



## Original article

## Awareness and attitude of final year students towards the learning and practice of cardiopulmonary resuscitation at the University of Ibadan in Nigeria



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## ABSTRACT

**Introduction:** Out-of-hospital cardiac arrest (OHCA) is a major cause of sudden cardiac death which can be prevented by early cardiopulmonary resuscitation (CPR). International bodies recommend that basic life support (BLS) skills be taught in schools in order to increase the rate of bystander CPR and reduce mortality from OHCA. We are not aware of any BLS education program for non-healthcare students in Nigeria. This study was to assess the awareness and attitude to acquiring BLS skills among university students.

**Methods:** We conducted a cross-sectional study among final year university undergraduates using a questionnaire that assessed students' sociodemographic characteristics, awareness of CPR, previous experiences, and attitude to basic life support (BLS). Counts and proportions were compared for the demographic characteristics using Chi-squared and Fisher's exact tests.

**Results:** Four hundred and seventy-five students from 15 faculties participated in this study, median age was 22.8 years (interquartile range: 21.2–24.5 years). Majority (82.5%) have heard of CPR, 29.7% have undergone CPR training; 77.3% of those who had been trained were confident that they could perform CPR. Previous CPR training was significantly associated with faculty, year of study and age. Eighty-nine (18.7%) students have witnessed someone die from a trauma. Four hundred and fifty (94.7%) respondents would like to get BLS training, 440 (92.6%) think that CPR training should be included in the school curriculum.

**Conclusion:** There is good awareness and positive attitude to the acquisition and practice of cardiopulmonary resuscitation among university students in Nigeria. Few students however, have been trained to administer bystander cardiopulmonary resuscitation. Therefore, there is a need to implement university wide BLS education in Nigeria.

## African relevance

- Poor emergency medical response in many African countries leads to poor outcomes for cardiac arrest victims
- Few Nigerian university undergraduates are qualified to administer cardiopulmonary resuscitation
- The students are willing to acquire and perform cardiopulmonary resuscitation when the need arises

- We recommend that basic life support be taught as part of the university curriculum in Nigeria
- There is need to strengthen and integrate every component of the chain of survival in Africa.

## Introduction

Cardiac arrest is a sudden and unexpected cessation of blood circulation due to failure of the heart to pump effectively [1]. Sudden cardiac

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arrest is a life-threatening emergency with poor survival rates. It could result from heart attack, suffocation, drowning, electrocution and any other cause of impairment to blood circulation or breathing [2,3].

Out-of-hospital cardiac arrest (OHCA) is a leading cause of mortality with about 0.5 to 1 deaths per 1000 population annually [4]. However, there is paucity of data on the incidence of sudden cardiac deaths in Nigeria. The figures are likely worse in a developing nation like Nigeria with increasing incidence of cardiovascular diseases and limited resources [5–9].

Early cardiopulmonary resuscitation (CPR) is a vital component in the chain of survival, the layperson being the most important link in Emergency Cardiovascular Care (ECC). Bystander-initiated CPR is known to improve survival outcomes among cardiac arrest victims [10]. Thus, several organizations like the International Liaison Committee on Resuscitation, the European Parliament and the World Health Organization [11,12] recommend that CPR training be included in secondary school curriculum in order to increase the number of people with Basic Life Support (BLS) skills thereby improving the rate of bystander CPR. This has taken effect in several primary and secondary schools across Europe and the United States [12]. We are however not aware of any such program for students at any level of education in Nigeria as BLS training remains the exclusive preserve of medical trainees, health professionals and paramedics [13]. Hence, we conduct this study in order to assess the awareness status and attitude of university final year students towards learning and practicing CPR.

We set out to assess the level of awareness of CPR among final year students of the University of Ibadan. We also aimed to assess their attitudes towards acquiring the skill and to test for significant differences in the CPR awareness and attitudes across faculties within the university.

## Methods

### Study subjects

This was a cross-sectional study conducted among final year students in all 15 faculties of the University of Ibadan. The University of Ibadan has about 29,000 undergraduate students with an estimated final year class of 2500 students.

### Study tools

Data was collected using a structured questionnaire which was adapted from the works of Badru and Kanmodi [14] and Onyeaso and Imogie [15]. The structured questions assessed the respondents' socio-demographic characteristics, awareness and acquisition of CPR skills; experience with loss of consciousness or traumatic events; and attitudes towards acquiring CPR skills.

### Ethical approval

We explained the purpose of the study to the students and obtained informed consent from voluntary participants. Ethical approval for this study was obtained from the University of Ibadan/University College Hospital Ethical Committee with assigned Institutional Review Board (IRB) number: UI/EC/20/0237. Confidentiality of study participants was maintained as no personal identifiers were used.

### Data collection

The authors approached the participants at various locations on campus to distribute the questionnaires which were then returned after ample time was given to fill them.

### Data analysis

Data was analyzed using IBM SPSS version 23. Counts and proportions were computed for each response. Chi-squared and Fisher's exact tests were used to test for associations between socio-demographic characteristics and the responses on awareness and attitude. A  $p$ -value of  $<0.05$  was considered significant in the analyses.

## Results

We received 511 responses, out of which 36 were excluded because of incomplete data. Four hundred and seventy-five complete responses were included in the analysis. The distribution of respondents across the 15 faculties is summarized in Table 1. The faculty of Clinical Sciences had the highest number (17.3%) of respondents followed by the faculties of Sciences (16.2%), Agriculture and Forestry (12.2%), and Technology (10.1%); the faculties with the least number of respondents are Veterinary Medicine (0.6%), Arts (1.3%) and Renewable Natural Resources (1.5%). The respondents were final year university students from 50 different courses of study. Though all of our respondents were final year students, their years of study varied from 4 to 6 depending on the course of study in the University. There were more male (55.4%) than female (44.6%) study participants. Married students made up only 3.6% of our respondents while the rest were single. Respondents' age distribution is presented in Table 1 with a modal age group of 20–24 years and a median age of 22.8 (IQR: 21.2–24.5) years.

### Awareness of cardiopulmonary resuscitation

Majority (82.5%) of the respondents claimed to have heard of CPR.

**Table 1**  
Students' sociodemographic characteristics ( $n = 475$ ).

	Frequency (%)
Faculty	
Agriculture and Forestry	58(12.2)
Arts	6(1.3)
Basic Medical Sciences	42(8.8)
Clinical Sciences	82(17.3)
Dentistry	23(4.8)
Economics	28(5.9)
Education	20(4.2)
Law	12(2.5)
Pharmacy	26(5.5)
Public Health	25(5.3)
Renewable Natural Resources	7(1.5)
Sciences	77(16.2)
Social Sciences	18(3.8)
Technology	48(10.1)
Veterinary Medicine	3(0.6)
Year of study	
4th	195 (41.1)
5th	214 (45.1)
6th	66 (13.9)
Gender	
Male	263 (55.4)
Female	212 (44.6)
Marital status	
Single	458 (96.4)
Married	17 (3.6)
Age	
15–19	3 (0.6)
20–24	353 (74.3)
25–29	103 (21.7)
30–34	15 (3.2)
35+	1 (0.2)
Median age (IQR <sup>a</sup> )	22.8 (21.1–24.5)

<sup>a</sup> IQR: interquartile range.

One-half of the 392 students that have heard of CPR heard through lectures, one-quarter reported awareness through a friend, 3 people heard of CPR through a family member, 2 reported awareness by virtue of their membership in voluntary organizations (Red Cross Society and Man O' War) in school, 1 respondent became aware by seeing someone do an actual CPR (Table 2).

Only 36% (141) of those who have heard of CPR ( $n = 392$ ) have undergone a training on how to perform CPR. Majority (88.7%) of those with CPR training ( $n = 141$ ) acquired the skill after admission into the university. A hundred and three respondents got trained in school, only three of them were trained in High school, and there were six online trainees.

Most (77.3%) of the BLS trained respondents ( $n = 141$ ) are confident enough to perform CPR; this actually makes up 22.9% of all the respondents in this study.

Awareness of CPR was significantly associated with faculty ( $\chi^2 =$

**Table 2**

Students' awareness status and attitude to cardiopulmonary resuscitation and previous experiences with loss of consciousness and trauma ( $n = 475$ ).

Questions	Yes (%)
Q1. Have you heard of Cardiopulmonary resuscitation (CPR)?	392 (82.5)
Q2. How did you hear about CPR?	
Print media (books, newspapers, magazines)	124 (26.1)
Internet and Social media	121 (25.4)
Radio	22 (4.6)
Movies and Television	155 (32.6)
Lecture	194 (40.8)
Friends	81 (17.1)
Parents and relations	3 (0.6)
Saw it being done on someone	1 (0.2)
Voluntary organization in school	2 (0.4)
Q3. Have you had any training on CPR?	141 (29.7)
Q4. When did you have your training in CPR?	
Before University admission	16 (3.4)
After University admission	125 (26.3)
Q6. Do you feel confident enough to perform a CPR?	109 (22.9)
Q9. Given the fact that CPR is a life-saving technique, would you like to be trained/retrained on CPR skills?	450 (94.7)
Q10. Do you think that acquiring CPR skill is necessary?	459 (96.6)
Q11. Would you pay if necessary to acquire this life-saving skill?	383 (80.6)
Q12. Would you love to teach CPR to others?	436 (91.8)
Q15. Do you think CPR training should be incorporated into the curriculum?	440 (92.6)
Q13. If you had the necessary skills, would anything prevent you from performing CPR on those who need it?	165 (34.7)
Q14. What would prevent you from performing CPR on those who need it?	
I could contract a disease	93 (19.6)
Coronavirus/Ebola virus	2 (0.4)
Poor hygiene of person needing CPR	2 (0.4)
I could cause further harm	41 (8.6)
There could be legal consequences	66 (13.9)
Rape litigation	1 (0.2)
If I am alone	1 (0.2)
Fear and anxiety	2 (0.4)
Religious and socio-cultural factors	4 (0.8)
Dangerous or unfavourable environment	4 (0.8)
Q7. Have you ever been present in a place where somebody suddenly collapsed?	204 (42.9)
Q8. Have you ever witnessed someone die as a result of drowning, automobile, fire accident or any other form of accident?	89 (18.7)

49.15,  $p < 0.001$ ), year of study ( $\chi^2 = 22.27$ ,  $p < 0.001$ ) and gender ( $\chi^2 = 5.96$ ,  $p = 0.02$ ); association with marital status and age was not statistically significant. Every student from the faculties of Clinical sciences, Dentistry, Law and Veterinary Medicine had heard about CPR. There was not a single sixth year student who was not aware of CPR. More females (87.3%) were aware of CPR than males (78.7%) (Table 3).

Previous CPR training was significantly associated with faculty, year of study and age. All of the respondents from the faculty of Dentistry had been trained in CPR. Whereas, the faculty of Law, with 100% awareness had no respondent with training in CPR. Only 1 of the 66 sixth-year students reported to have had no training in CPR (Table 3).

#### Experience with a traumatic or potentially life-threatening situation

Two hundred and four (42.9%) have been around someone who suddenly lost consciousness and collapsed, 18.7% have witnessed someone die from a traumatic incidence.

#### Attitude towards acquiring CPR skills

Among those who have heard about CPR ( $n = 392$ ), 99% think that acquiring CPR skill is necessary, 82.9% would not mind paying in order to acquire the skill, 93.4% would love to teach BLS skills to others, 95.1% think that the skill should be incorporated into the university curriculum.

Majority (94.7%) of respondents would like to be trained or retrained in CPR skills; 95% of those with previous BLS training would like to be retrained vs 94.6% of those with no BLS training like to get trained. There was no statistically significant difference in the proportion of students who are willing to receive training between both groups (Table 3).

Faculty, year of study, gender, marital status and prior BLS training were non-significant predictors of respondents' choice to acquire BLS skills, age was a significantly associated with the choice to get CPR training (Table 3).

#### Barriers to performing cardiopulmonary resuscitation

Majority (65.3%) of the respondents identified no factor that would prevent them from performing CPR on those who need it if they had the required skill. The fear of contracting a disease was the most identified barrier (19.6%) to performing a CPR among the students, 2 respondents were concerned about the risk of contracting the Ebola virus and Coronavirus. The fear of litigation ranked second (13.9%) in this category followed by the fear of causing further harm (8.6%). A respondent also expressed concern about being sued for rape later in the future while two others claimed that CPR was not acceptable in Islam (Table 2).

#### Discussion

Previous studies have looked at the level of awareness of CPR and attitude to CPR among healthcare undergraduate students [10,16–22]. Badru and Kanmodi [14] conducted a similar study among freshmen in the same university. Onyeaso [15] also investigated the attitude of secondary school students in Rivers State, Nigeria, towards acquiring CPR skills. Our study had a larger sample size and accounted for 5 more faculties (Clinical Sciences, Renewable Natural Resources, Economics, Law and Public Health) than a previous study in the same institution [14].

About 4 in every 5 respondents had heard of CPR. This is higher than 62.6% among freshmen and lower than 93.8% observed among healthcare interns [5]; this suggests that tertiary education has played a role in their current CPR awareness status. There was significant association between CPR awareness and respondents' faculty, year of study and gender. It is not surprising that the faculties of Clinical Science (which comprises Medicine and Surgery, Nursing and Physiotherapy)

**Table 3**

Distribution of CPR awareness status, previous CPR training and willingness to undergo CPR training (n = 475).

	Association between awareness of cardiopulmonary resuscitation and sociodemographic factors		Association between previous cardiopulmonary resuscitation training and sociodemographic factors		Association between respondents' willingness to undergo BLS training and students' characteristics	
	Chi-squared ( $\chi^2$ )	p-value	Chi-squared ( $\chi^2$ )	p-value	Chi-squared ( $\chi^2$ )	p-value
Faculty	49.15	<0.001 <sup>a,b</sup>	266.10	< 0.001 <sup>a,b</sup>	21.12	0.11 <sup>a</sup>
Year of study	22.27	<0.001 <sup>b</sup>	183.34	< 0.001 <sup>b</sup>	2.02	0.37
Gender	5.96	0.02 <sup>b</sup>	2.04	0.15	2.95	0.86
Marital status	0.45	0.51 <sup>a</sup>	0.001	0.98	0.98	1.00 <sup>a</sup>
Age	8.73	0.07 <sup>a</sup>	11.93	0.006 <sup>a,b</sup>	25.60	0.01 <sup>a,b</sup>
Prior training in CPR					0.04	0.85

<sup>a</sup> Fisher's exact test.<sup>b</sup> Statistically significant ( $p < 0.05$ ).

and Dentistry had 100% awareness, considering that their training as healthcare professionals affords them the opportunity to learn CPR. In addition, all of the sixth year students had heard of CPR. This is also explained by the fact the six-year courses in the university – Medicine and Surgery, Dentistry and Veterinary Medicine – are all medically related courses.

Our study shows that the wide usage of social media among university students [23] has not been as effective as lectures for CPR awareness. This is in keeping with a study by Alsharari et al. [24] in Saudi Arabia where the universities were found to be the main source of CPR knowledge. It is also noteworthy that 9 out of every 10 students who had undergone CPR training were exposed to CPR training after admission into the university. It is likely that university had played a role directly or indirectly in their CPR skill acquisition.

The proportion of those with CPR training in our study was >4 times what was reported among freshmen in a previous study [14]. This (29.7%), albeit is still small compared to a more developed setting where half of the general population have been trained to administer bystander CPR. Even in such settings, the need to increase the number of trained laymen is still being advocated so as to increase survival outcomes of OHCA [25].

Faculty, age and year of study were significantly associated with previous CPR training. Almost all of the sixth-year students had been trained to perform CPR. Again, this is in concordance with our earlier explanation on exposure of certain health professional courses to CPR skills by virtue of their curriculum. There was no gender preponderance with CPR training even though more female students had heard of CPR.

Respondents' self-reported confidence to perform CPR was found in 22.9% of them. This is also quite low compared to 49% among the general adult population of Scotland where CPR training is widely available. Those who are confident in their skills are however, four-fifth of those who had been trained. We posit that if more students are trained, the same level of confidence can be achieved in them on a wider scale such that more people can rise up to the occasion in emergency situations.

Badru and Kanmodi found 17.9% of university freshmen who had witnessed someone collapse and die [14]. Their findings are quite similar to ours; 18.7% of final year students had seen someone die as a result of road traffic accident, drowning, fire accident or other forms of trauma. Whereas, 42.9% of them had seen someone suddenly lose consciousness and collapse.

The majority showed a positive attitude towards acquiring BLS skill; 96.6% are convinced that CPR is a necessary skill. Many (94.7%) would like to be trained or retrained; this is lesser than observed (98.9%) among High School students in Nigeria but higher than reported in a previous study from the same university [14] and among Norway students [26]. There was no significant difference in the willingness to get trained/retrained between those with prior training and those with no training at all. Compared to a study from Scotland, more than twice of untrained students were willing to acquire CPR skills (42% vs 97.2%) compared to those with a previous training. Nine in 10 students would

love CPR training incorporated into the university curriculum, similar to 94.9% in some Nigerian Secondary School students [15] but higher than Saudi Arabian university students (49%) [24].

The major barrier that could discourage the students from administering CPR was the fear of contracting a disease. This concern has also been reported to be high in other parts of the world [27–29], however low in Japanese schools [30]. Certain respondents specifically stated their concerns for the Ebola virus and COVID-19 which has now been declared a pandemic by the World Health Organization [31]. Respondents' fear of infection could have also been triggered by the latest developments in global health. In order to allay such fears and overcome this potential obstacle, it would be very important to communicate with CPR trainees that the risks of disease transmission during CPR is generally low [29]. Review of literature published over 3 decades revealed only 15 of such cases have been reported [32]. Moreover, while performing CPR, one may choose not to administer mouth-to-mouth ventilation should there be any concerns about disease transmission [33].

Respondents' fear of being sued or jailed for attempting CPR could have been based upon their experience with the nation's judiciary system which is riddled with lack of fair hearing, delays and other difficulties [34]. Notwithstanding, litigation for personal reasons is not commonplace among Nigerians, and it is unlikely to get sued for attempting to rescue in an emergency situation.

Although only a minority identified religious and socio-cultural factors as potential barriers, it is important to address these concerns so as to prevent gender and cultural disparities in OHCA survival. In a study by Ismail et al., they maintained that administering CPR is a fulfilment of one's moral and religious obligation as long as the benefits outweigh the risks [35]. The authors are however, not aware of any ethnic practice in Nigeria that explicitly forbids CPR.

Early CPR is only one out of the 5 links in the chain of survival and paucity of skilled personnel to administer bystander CPR is not the only barrier to quality ECC in Nigeria; there are other areas in need of improvement. Although Nigeria is among one-third of African countries that have emergency medical services (EMS) [36], there are lingering problems with EMS coverage, immediate availability and awareness of the public about EMS operations [37]. The time from activation of emergency medical services to response is between 15 and 35 min [37,38] which is longer than [8 min] recommended by the World Health Organization (WHO) [39]. Government-funded EMS suffer from poor maintenance and lack of infrastructure and medical consumables [37]. Venkatraman et al. [38] also identified traffic congestion and bad roads as contributing factors to the poor response rate of the Lagos State ambulance service.

Defibrillation has been described as the most effective intervention in ECC [40], yet there are no Automated External Defibrillators (AEDs) in many public locations, universities and health institutions in Nigeria. A survey of referral hospitals in Nigeria revealed that only 6.7% of them had an AED in places other than the intensive care units (ICUs) [41]. Moreover, many hospitals lack a cardiac arrest response team [41] and



there is usually no communication with hospitals before bringing in patients in emergency cases [42]. Considering all of these coupled with the lack of infrastructure and medical supplies, hospitals are bound to be unprepared for immediate administration of advanced cardiac life support (ACLS) and post-resuscitation care.

This is probably the case or even worse in many other African countries. A study conducted among 47 low- and middle-income countries in Sub-Saharan Africa showed that South Africa was the only one with a fully functional and well integrated emergency response system [36]. In view of the foregoing, CPR awareness and skill acquisition alone will not suffice to mitigate OHCA mortality in Africa. In fact, teaching BLS where there are no infrastructures for post-resuscitation care can be ineffective and counterproductive. Thus, there must be concerted efforts to strengthen the other links in the chain of survival [43].

To the best of our knowledge, ours is the first study to assess the awareness status and attitude to cardiopulmonary resuscitation among final year university students in a poor-resource setting. This study serves as an important tool to inform policy making among stakeholders in the academic and health sectors.

The following may limit the generalisability of our study. Study participants were recruited by convenience sampling at different periods and locations, majorly classrooms and hostels. The number of participants in certain faculties was limited by students' unavailability in classrooms due to other activities including final year projects, field trips and exam preparations. The faculties of Veterinary Medicine, Law, Arts, Social Science and Education were mostly affected by these factors. The other faculties were well represented in our sample size.

Also, our study did not objectively assess how knowledgeable students are and whether their self-reported confidence in performing CPR actually matches up to their skills. This remains a research question that could be explored in future studies.

## Conclusion

Majority of University of Ibadan final year undergraduate students have heard about CPR. However, a few of them have been trained and even fewer are confident enough to perform CPR. They have positive attitudes to learning and performing CPR and are very receptive to a curriculum-based BLS training. Majority of the few students with BLS training are quite confident that they can perform. We therefore recommend BLS skill acquisition program for students in tertiary institutions of learning in Nigeria.

## Dissemination of results

Results from this study was shared with members of staff and students of the University of Ibadan via social media. A virtual cardiopulmonary resuscitation awareness programme was also organised during which these results were communicated.

## CRedit authorship contribution statement

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:

BAA contributed 35%; DEA 15%; ADA and PSA contributed 10% each; OAA, SDO, JDA, OSK, EO and RAO contributed 5% each.

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 declared no conflicts of interest.

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