



## ORIGINAL ARTICLE

## Factors influencing willingness to intervene as bystanders among adult residents living in crash-prone areas in the Ashanti region of Ghana

Miilon Sommik Duut<sup>a,\*</sup>, Paul Okyere<sup>b</sup>, Ahmed Nuhu Zakariah<sup>c</sup>, Peter Donkor<sup>d</sup>, Charles Mock<sup>e</sup><sup>a</sup> National Ambulance Service, Ashanti Branch, Kumasi, Ghana<sup>b</sup> School of Public Health, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana<sup>c</sup> National Ambulance Service, Headquarters, Accra, Ghana<sup>d</sup> Department of Surgery, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana<sup>e</sup> Department of Surgery, University of Washington, Seattle, WA, United States

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## ABSTRACT

**Introduction:** Formal prehospital emergency medical services cover only a small percent of the population in most low- and middle-income countries. Increasing the involvement of laypersons in prehospital first aid can be an important part of the response to injuries and other medical emergencies. We sought to understand factors associated with the willingness of laypersons in Ghana to provide first aid to road traffic crash victims.

**Method:** This cross-sectional study purposively sampled four crash-prone areas in the Ashanti Region and 385 participants were interviewed. A structured questionnaire was used to ask about their demographic characteristics, first aid knowledge, and perceptions about first aid. Factors affecting willingness to provide first aid were assessed using multivariable logistic regression.

**Results:** Most participants were male (57.7%) and young (median age 28 years). A large majority (82.9%) were willing to provide first aid to crash victims. However, only 43.1% had been trained in first aid and only 40.4% had adequate knowledge of first aid ( $\geq 70\%$  correct). Factors associated with willingness to provide first aid included first aid knowledge (aOR 17.27 for moderate knowledge vs. low knowledge,  $p=0.018$ ; aOR 13.63 for adequate knowledge vs. low knowledge,  $p=0.030$ ) and positive attitudes towards first aid, including the feeling that: every person should be trained in first aid (aOR 2.98,  $p=0.025$ ), first aid increases survival (aOR 2.79,  $p=0.046$ ), it is important to learn first aid (aOR 2.40,  $p=0.005$ ), and bystanders have the responsibility to give first aid (aOR 4.34,  $p<0.001$ ).

**Conclusion:** A high percentage of people in these crash-prone areas of Ashanti Region, Ghana were willing to provide first aid. However, under half had been trained in first aid or had adequate knowledge of first aid. A major implication of these findings is the need to increase the availability of quality training in first aid in these areas.

## African relevance

- Formal prehospital ambulance services do not yet cover most of the population in many African countries.
- Involving laypersons in prehospital first aid and activating the emergency response system is an important component of strengthening prehospital care.
- It is important to understand lay person's first aid knowledge level and factors affecting their willingness to provide first aid.

## Introduction

Injury is a major health problem globally, with nearly 5 million deaths per year and many more millions injured [1]. Rates of injury-related deaths and disabilities are especially high in low- and middle-income countries (LMICs) [2–4]. An important part of the response to injury is to strengthen care for the injured. Prehospital care is especially important as a very large percentage of injured people die in the prehospital setting, before any chance of hospital care [4].

High-income countries mostly have formal emergency medical services (EMS, e.g., ambulance services) which cover almost all of their population [5–7]. In general, LMICs have less developed EMS than high-income countries [5–7]. Even when formal EMS does exist, it is primarily concentrated in urban areas and large parts of the population do not

\* Corresponding author.

E-mail address: [duut.sm@gmail.com](mailto:duut.sm@gmail.com) (M.S. Duut).

have rapid access to it [8]. It has been estimated that in one area in Ghana, only 10% of injured people who needed hospital care received ambulance transport, with the remainder being taken to health care facilities by bystanders [9].

Bystanders and other laypeople having first aid skills and being willing to intervene at crash scenes can be an important adjunct to formal EMS, especially in areas of LMICs where formal EMS is limited or absent [10,11]. Even in high-income countries, laypersons need to be involved in activating EMS and sometimes in providing first aid if EMS is delayed, such as in remote areas [12–13]. Hence, how well trained laypeople are in first aid and their willingness to intervene and provide first aid in motor vehicle crashes and other medical emergencies is an important issue worldwide [14–17]. One review on this topic showed that bystanders' decisions to intervene in crashes were influenced by multiple factors, including fear, knowledge, perceptions, demographics, relationship to the victim, and interactions with other bystanders [18]. In Sweden, lay bystanders who lacked first aid knowledge were less willing to intervene due to low confidence levels [19].

Information on the role of bystanders in prehospital care in Ghana, as in many African countries, is limited. Hence, we sought to address this gap by evaluating bystanders' experience with and willingness to provide first aid in crash-prone areas of Ashanti Region, Ghana. We also sought to assess what factors influenced their willingness to provide first aid. By so doing, we hoped to identify ways to increase effective bystander first aid in areas with limited formal EMS in Ghana and similar countries globally.

## Methods

This study is an analytical cross-sectional study that involved bystanders sampled from communities along major highways. It was conducted from September 2020 to May 2021.

The Ashanti Region has the highest number of crash deaths in Ghana [20]. The Kumasi-Accra and Kumasi-Tamale roads are the two busiest highways in Ashanti. Communities along these roads were purposively selected due to their high rates of crashes. Out of seven possible large communities on these roads, we randomly selected four for the study. These four were: Boankra, Ejisu, Kodie, and Offinso, with a total population of 319,000. During 2020, 76 road traffic injuries (including 21 fatalities) were reported on the road between Kodie and Offinso, and 101 (including 26 fatalities) between Ejisu and Boankra [21].

A sample size of 400 was estimated using an expected proportion of 50% for the outcome variable of willingness to provide first aid (based on pilot work by the PI) and 5% as the acceptable margin of error [22]. People who were aged 18 years or above and who had been resident in the above communities at least six months were included. Those who agreed to be interviewed provided written informed consent.

A convenience sampling technique was used to recruit study participants. People on the two highways were approached by the principal investigator or research assistants to explain the purpose of the study to them. They were screened to ensure they met the inclusion criteria. Those who consented were interviewed using a structured questionnaire that included questions on demographics, opinions on first aid, willingness to provide first aid, and knowledge of other aspects of emergencies such as emergency response numbers. One question asked whether participants have heard about first aid before. For those who had not, a description of first aid was provided to them, which enabled them to answer further questions about first aid. Participants (respondents) were also asked 11 questions to assess their first aid knowledge (appendix A). The questionnaire (including questions on first aid knowledge) was developed by the study team and pilot tested on 40 people in an area not involved in later data gathering. Questions on first aid knowledge were created by the principal investigator (who has 10 years of experience in prehospital care), with input from others in the ambulance service, and was informed in part by questions used in a similar study in Ethiopia [23].

**Table 1**  
Socio-demographic profile of respondents by willingness to provide first aid.

Characteristics	Totals	Willing	Not willing	P value
	N=385 (%)	N=319 (%)	N=66 (%)	
Sex				
Male	222 (57.7)	188 (58.9)	34 (51.5)	0.267
Female	163 (42.3)	131 (41.1)	32 (48.5)	
Age				
18–28	193 (50.1)	161 (50.5)	32 (48.5)	0.337
29–38	112 (29.1)	87 (27.3)	25 (37.9)	
39–48	49 (12.7)	44 (13.8)	5 (7.6)	
49–59	24 (6.2)	21 (6.6)	3 (4.5)	
60+	7 (1.8)	6 (1.9)	1 (1.5)	
Education				
No education	15 (3.9)	11 (3.5)	4 (6.1)	0.525
Basic school	81 (21.2)	68 (21.5)	13 (19.7)	
Secondary	185 (48.3)	150 (47.3)	35 (53.0)	
Tertiary	102 (26.6)	88 (27.8)	14 (21.2)	
Employment Status				
Yes	291 (76.2)	243 (76.4)	48 (72.7)	0.808
No	91 (23.8)	75 (23.6)	16 (24.2)	

Missing values: Education (2, willing); Employment status (1, willing; 2 not willing). Percentages and statistical values based on non-missing data.

Depending on the participants' preferences, research assistants either gave the paper questionnaire to people to fill out themselves or read questions to the participants in either English or Twi (the local vernacular language), with the research assistants filling out the questionnaire. Questionnaires filled out directly by the respondents were completed at the time, with the research assistants present. Respondents were interviewed at convenient places of their choosing, such as rest stops, their shops, or their homes.

Data collected were entered into Excel and exported into STATA version 14 (StataCorp, Texas). Data were analysed descriptively and inferentially. Chi-square analysis was performed to determine the relationship between the dependent and independent (willingness to provide first aid) variables. In all analyses  $p \leq 0.05$  was considered statistically significant. Knowledge of first aid was categorized based on the percent correct of the 10 questions: below 40% (inadequate), 40–69% (moderate), 70% or above (adequate). Significant variables ( $p < 0.05$ ) on bivariate analysis were included in a multivariable logistic regression model.

This study was approved by the Committee on Human Research Publication and Ethics, Kwame Nkrumah University of Science and Technology (CHRPE/AP/368/20).

## Results

A total of 435 people were approached for the study, with 385 agreeing to participate (response rate of 88.5%). Among the study participants, the majority were male (57.7%) and young, with median age of 28 years (Table 1). More than 96% of the participants had at least basic education, with secondary education being the most common (48.1%).

Less than half (166, 43.1%) of participants had any education on first aid in the past five years. Based on 11 questions about first aid in the questionnaire, just under half (156, 40.4%) of participants had adequate knowledge of first aid. Just over half (225, 58.3%) had moderate knowledge. A small number (5, 1.3%) had inadequate knowledge. There was no relationship between prior education on first aid and first aid knowledge. Less than half (42.8%) of those who had prior first aid education had adequate knowledge, compared with 38.8% of people without prior first aid education ( $p=0.43$ ).

Majority of participants (319, 82.9%) were willing to provide first aid to victims of a road traffic crash. Among the 66 (17.1%) who indicated that they were not sure or not willing, 52.3% said they did not know what to do to help (lack of knowledge) and 31.8% gave no reason for being unwilling to help.

**Table 2**  
Attitudes and knowledge of respondents by willingness to provide first aid.

Characteristics	Totals(N=385) (%)	Willing(N=319) (%)	Not willing(N=66) (%)	P value
<b>Have you ever heard about first aid?</b>				
Yes	345 (89.6)	290 (90.0)	55 (83.3)	0.066
No	40 (10.4)	29 (9.1)	11 (16.7)	
<b>Have you had any education on first aid in the past five years?</b>				
Yes	166 (43.1)	139 (43.6)	27 (40.9)	0.69
No	219 (56.9)	180 (56.4)	39 (59.1)	
<b>First aid knowledge:</b>				
Low knowledge	5 (1.3)	1 (0.3)	4 (6.1)	<0.001
Moderate Knowledge	224 (58.2)	189 (59.2)	35 (53.0)	
Adequate Knowledge	156 (40.5)	129 (40.4)	27 (40.9)	
<b>Should every person be trained in first aid?</b>				
Yes	359 (93.2)	304 (95.3)	55 (83.3)	<0.001
Don't know / No	26 (6.8)	15 (4.7)	11 (16.7)	
<b>Who should be trained in first aid?</b>				
Drivers	245 (64.8)	208 (66.0)	37 (58.7)	0.65
Farmer	65 (17.2)	52 (16.5)	13 (20.6)	
All others	68 (18.0)	55 (17.5)	13 (20.6)	
<b>Have you ever heard of “The good Samaritan Law”?</b>				
Yes	229 (60.7)	195 (61.5)	34 (56.7)	0.46
No	148 (39.3)	122 (38.5)	26 (43.3)	
<b>Giving first aid at the accident scene increases the victim's survival rate</b>				
Agree	354 (93.2)	299 (94.3)	55 (87.3)	0.044
Disagree	26 (6.8)	18 (5.7)	8 (12.7)	
<b>It is important to learn about first aid</b>				
Agree	269 (69.9)	236 (74.2)	33 (50.8)	<0.001
Disagree	114 (29.6)	82 (25.8)	32 (49.2)	
<b>Giving first aid is not good</b>				
Strongly agree / agree	158 (41.5)	127 (40.1)	31 (48.4)	0.101
Strongly disagree / disagree	223 (58.5)	190 (59.9)	33 (51.6)	
<b>Bystanders have the responsibility to give first aid at the accident scene</b>				
Strongly agree / agree	336 (89.1)	293 (92.7)	43 (70.5)	<0.001
Strongly disagree / disagree	41 (10.9)	23 (7.3)	18 (29.5)	

Missing: Who should be trained in first aid (4 willing, 3 not willing), heard of good Samaritan law (2 willing, 6 not willing), giving first aid at accident scene increases victim's survival (2 willing, 3 not willing), giving first aid is not good (2 willing, 2 not willing), important to learn about first aid (1 willing, 1 not willing), bystanders have responsibility (3 willing, 5 not willing). Percentages and statistical values based on non-missing data.

None of the demographic factors (Table 1) were associated with willingness to provide first aid. A variety of questions regarding familiarity with and attitudes towards first aid were asked and assessed for association with willingness to provide first aid. Most participants had heard about first aid and had positive attitudes towards it, such as feeling laypeople should be trained in first aid and understanding that giving first aid increased injured person's survival rate (Table 2).

Adequate and moderate first aid knowledge were associated with an increased likelihood of being willing to provide first aid, compared with low knowledge ( $p<0.001$ , Table 2). Several attitudinal factors were significantly associated with increased likelihood of being willing to provide first aid: feeling that all laypeople should be trained in first aid ( $p<0.001$ ); understanding that giving first aid can increase a victim's survival rate ( $p<0.044$ ); feeling that it is important to learn first aid ( $p<0.001$ ); and feeling that bystanders have a responsibility to give first aid ( $p<0.001$ ).

On multivariable analysis the following factors remained significantly associated with willingness to provide first aid: first aid knowledge (aOR 17.27 for moderate knowledge vs. low knowledge,  $p=0.018$ ; aOR 13.63 for adequate knowledge vs. low knowledge,  $p=0.030$ ) and positive attitudes towards first aid, including the feeling that: every person should be trained in first aid (aOR 2.98,  $p=0.025$ ), first aid increases survival (aOR 2.79,  $p=0.046$ ), it is important to learn first aid (aOR 2.40,  $p=0.005$ ), and bystanders have responsibility to give first aid (aOR 4.34,  $p<0.001$ ) (Table 3).

The above findings were robust to a different permutation of the multivariable analysis. There were few participants in the low category of first aid knowledge. Hence, we conducted a sensitivity analysis in which we dropped this variable and evaluated the effect of the other four variables in Table 3. The results changed minimally compared to the main

analysis. The variable “first aid increases survival” had been significant ( $p=0.044$ ) level in the main analysis, but became non-significant in the sensitivity analysis (aOR 2.55,  $p=0.066$ , 95% CI 0.94, 6.94). All other variables maintained significance: should every person be trained (aOR 2.71,  $p=0.04$ , 95% CI 1.05, 7.01); it is important to learn first aid (aOR 2.37,  $p=0.004$ , 95% CI 1.31, 4.31); and it is a bystander's responsibility to give first aid (aOR 4.91,  $p<0.001$ , 95% CI 2.37, 10.17).

Most (246, 64.7%) participants indicated that they knew of at least one emergency helpline number, with 134 (35.3%) indicating that they did not know (Table 4). However, when read a list of numbers and asked which number they should call for a road traffic crash, only 33 (9.0%) indicated that they did not know. The majority chose a valid number to call (the Ghana universal number, fire, police, or ambulance), but 56 (15.2%) chose 911, which is not used in Ghana.

In these crash-prone areas, the majority (240, 64.7%) had witnessed a road traffic crash in the past five years. A substantial number (148, 39.3%) had encountered situations in which they had to call emergency responders. If they had encountered more than one such situation, they were asked to provide details for the most recent. These most recent situations were primarily fires (64, 43.2%) and road traffic crashes (61, 41.2%). The main emergency services called were fire service (71, 48.0%) and ambulance service (48, 32.4%).

Participants were asked what might discourage them from calling emergency service responders in the future. The most common reasons were delays in responding (232, 60.3%), the perception that the people answering the calls asked too many questions (112, 29.1%), and difficulty in contacting the numbers (105, 27.3%). People had witnessed road traffic crash victims being transported to hospitals by a variety of means, less than half of which (184, 48.8%) were ambulances. In terms of prior experience with first aid, a substantial number (130,

**Table 3**  
Multivariable logistic regression analysis <sup>1</sup>: odds of being willing to provide first aid.

	Odds Ratio	P>z	[95% Conf. Interval]	
First aid knowledge:				
Low knowledge	Referent			
Moderate Knowledge	17.27	0.018	1.65	181.13
Adequate Knowledge	13.63	0.030	1.30	143.31
Should every person be trained in first aid?				
No	Referent			
Yes	2.98	0.025	1.15	7.75
Giving first aid at the accident scene increases the victim's survival rate				
No	Referent			
Yes	2.79	0.046	1.02	7.67
It is important to learn first aid				
No	Referent			
Yes	2.40	0.005	1.31	4.41
Bystanders have the responsibility to give first aid at the accident scene				
Disagree	Referent			
Agree	4.34	< 0.001	2.03	9.28

<sup>1</sup> Based on 374 participants with full data for the five variables included in the model.

33.8%) had ever attended to a victim of heavy bleeding, and a smaller number (67, 17.4%) had ever attended to a victim with an airway problem.

## Discussion

This study sought to evaluate lay bystanders' willingness to provide first aid in crash-prone areas of Ashanti Region, Ghana. It also sought to assess factors influencing this willingness. We found that a large majority (82.9%) of participants were willing to provide first aid. Most had good attitudes about first aid and its importance, such as understanding that giving first aid increased a victim's chance of survival. However, only 43.1% had training on first aid during the past 5 years and only 40.4% had adequate knowledge of first aid. The main predictors of willingness to provide first aid were the level of knowledge of first aid and positive attitudes towards first aid.

The high rate of willingness to intervene (82.9%), including providing first aid to victims of road traffic crashes, is similar to other studies from Africa and elsewhere. Awasthi *et al* interviewed 252 commercial drivers in India, reporting that 92.5% were willing to give first aid to crash victims [24]. Teshale and Alemu interviewed 785 taxi drivers in Addis Ababa, Ethiopia, and found that most (80.6%) were willing to provide first aid to road traffic crash casualties, and that 44.3% had assisted a crash victim in the past year [25]. Ssewante *et al* interviewed 345 taxi drivers in Kampala, Uganda and found that 97% perceived first aid as important, but only 69% were willing to give first aid [26]. Similar results are reported from high-income countries, such as Poland, where 90% of private drivers indicated they would be willing to assist traffic crash victims [27].

Even though most participants were willing to help, the current study also showed that less than half (43.1%) of participants had first aid training in the past 5 years and a similar number (40.4%) had adequate knowledge of first aid. A wide range of figures is reported for these details in the literature [25,26,28,29,30]. Pallavisarji *et al* studied [28] 720 potential lay first responders, including police, teachers, and commercial drivers in southern India. Only 26% had ever had first aid training and only 13% had first aid training in the past two years. However, the percentage of those having any first aid training was much higher (62%) among the drivers [28]. Teshale and Alemu reported that only 26.8% of commercial drivers in Addis Ababa had any first aid training in their lifetimes. In terms of knowledge, they found that half (50.3%) of participants had adequate first aid knowledge, defined as a score of 80% or more on questions about first aid [25]. Ssewante *et al* reported that only 19.4% of taxi drivers in Uganda had prior first aid training, but that more (29.9%) had good knowledge (defined as >50%

correct on first aid questions) [26]. Sangowawa and Owoaje reported on first aid knowledge scores among university drivers in Ibadan, Nigeria, showing that a group of 98 drivers had a first aid knowledge score of only 51.2% correct [29]. Olugbenga-Bellow *et al* found that only 37.6% of commercial drivers in Nigeria identified basic resuscitation priorities correctly [30]. It should be noted that most studies in the above two paragraphs interviewed road users, whereas the current study interviewed the general public.

Predictors of being willing to provide first aid in the current study were first aid knowledge and positive attitudes towards first aid and its importance. This is similar to findings on the above-noted study of commercial drivers in Ethiopia, in which Teshale and Alemu found that the main independent predictors of being willing to provide first aid to crash victims were first aid training, adequate knowledge, and carrying a first aid kit in their car. Each of these three factors increased the likelihood of being willing to provide first aid by five-fold [25].

The current study also evaluated people's knowledge of emergency response numbers and their experiences with using them to activate the formal emergency response system. Many people had experienced events that led them to call some emergency number, including police, fire, and ambulance services. Most knew valid emergency response numbers, although some incorrectly identified 911 as a number to call in Ghana. Likewise, many participants felt that the best number to call for a crash was the Fire Service. The reason for this is not obvious, but may partially reflect the fact that the Fire Service has been in existence longer than the Ambulance Service and that it is general knowledge that the Fire Service personnel know first aid. Participants expressed frustrations with several aspects of activating the emergency response system, including delays in responding, difficulties in contacting the numbers, and the perception that those answering the calls asked too many questions. Such factors are important limitations for government officials to be aware of as delays in activating EMS can lead to delays in treatment, which lowers crash victims' survival rates [31].

There were several limitations to this study. First, participants were drawn from a convenience sample of people in these crash-prone areas. This might bias the results. For example, most participants were 18–28 years old, indicating the younger people might have been preferentially selected, skewing the results towards the opinions of that age group. Likewise, the fact that a third of participants had not witnessed crashes in the past 5 years may indicate that this group was over-represented. Second, the test used to assess first aid knowledge was only 11 questions. This might not have adequately reflected true first aid knowledge. Third, the multivariable model was based on demographic, first aid knowledge, and attitudes towards first aid. The analysis could have been expanded to include other variables such as experience with crashes. Despite these

**Table 4**  
Knowledge and experience in activating emergency medical services.

Characteristics	N	(%)
<b>Do you know of any emergency helpline numbers?</b>		
Yes	246	64.7
No	134	35.3
<b>Which number should you call for help when you witness a road traffic crash?</b>		
112 (Ghana universal number)	158	42.9
191 (Fire service)	55	14.9
192 (Police)	42	11.2
193 (Ambulance)	24	6.5
911 (Not in Ghana)	56	15.2
Don't know	33	9.0
<b>Have you witnessed any road traffic crashes during the past five years?</b>		
Yes	240	64.7
No	131	35.3
<b>Have you ever encountered a situation that demanded you call emergency responders?</b>		
Yes	148	39.3
No	229	60.7
<b>If yes in the above question, what was the situation? <sup>1</sup></b>		
Fire emergency	64	43.2
Road traffic crash	61	41.2
Domestic accident	19	12.8
Fall from high	2	1.4
Industrial accident	2	1.4
<b>Which emergency response department did you call? <sup>1</sup></b>		
Fire service	71	48.0
Ambulance service	48	32.4
Police service	29	19.6
<b>Which emergency service responders do you usually contact or will contact during a road traffic crash?</b>		
Fire service	34	9.2
Police service	69	18.6
Ambulance service	248	67.0
Have not encountered such a situation before	19	5.1
<b>Is it necessary to call the EMS Responders / National Ambulance Service when you suspect any emergency?</b>		
Yes	335	88.2
No	45	11.8
<b>Do you find the questions asked by Emergency Service personnel during distress call relevant? <sup>2</sup></b>		
Yes	203	54.4
No	105	28.2
Have never called them before	65	17.4
<b>What will discourage you from calling emergency service responders in an accident situation? <sup>3</sup></b>		
Delays in responding	232	60.3
Difficult to contact them	105	27.3
They asked many questions when one calls them	112	29.1
Lack of credit to call	50	13.0
<b>By what means have you witnessed road traffic accident victims transported to hospitals? <sup>3</sup></b>		
Ambulance vehicles	184	48.8
Commercial vehicles	109	28.9
Private cars	58	15.4
Motorbike	14	3.7
Others	10	2.7

Missing values: know helpline (5), have you encountered a situation (8), have you witnessed a road traffic crash (14), which emergency line do you usually contact (15), is it necessary to call EMS responders when you suspect an emergency (5), do you know any dedicated call number for EMS (5), which number should you call for a road traffic accident (17), do you find the questions asked by EMS personnel relevant (12), by what means have you witness road traffic crash victims transported to hospital (8).

<sup>1</sup> Percentage based on denominator of those who answered yes to having ever encountered a situation that demanded they call emergency responders (n=148). <sup>2</sup> Pertains to calls that they made personally or to calls in which they were involved, but in which other people made the calls. <sup>3</sup> Multiple answers allowed, hence totals may be above 385. Percentages based on denominator of number of respondents who answered and hence totals may be above 100%.

limitations, the study has several strengths, such as a large sample size of participants living in areas with high rates of road traffic crashes and the use of an in-depth questionnaire that included a section that objectively assessed participants' first aid knowledge.

## Conclusion

This study found that the majority of participants living in these crash-prone areas were willing to provide first aid. However, less than half had training on first aid during the past five years and only 40%

had adequate first aid knowledge. The main predictors of willingness to provide first aid were first aid knowledge and positive attitudes towards first aid. Efforts to strengthen lay first response in the study area should include increasing the availability of high-quality first aid training, which would increase the quality of first aid provided as well as increase people's willingness to use it. Likewise, dissemination of information about the importance of first aid would decrease negative perceptions about it, the other major barrier to its use. Increasing bystander skills and involvement with first aid can augment the currently low level of resources devoted to prehospital care in many LMICs.



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## Dissemination of results

Results from this study have been shared with staff working with the National Ambulance Service, both in the Ashanti Region and at Headquarters in Accra. There are also plans to present the findings to the road safety authorities in the Ashanti Region.

## Author's contribution

Authors contributed as follow to the conception or design of the work; the acquisition, analysis, or interpretation of data for the work; and drafting the work or revising it critically for important intellectual content: DSM contributed 50%; PO 12.5%; NZ 12.5%; PD 12.5%; CM 12.5%. All authors approved the version to be published and agreed to be accountable for all aspects of the work.

## Declaration of Competing Interest

The authors declare no conflicts of interest.

## Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.afjem.2022.06.010.

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