a mug or bottle [22,68–70]. This finding implies that the respective associations of drivers have been able to educate their members on the behaviours that do not support safe driving [71,72]. It could also mean that before one can obtain a driving license, one is taught the behaviours that the transport industry does not entertain or endorse, and they are informed to avoid them while driving [71,72]. The reason for this finding could be that these passenger drivers do adhere to the appropriate behaviours and do not engage in behaviours that are not entrenched in the transport industry safety protocols in their daily operations [73,74]. Also, it could probably mean that they have, on countless occasions, seen or heard about a particular driver who engages in the above-mentioned behaviours while driving. However, the 16.7% passenger drivers who reported either defensive driving: maintain a safe driving distance, or obey traffic lights, signs, and lane markings reason could probably be that they prioritise this behaviour daily while driving [75,76]. This finding implies that these passenger drivers might not want to be involved in a crash in their active time as passenger drivers [75,76].

The study found varied car maintenance practices among passenger drivers, which included regular vehicle inspection and maintenance, tires, brakes, headlights, and other indicators that function correctly, and ensures cleaning of the windshield and wipers effectively. This finding is almost in line with a study which postulated that regular vehicle maintenance may include oil and filter change, other fluid checks and changes, air and fuel filter replacement, tire rotation, and brake inspection [77]. This finding implies that the passenger drivers do at least maintain their vehicles daily before commencement of duty [78]. The finding further suggests that passenger drivers prioritise a maintenance culture in the transport unit in the selected region. The plausible explanation for this finding could be that these passenger drivers might not want to encounter any emergency while in operation. It could also be that they value their occupation and hold it in high esteem. It might also be that they do not want to be the cause of people's sudden demise [79].

The study found that 33.3% of the passenger drivers reported they know what to do in an emergency in case of an accident. This outcome is almost in line with a study that postulated that training increases knowledge, skills, and willingness to attend to victims as a first responder [80]. This finding implies that these passenger drivers might have mastered the road safety emergency protocols and are abreast of what to do in an accident situation, such as handling of casualties and calming passengers' tempers down [80]. It could also mean that they have been in the transport industry for years and that they can discern or sense an accident-prone area or identify accident signals far before they manifest, hence, accident rates decrease with driving experience [81]. The possible

reason for this finding could probably be that their respective associations organise periodic workshops on road emergency safety measures for them, which have invariably equipped them with the requisite knowledge [82–84]. However, the 11.1% who indicated they do understand and comply with traffic laws might be that they are law-abiding individuals [78]. This finding implies that some passenger drivers are not law-abiding, which highlights that the Mean Time to Detect (MTTD) should endeavour to strengthen the laws governing road traffic laws so that defaulters can be sanctioned in order to serve as a deterrent to others.

The study found that 89% of the passenger drivers never got involved in a crash during the last 12 months prior to the study. This outcome corroborated with a previous study, which also found that passengers had an overall protective effect, that is, the crash risk was higher for those who drove alone, regardless of their age or gender. This protective effect increased with every extra passenger (up to eight), indicating that the more passengers in the vehicle, the safer the driving [85]. This finding suggests that the passenger drivers do adhere to the road safety measures [78]. Further, the finding implies that the drivers are experienced and also do not engage in anything funny that can distract them while driving, hence, passengers had an overall protective effect. The plausible reason for this outcome could probably be that these passenger drivers take their car maintenance practices seriously, which enabled them to replace their worn tires, which can reduce braking and handling, especially in wet or icy conditions [86]. However, the 11% that reported they ever got involved in a crash reason could probably be that the roads that they use were composed of sharp curves, narrow lanes, inadequate signage, poor road surfaces, potholes, and/or lack of proper lane markings [22]. The finding suggests the passenger drivers in question do not comply with the road safety protocols, might be inexperienced, and/or engage in behaviours such as eating, texting, and making telephone calls, which distract them while driving. It could also mean that they drink and drive. This outcome disagrees with a previous study, which found that 74% of passenger drivers got involved in two-car vehicular collisions [87].

Conclusion

The current study established a significant relationship between motor vehicle crash involvement and factors such as functional headlights and their indicators, drivers' behaviour, car maintenance practices, and knowledge of safety procedures in the selected region of Ghana. Based on this, the study recommends that targeted interventions should be implemented to improve vehicle maintenance, enhance driver education on road safety procedures, and promote responsible driving behaviour to reduce motor vehicle crash involvement in the region. A key limitation of the study is that it was conducted cross-sectionally and relied on self-reported data, so the possibility of social desirability or recall bias is high, and this is likely to affect the findings of the study. Also, generalisability was not possible since the study was not a census, so the findings might not represent the views of the entire passenger drivers in the region.

Declaration

Ethical approval: Ethical clearance (with ID (UHAS-REC A. [018]) 21–22) to carry out the study was obtained from the University of Health and Allied Sciences.

Consent to participate in the study: In the field, verbal consent was sought before a participant could take part in the study.

Consent to publish: Participants were informed that the study was strictly academic and that the results would be published to contribute to building academic literature.

Funding: The study was self-funded

Availability of data and materials: The data is only available to the author, hence it was primary data. However, it can be shared upon request from the corresponding author through (anthonyedward58@yahoo.cm), University of Cape Coast, Cape Coast, Ghana.

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Author's contribution

Anthony Edward Boakye: Conceptualise the study, Methodology, Formal analysis, Data curation, Writing – original draft, Proof reading, and Writing – review & editing.

Abigail Asabea Addo: Writing – original draft, Software, proof reading, Writing – review & editing.

Rita Tekpertey: Data curation, Formal analysis, and Software, Writing – original draft, and proof reading.

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