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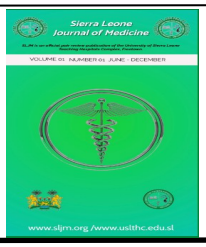

Assessment of Basic Medical Knowledge and Skills of Federal Road Safety Corps Officers on Pre-Hospital Trauma Care of Road Crash Victims in Southwest, Nigeria: A Cross-Sectional Study

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ABSTRACT

Background: Prompt and efficient pre-hospital care enhances the survival and recovery of road traffic crash (RTC) victims. Often provided by individuals with basic medical skills, such as Federal Road Safety Corps (FRSC) officers, such care can be life-saving making their knowledge and skills in prehospital care critical to victim survival. This study assesses the medical knowledge and skills of FRSC officers in delivering pre-hospital care to RTC victims.

Methods: A descriptive cross-sectional survey was conducted among FRSC officers in Southwestern Nigeria, using convenience sampling and structured questionnaires. Data collected included sociodemographic details, training history, knowledge and skills of pre-hospital trauma care, and availability of emergency materials as well as equipment. Data were analyzed with descriptive statistics, Pearson's chi-square, and Mann-Whitney U tests using IBM SPSS version 26.

Results: The study surveyed 137 participants (median age 38 years, 77% male, 43.1% with a university degree). Of these, 35% had over 10 years of service, while 13.9% had less than one year. Results showed that 56.2% had insufficient knowledge of prehospital care of crash victims, but 75.2% demonstrated basic trauma care skills. Officers with higher skills had a significantly higher median age (39 years) compared to those lacking skills (28 years, p = 0.018), and there was a positive correlation between years of service and pre-hospital care competence (p = 0.011).

Conclusion: Despite limited knowledge, most FRSC officers had experience and skills in pre-hospital trauma care. Skill level was linked to age, education, and experience, but not to knowledge or prior training. Access to equipment and ambulances supported effective victim transport. Regular hands-on training is essential to improve care quality and outcomes.

Key words: Road-Safety-Officers, Knowledge, Skills, Pre-hospital, Care.

1. INTRODUCTION

Road traffic crashes (RTC) are a leading cause of death among the young, particularly in developing countries like Nigeria[1]. With high morbidity and mortality rates, RTCs have been declared a major public health problem in these regions[2-4]. In 2012, Adeloye et al.,[5] estimated the mortality rate from RTCs in Nigeria to be 162 deaths per 100,000 population, among the highest globally. As Nigeria's economy continues to grow, increased motorization and rapid urbanization are expected to contribute to higher traffic volumes, potentially leading to a rise in road traffic crash-related fatalities. This is particularly concerning given the inadequate implementation of road safety measures, poor infrastructure, and the prevalence of unsafe vehicles. More recent data reveal that 1,400 deaths were recorded in the third quarter alone while 1,700 deaths were recorded in the fourth quarter of 2021[6-7]. This reflects an upward trend of death from road traffic crashes.

The quality of pre-hospital care received by RTC victims plays a pivotal role in determining their survival. However, a study by Oluwadiya et al[8]. highlighted the severe inadequacy of pre-hospital care for RTC victims, which has necessitated the involvement of non-medical personnel, including security operatives, in emergency response efforts.

The WHO identified three tiers of pre-hospital care[9,10,11]: care provided by laypersons within the community[2], care provided by trained individuals such as paramedical personnel equipped with vehicles and tools, and[3] advanced trauma care delivered by highly skilled professionals using sophisticated equipment. The Federal Road Safety Commission is a government agency originally established under Decree 45 of 1988 and reaffirmed by the Federal Road Safety Commission (Establishment) Act 2007. The Act delineates the responsibilities of FRSC officers, which include responding promptly to accident scenes, evacuating victims, administering first aid, and transporting victims to healthcare facilities[11,12]. Their additional duties encompass enforcing road traffic regulations, detecting and penalizing traffic offenders, and discouraging practices such as overspeeding and impaired driving.

Despite preventive measures, the prevalence of RTCs in Nigeria remains alarming[13]. During the fourth quarter of 2021 alone, over 11,800 road traffic casualties were recorded, including approximately 10,200 injuries and 1,700 fatalities[6]. From January to June 2023, an average of 24 lives were lost daily due to RTCs in Nigeria[14]. The high incidence of RTCs in low- and middle-income countries and the poor state of prehospital care of accident victim in Nigeria as reported by Solagberu et al[13]. underscores the need for skilled first responders, such as FRSC officers, who are often stationed near accident-prone areas[15]. Beyond physical injuries, RTCs have far-reaching social, emotional, psychological, and economic impacts[2,16]. Prompt intervention can significantly enhance victim outcomes, with critical factors such as the severity of impact, vehicle condition, seatbelt usage, and infrastructure quality influencing survival rates[13,17,18]. The WHO emphasizes empowering specific agencies to fulfil pre-hospital trauma care roles in regions lacking comprehensive trauma systems[15].

In Nigeria, FRSC and the Nigerian Police officers frequently serve as the first responders to RTCs. They often deliver first aid at roadside emergency clinics and transport victims to healthcare facilities[2,6]. Their interventions are pivotal for victim survival, affecting triage decisions, treatment prioritization, and seamless hospital transfer. Delays in accessing timely healthcare services exacerbate the morbidity and mortality associated with RTCs, making effective pre-hospital care essential[5].

While some states, like Osun, have deployed emergency ambulance services with trained paramedics along highways, these services are often insufficient[19]. Consequently, FRSC officers and other security agencies frequently assume the responsibility of rescuing and transporting victims due to their constant highway patrols, unlike ambulance services that await dispatch calls.

In addition to their primary responsibilities, the FRSC also carry out the following; ensuring crash scene safety, triaging victims to prioritize care, delivering urgent interventions, and coordinating seamless handovers to hospital personnel. Successfully performing these duties requires substantial knowledge of trauma care and the necessary practical skills[11,12]. Despite their importance, the competence and knowledge levels of these first responders in Nigeria remain insufficiently explored. Solagberu et al[13]. reported that 45.5% of crash victims are being transported by either FRSC or Nigerian Police to the hospital. A similar trend was observed during the 2022 Easter period, during which the FRSC reported rescuing 47% of crash victims[20]. These data affirm the FRSC's key role as first responders in the national emergency care framework, particularly in rural and peri-urban areas where formal ambulance services are either absent or insufficient. However, the competency of FRSC officers in delivering these critical pre-hospital interventions remains under-researched. Given their frontline role, it is essential to evaluate their baseline medical knowledge and trauma care skills. The study, therefore, aims to assess the basic medical knowledge and pre-hospital trauma care skills of FRSC officers in Osun State. By identifying gaps in their knowledge and skills, the findings will provide a basis for policy recommendations and advocate for structured, regular training programs to better equip FRSC officers, ultimately improving their effectiveness in managing RTCs cases.

Table 1: Population of FRSC Officers in the Selected Location

S/N	FRSC units	Population	Percentage
1	Osogbo	95	52.8
2	Ilesha	40	22.2
3	Ife/Gbongan	50	25.0
	Total	**180**	**100.0**

2. PATIENTS AND METHODS

2.1 Study Design and Population

This study employed a descriptive cross-sectional design to evaluate the current knowledge and skills of the Federal Road Safety (FRSC) officers in pre-hospital care of road traffic crash. The study was conducted among the officers at the state headquarters in Osogbo as well as units in Ile-Ife, Gbongan, and Ilesa, within Osun State, South-west Nigeria. Table 1 shows the population of FRSC officers in the selected locations.

2.2 Sample and Sampling Methods

Sample size was determined using Taro Yamane formula (N=185; e^2=level of precision 0.05).

$$n = \frac{N}{1 + N(e)^2}$$

Where

n = sample size,

N = population size (185), and

e = level of precision (0.05)

Substituting the values:

n = 185 / [1 + 185(0.05)^2]

n = 185 / [1 + 0.4625]

n = 185 / 1.4625 ≈ 126

After adding a 10% allowance for nonresponse, the final sample size was 140 .

A convenience sampling method was adopted to recruit the 140 FRSC officers because the officers were not always on duty at the same time. Consequently, only those on duty during the data collection period were enrolled until the desired sample size was achieved

2.3 Data Collection Tool

Data were collected using a self-developed semi-structured questionnaire consisting of three (3) sections: Section I: Personal information about FRSC officers consisting of 7 items. Section II elicit-

Table 2: Proportionate Sample Size

S/N	FRSC units	Population	Percentage	Proportionate Sample Size
1	Osogbo	95	51.4	72
2	Ilesha	40	21.6	30
3	Ife/Gbongan	50	27.0	38
	Total		**100.0**	**140**

ed information on knowledge assessment of FRSC officers on trauma victim evaluation, comprised ten questions. Correct answer was allotted 2 while incorrect answer was allotted 1, the maximum possible score was 20 while the minimum possible score was 10. The scores between 10 and 14 (below average) is considered poor knowledge, the score on 15 (average) was considered average knowledge while the scores between 16 and 20 (above average) was considered good knowledge. Section III consisted of two parts: Part 1 assessed respondents' skills for pre-hospital trauma care, which focus on the airway, breathing, and circulation (ABC) approach. This part utilized a simulated scenario replicating real-life accident conditions, with twelve questions items requiring the selection of correct options. Correct responses were awarded one point, while incorrect answers scored zero. The total possible score was 12, the scores between 1 and 6 were considered unskilled while the scores between 7 and 12 were considered skilled. Part 2 evaluated the availability of essential consumables, materials, and instruments for pre-hospital care with "Yes" or "No." responses. The 'Yes' response indicated positive response while the 'No' indicated negative response. The data were collected with the help of trained research assistants, all holding at least a first degree in health or related disciplines

2.4 Face Validity

The questionnaire's face validity was independently reviewed by three experts in the field of traumatology, whose feedback informed the final version. A pilot test was conducted to assess reliability, with data from the pilot study excluded from the main analysis. Only fully completed questionnaires submitted by consenting FRSC officers were included in the final dataset.

2.5 Statistical Analysis

Data analysis was conducted using SPSS version 26 for Windows. Descriptive statistics of frequency and percentage were used to summarize the objectives while chi-square was used to compare categorical variables. Significance level was set at p = 0.05. Normality of data distribution was checked using Kolmogorov-Smirnov test. The results were presented in tables.

2.6 Ethical Consideration

Administrative permission was obtained from the sector commandant of the Federal Road Safety Corps, Osun State. In addition, ethical clearance was secured from the Research and Ethics Committee of the Obafemi Awolowo University Teaching Hospitals Complex (OAUTHC) in Ile-Ife with the following protocol numbers; International: IRB/IEC/0004553, National: NHREC/17/03/2021 and Study Protocol Number: ERC/2022/09/04

2.7 Consent

Informed consent was obtained from all participants before data collection.

2.8 Data Availability

The data supporting the findings of this study are freely accessible at the Open Science Framework (OSF) repository through this link: https://osf.io/sjy65/files/osfstorage?view_only=0b000fe22dd1402f830172257effe6f7

3. RESULT

One hundred and forty (140) questionnaires were distributed to the respondents, one hundred and thirty-seven (137) were retrieved, properly filled and eligible for analysis making 97.9% response rate. Majority of the respondents were within the age range of 31- 40 years (54; 39.4%) with a mean age of 36.9 + 10.22 years. The highest proportion of the respondents was males (106; 77.4%), from Yoruba ethnic group (121; 88.3%), Christians (111; 81.0%) by religion with a BSc Certificate (59; 43.1%). Approximately one-third of participants (48; 35.0%) had more than ten years of employment as FRSC officers with a mean of 7.4 ± 4.7 years as shown in Table 3.

Table 3: Socio-Demographic Variables of the Study Participants

Variables	Category	No	%
Age group	Less than 20 years	2	1.5
	21-30 years	38	27.7
	31-40 years	54	39.4
	41-50 years	24	17.5
	51-60 years	19	13.9
Gender	Male	106	77.4
	Female	31	22.6
Ethnicity	Yoruba	121	88.3
	Hausa	4	2.9
	Igbo	9	6.6
	Others	3	2.2
Religion	Christianity	111	81.0
	Islam	25	18.3
	Others	1	0.7
Level of Education	Secondary School Certificate	33	24.1
	OND/HND Certificate	32	23.3
	Undergraduate Degree	59	43.1
	Postgraduate Degree	13	9.5
Employment	Less than 1 year	19	13.9
	1–5 years	37	27.0
	6–10 years	33	24.1
	Above 10 years	48	35.0

As presented in Table 4, vast majority of the respondents had access to consumables like elbow-length rubber gloves (125; 91.2%) and crepe bandages (111; 81.0%), rescue materials like first aid kit (115; 83.9%), scissors (102; 74.0%), splint hand board (91; 66.4%), spinal board (85; 62.0%), and cervical collar (77; 56.2%). Additionally, documentation materials such as pre-hospital care guidelines (107; 78.1%) and documentation charts (85; 62.0%) to

Table 4: Accessibility to Basic Pre-Hospital Care Materials and

Items Category	Item	Yes n (%))	No n (%))
Consumables	Elbow Length Gloves	125 (91.2)	12 (8.8)
	Clean Crepe Bandage	111 (81.0)	26 (19.0)
Rescue Instruments & Materials	First aid Kit	115 (83.9)	22 (16.1)
	Scissors	102 (74.5)	35 (25.5)
	Splint Hand Board	91 (66.4)	46 (33.6)
	Spinal Board	85 (62.0)	52 (38.0)
	Cervical Collar	77 (56.2)	60 (43.8)
Documentation Materials	Pre-Hospital Care Guidelines	107 (78.1)	30 (21.9)
	Documentation Chart	85 (62.0)	52 (38.0)
Transportation	Availability of Pickup	124 (90.5)	13 (9.5)

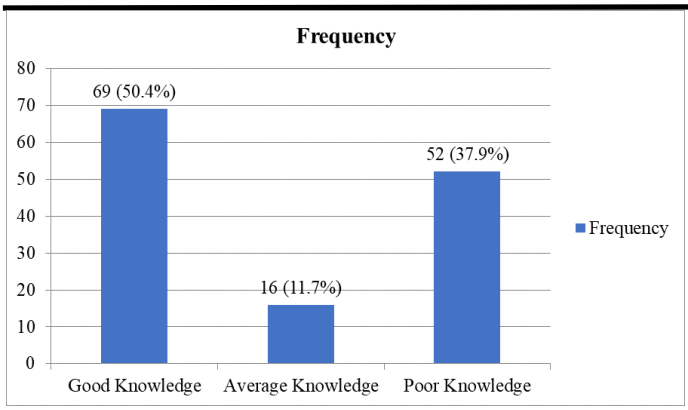

Figure 1: Knowledge of the Respondents on Prehospital Care for RTC Victims

monitor crash victims while in transit to the hospital were accessible to the respondents. A significant percentage of the respondents (124; 90.5%) affirmed the availability of pickup to transport FRSC officers and the victims from accident scene to the nearest hospital.

Figure 1 indicated that slightly more than one third of the participants (52; 37.9%) had poor knowledge of pre-hospital care while slightly more than half of the participants (69; 50.4%) had good knowledge of pre-hospital care.

Table 5 shows that a majority (103; 75.2%) of the respondents were skilled in providing pre-hospital care for the RTC victims. There is a significant association between socio-demographic characteristics specifically age, education level, year of employment and skill level in providing prehospital care of RTC victims. In contrast, no statistically significant relationship was observed between skill level and other variables such as gender, knowledge of pre-hospital care, history of providing pre-hospital RTC care, or history of training in pre-hospital care for RTC victims. Respondents with more than ten years of employment had the highest number of skilled officers (n = 38). Likewise, those with a university or higher education demonstrated significantly greater competence in prehospital care than those with lower educational levels (p = 0.001). A higher proportion of respondents with good knowledge (76.9%) were skilled, mirroring the same percentage among respondents with a prior history of providing prehospital care. Similarly, 76 percent of those who had received prehospital training were classified as skilled.

4. DISCUSSION

Our findings confirm that FRSC officers in Osun State, Nigeria possess inconsistent knowledge and limited practical competence in pre-hospital trauma care, despite many having basic training. Majority of our respondents fall within the 31 – 40 years age range. This is similar to age range reported by Ogunyemi et al[16]. in a study conducted among police officers in Abuja which is also a paramilitary agency. The implication of this could be that the two agencies have similar recruitment age. These results showed that slightly more than a third of the officers exhibited poor knowledge of pre-

Table 5: Association Between Participants' Characteristics and Pre-Hospital Care Skills

Variables	Pre-Hospital RTC Victim Care Skill			Statistics		
	Unskilled	Skilled	Total			
Age	n (%)	n (%)	n (%)	X^2	df	p
Less than 20 Years	2 (100)	0 (0.0)	2 (100)			
21-30 Years	4 (10.5)	34 (89.5)	38 (100)			
31-40 Years	15 (27.8)	39 (72.2)	54 (100)			
41-50 Years	6 (25.0)	18 (75.0)	24 (100)			
51-60 Years	7 (36.8)	12 (63.2)	19 (100)	11.944	4	0.018
Total	34 (24.8)	103 (75.2)	137 (100.0)			
Gender						
Male	30 (28.3)	76 (71.7)	106 (100)			
Female	4 (12.9)	27 (87.1)	31 (100)	3.048	1	0.081
Total	34 (24.8)	103 (75.2)	137 (100.0)			
Years of Employment						
<1 Year	9 (47.4)	10 (52.6)	19 (100)			
1–5 Years	12 (32.4)	25 (67.6)	37 (100)			
6–10 Years	3 (9.1)	30 (90.9)	33 (100)			
>10 Years	10 (20.8)	38 (79.2)	48 (100)	11.111	3	0.011
Total	34 (24.8)	103 (75.2)	137 (100.0)			
Level of Education						
Secondary School Certificate	15 (45.5)	18 (54.5)	33 (100)			
OND/HND	13 (40.6)	19 (59.4)	32 (100)			
University Degree	6 (10.2)	53 (89.8)	59 (100)			
Postgraduate Degree	0 (0.0)	13 (100)	13 (100)	37.503	3	0.001
Total	34 (24.8)	103 (75.2)	137 (100.0)			
Knowledge of Pre-Hospital Care						
Poor	22 (28.6)	55 (71.4)	77 (100)			
Average	2 (18.2)	9 (81.8)	11 (100)			
Good	10 (20.4)	39 (79.6)	49 (100)	1.352	2	0.509
Total	34 (24.8)	103 (75.2)	137 (100.0)			
History of Providing Pre-Hospital RTC Care						
Yes	27 (23.1)	90 (76.9)	117 (100)			
No	7 (35.0%)	13 (65.0)	20 (100)	1.301	1	0.254
Total	34 (24.8)	103 (75.2)	137 (100.0)			
History of Pre-hospital Training						
Yes	29 (24.0)	92 (76.0)	121 (100)			
No	5 (31.3)	11 (68.8)	16 (100)	0.402	1	0.526
Total	34 (24.8)	103 (75.2)	137 (100.0)			

hospital care, despite their routine involvement in such activities. This finding contrasts with Odole et al.[21], who reported that over three-quarters of their participants had good knowledge of pre-hospital care. The difference in the knowledge base observed in this study could be due to differences in the content and structure of the knowledge assessment tools. Additionally, the diverse academic backgrounds of the officers, which often do not emphasize health-related disciplines essential for pre-hospital care, could be a contributing factor.

The current study reported that previous pre-hospital care training did not significantly impact the participants' prehospital care skills and knowledge. This is similar to Ogunyemi et al[16]. that reported a nonsignificant association between previous training and knowledge/skills of prehospital care. The similarity in the result could be due to the time lag between when the respondents received the last prehospital care training and the current study was conducted. Olumide et al[22]. reported the great impact of recent first aid training on skills in a study conducted among commercial drivers whose knowledge were assessed at three different time (before training, immediate post training and three month post training).

Moreover, no significant association was found between respondents' education level and their knowledge of pre-hospital care for RTC victims. This result could be attributed to the similar onboarding training in first aid and basic life support that all the officers received, irrespective of their educational background. Contrastingly, Ogunyemi et al[16]. Abuja, Nigeria and Lukumay et al[23]. Dar es Salaam Tanzania independently conducted study among police officers and identified a significant connection between education level and knowledge of pre-hospital care among police officers. Both studies reported that officers with tertiary and postgraduate education demonstrated better knowledge. The disparity in the content and structure of the onboarding training of recruited police officers which is based on their education level could be responsible for the dissimilar results reported among police officers and FRSC[24].

Most officers demonstrated basic skills for pre-hospital care, with significant associations observed between skills possession, years of service, and age. This correlation suggests that cumulative on-the-job experience plays a critical role in skill acquisition. Similarly, Sam et al[25]. in a study of Ghanaian first responders, reported that while participants initially had limited knowledge of emergency pre-hospital care, their skills improved over time through practical experience.

The level of education of FRSC officers was also a significant determinant of having basic skills for pre-hospital care. Officers with tertiary education had a higher probability of possessing the required basic skills, likely due to their better access to information from various sources and self-learning capabilities compared to those with lower education levels.

This finding is similar to a study conducted among police officers by Ogunyemi et al[16]. that reported a statistically significant association between knowledge and skills of first aid/basic life support and level of education. They reported that officers with tertiary level of education were 3.35 times more likely to have good knowledge and skills of first aid and basic life support while those with postgraduate level of education were 6.89 times more likely to have good knowledge and skills when compared to officers with secondary level of education.

Regarding the availability of consumables, instruments, and materials for pre-hospital care, a significant number of officers reported having the necessary resources to perform their duties effectively. This contrasts with findings from Odole et al.[21], who reported a lack of equipment for emergency medical services among officers in Ibadan, Oyo State. Challenges such as the high cost of ambulances in developing countries often result in alternative transportation methods, such as tricycles or trucks[9]. Although, Nigeria is a developing country, the current study revealed that a substantial proportion of participants had access to ambulances, enabling the transportation of accident victims to nearby hospitals for definitive trauma care.

4.1 Study Limitations

The cross-sectional design and self-reported nature of the skill assessment may introduce limitations, as the skills reported by the participants were not verifiable. The use of a convenience sampling technique may limit the generalizability of the findings. However, a large sample size was obtained to mitigate the effect of this sampling method. There was a selection bias due to the recruitment of participants during statutory meetings, potentially excluding those on patrol duties or other assignments. This bias was addressed through repeated visits to statutory meetings of the same commands to include those who were absent during previous meetings, as most postings are rotational. Efforts were made to limit recall bias by making the assessment of knowledge and skills as practical as possible. Additionally, since responding to accident emergencies is a routine service for the corps and occurs frequently, the likelihood of recall bias was further minimized.

4.2 Conclusion

This study highlights that many lack adequate knowledge but about three quarter of the FRSC officers had experience and skills in providing prehospital trauma care to crash victims. over half had poor knowledge, and nearly a quarter were unskilled in prehospital trauma care, Skill level was significantly associated with age, education, and years of experience, but not with knowledge or prior training. The access to pre-hospital care materials and ambulance enables easy transportation of crash victims to nearby hospital. These findings underscore the need for regular, hands-on training programs to improve the competence of FRSC officers and enhance outcomes for road traffic accident victims.

Suggestions for Future Study

This study primarily focused on the supply side of pre-hospital care. To gain a comprehensive understanding, there is a need to assess the quality of services rendered by FRSC officials from the perspectives of road accident survivors. Additionally, studies that evaluate the outcomes of pre-hospital care would provide valuable insights into the effectiveness of the services provided by this agency. We recommend further research in the following areas: evaluating the effectiveness of the proposed structured training programs for FRSC officers, exploring factors that influence the retention of knowledge among officers, and assessing the quality of pre-hospital care services from the road accident survivors' perspectives

Contributor Roles Taxonomy (CRediT) Statement

Akinniyi TA – Conceptualization, Validation, Formal analysis, Resources, Methodology, Data Curation, Visualization, Writing – Original draft, Writing – review and editing, Supervision.

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Conflict of Interest:

The authors declare that they have no conflict of interest

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