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Determinants of Basic Life Support (BLS) Among Undergraduate Students of University of Port Harcourt, Rivers State, Nigeria

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Abstract

Background: The rising incident of deaths following cardiorespiratory arrest are an increasing concern globally, adequate knowledge, positive attitude, and good practice of BLS are capable of reducing mortalities when such events occur. BLS is a set of life-saving procedures used to keep a person alive after a cardiorespiratory arrest. This study revealed the determinants of BLS among undergraduate students at the University of Port Harcourt.

Methods: Descriptive cross-sectional study design with multi-stage sampling technique was employed, and an online self-administered questionnaire was used to collect data from 494 undergraduate students. Data was analyzed using IBM Statistical Product and Service Solutions (SPSS) version 27. Data were summarized using means, frequency, proportions, Chi-square and regression analysis, p-value of ≤ 0.05 was considered significant.

Result: The result showed that age group, gender, and department of participants were significant determinants of BLS among the study participants. Attitude was seen to be a statistically significant determinant of BLS (df=2; x^2=14.665; p-value=0.001). It also showed that age group is a significant determinant of BLS (df=6; x^2=29.590; p-value=0.0001), gender a significant determinant of BLS (df=2; x^2=18.574; p-value=0.000) and departments were all statistically significant determinants of BLS among undergraduate students of University of Port Harcourt.

Conclusion: Comprehensive strategic plan needs to be put in place in the institution to ensure training and re-training of the students on BLS irrespective of their ages, gender, department and faculty as this will further increase their attitude towards BLS.

Keywords: Basic Life Support, BLS, Determinants, Undergraduate students, University of Port Harcourt

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Introduction

Cardiac arrest and other medical emergencies can occur unexpectedly, and it is crucial for individuals, especially undergraduate students, to possess basic life support (BLS) skills to respond effectively[1, 2, 3, 4, 5]. However, many students lack the necessary knowledge and skills to provide BLS.[3, 5]

Globally, cardiac arrest and other medical emergencies are prevalent, with a significant number occurring out-of-hospital, including on university campuses. [6, 7] These emergencies have emerged as leading causes of death worldwide, carrying a high mortality rate. [8, 9]

The incidence of out-of-hospital cardiac arrest (OHCA), defined as cessation of cardiac mechanical activity occurring outside of the hospital setting[9] has increased dramatically, with varying rates reported in different countries, including the USA, Denmark, Norway, and Africa [9, 10, 11, 12, 13]. Although there is no existing data on the incidence of OHCA in Nigeria, BLS training is essential for prompt and effective response. [14]

Basic Life Support (BLS) generally refers to the type of care that first responders, healthcare providers, and public safety professionals provide to anyone who is experiencing cardiac arrest, respiratory distress, or an obstructed airway[15]. It requires knowledge and skills in cardiopulmonary resuscitation (CPR), using automated external defibrillators (AED), and relieving airway obstructions in patients of every age.[15]
Several studies have investigated the knowledge, attitude, and practice of BLS among different populations, including students, healthcare professionals, and the general public. [14, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32] These studies have consistently shown a lack of knowledge and skills in BLS, highlighting the need for targeted interventions and training programs. For instance, 39.2% of participants in Saudi Arabia, 43.7% in Iran, 74.3% in Egypt, and 44.0% in Jimma had knowledge of BLS.[16, 17, 18] Similarly, other studies in Saudi Arabia and Addis Ababa reported BLS knowledge levels of 50.0%, 45.8%. 40.0% and 50.3% respectively.[16, 19, 20, 21] In Ethiopia, 44.4% of non-medical participants had good knowledge of BLS[22], while 29.3% of medical students in Uganda had good knowledge of BLS.[23] In Nigeria, 82.5% of final-year undergraduate students were aware of BLS,[24] and 79.2% of medical students in south-west, Nigeria were aware of BLS.[24]

Several studies investigated the determinants of BLS. In a cross-sectional study conducted among junior doctors and students in a tertiary care medical institute in India, it was observed that training on BLS was a significant determinant of BLS.[26] Also, another cross-sectional study conducted among health workers in Khyber Teaching Hospital, Reshwar, Pakistan,it was shown that age, designation, number of BLS sessions attended, and time elapsed since the last BLS training session attended were significant determinants of BLS.[27]

In the cross-sectional study conducted among 167 health science and medical graduating class students of Dilia University, Ethiopia; department, BLS and ALS training, and exposure to the person in need of BLS were significant determinants of BLS.[28] In a study conducted among a non-medical population in Gondar Town, Ethiopia, it was observed that age, sex, residence, training about BLS, ever hearing about BLS, and exposure to the person in need of BLS were significant determinants of BLS.[22] Also, in an institutional-based cross-sectional study conducted among health care professionals at the University of Gondar Comprehensive Specialized Hospital, Northwest Ethiopia, to assess the determinants of BLS, it was revealed that variables such as sex, age, work experience, number of work settings, educational status, exposure to cardiac arrest cases, CPR training, and reading international CPR guidelines were significant[29]. Furthermore, in the study conducted among health workers in the Upper Denkyiva East Municipality of Ghana, it was shown that gender, grade, educational qualification, department, and years of experience were all significant determinants of BLS.[30] In another cross-sectional study conducted among nurses in Babcock University Teaching Hospital in Ilishan-Remo, Ogun State, it was observed that age, educational status, year of clinical experience, current assigned work place, resuscitation training and previous exposure to BLS maneuvers were significant determinants of BLS[31]. However, there is paucity of studies done to determine the factors associated with basic life support in Rivers State.

This study aims to investigate the determinants of BLS among undergraduate students of University Port Harcourt, Rivers State, Nigeria. Understanding these determining factors is essential to developing targeted interventions, improving BLS competence, and enhancing campus safety.

Method

Study design

A descriptive cross-sectional study was employed for this study.

Study settings

The study was conducted in the University of Port-Harcourt.[33] It is a prestigious federal government owned

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tertiary institution located in Choba in Port-Harcourt, Obio-Akpor Local Government Area, Rivers state.[34] It is situated in the Niger-Delta region of Nigeria.[35] It is located in the north-western part of Port Harcourt, the capital city of Rivers State between latitude 4°54'9.49" N and longitude 6°55'13.91" E.[36] UNIPORT was established in 1975as University College, Port Harcourt and was given university status in 1977.[34]

The university which provides numerous academic and non-academic services has 14 faculties which are located amongst the three campuses of the university namely Abuja, Delta and Choba campuses, all occupying approximately 3.84 square kilometer of built-up land area[33]. The institution has a student population of over 60,000 and over 3000 staff[33]. The commercial/business activities in the University community include stationary stores, food restaurants, dealers in mobile phones and accessories and printing services.[33]

The healthcare services available to the students and staff of the University of Port Harcourt include the O. B. Lulu-Briggs Health Center, primarily, and the University of Port Harcourt Teaching Hospital (UPTH).[37 38]
There is a health service department that is in charge of the curative and preventive health care of the university community[37]. Their goal is to ensure that healthcare services are made available, accessible, affordable, and acceptable to all members of the university community (staff and students, inclusive) through prompt and efficient professional healthcare delivery.[37]

The O.B. Lulu-Briggs Health Center runs a benefit package for the Tertiary Institution Social Health Insurance Program (TISHIP).[39] The TISHIP package covers a wide range of primary and secondary-level care services[39]. The primary level care services include; consultation with general practitioners, prescribed drugs, health prevention and promotion services, management of simple infections and infestations, management of minor injuries, primary dental care, management of non-communicable diseases, special maternal, neonatal and child health (MNCH) services, deworming, management of uncomplicated lower respiratory tract infections, postnatal services, neonatal care for 12 weeks, child birth services, basic and comprehensive emergency obstetrics care, basic laboratory investigations, management of sickle cell diseases, allergic conditions, poisoning, accident and emergency and other conditions as may be listed by NHIS from time to time[39]. They also provide secondary-level care services such as consultation and treatment by specialists, admission (maximum of 15 days cumulative per year), procedures that cannot be handled at the primary level of care, treatment of moderate to severe infections and infestations, basic and comprehensive emergency obstetrics care, management of preterm or pre-labor rupture of membrane (P/PROM), surgeries, dental care, management of communicable diseases, management of emergencies, psychiatry, laboratory investigations at the secondary level, and so on.[39]

Study Participants
The participants for this study included all undergraduate students currently enrolled in the university of Port-Harcourt. All enrolled Undergraduate students of University of Port Harcourt from 100L to final year were included in the study. Undergraduate students of University of Port Harcourt that do not give consent to partake in the study while undergraduate students of University of Port Harcourt that are not available on campus during the period of the study and undergraduate students of University of Port Harcourt that are sick and hospitalized during the period of the study were excluded from the study.

Sample size
In order to get the minimum sample size, a prevalence rate (p) of practice of BLS (38.3%) was estimated from a previous study that was carried out among public health nurse practitioners in Cross-River's state, South-South Nigeria.[32]
The minimum sample size was determined using the Cochran's formula.[43]
$n = z^2pq / e^2$
Where n = sample size; e = error tolerance (level) or margin of error set at 0.05; p = sample proportion = 0.383; q = (1-p); z = z-score value found on the z-score table (1.96).
$n = \{(1.96)^2*(0.383)\ (1-0.383)\} / (0.05)^2$
n = 363
Adjusting for non-response:
Adjusted sample size = n / (1- non-response rate)
Assuming a non-response rate of 10% (0.1)
n / (1-0.1)
363/ (1-0.1)
363 / 0.9 = 403
The adjusted sample size for a non-response rate of 10% = 403.
Therefore, the minimum sample size required to conduct this study was estimated to be 403 undergraduate students of the University of Port Harcourt.

Sampling technique
A multi-stage sampling method was employed for this study.

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The University has 14 faculties which are Basic medical sciences, Clinical sciences, Humanities, Social sciences, Science, Science laboratory technology, Education, Engineering, Management sciences, Agriculture, Pharmaceutical science, Dentistry, Law, and Communication and media studies[40].

The first stage was selection of the faculties to be studied. Out of the fourteen faculties in the university, four faculties were chosen, using simple random by balloting, this was achieved by assigning numbers to represent each faculty and these numbers were written on papers and folded afterwards. Four folded papers were selected blindly after shuffling them. One folded paper at a time without replacement. The chosen faculties were written out [Faculty of Basic Medical Sciences, Faculty of dentistry, Faculty of social sciences, and Faculty of Engineering**]**.

The second stage was selection of the departments to be studied from the faculties. From each of the four faculties selected from stage one, two departments were selected using the balloting method of simple random sampling technique. For each faculty, the departments were written out in different papers and folded. One of the chosen faculties (Faculty of Dentistry) from stage one has only one department (Department of Dentistry) so the department was automatically selected. However, for the remaining three faculties, the different departments that make up the faculties were assigned numbers and the papers were folded. Faculty of Social sciences has 5 departments (department of economics, department of geography and environmental management, department of sociology, department of political and administration studies and department of social works). Faculty of Engineering has 7 departments (department of chemical engineering, department of petroleum engineering, department of civil engineering, department of mechanical engineering, department of electrical engineering, department of gas engineering, department of environmental engineering). Faculty of Basic medical sciences has 5 departments namely anatomy department, physiology department, medical biochemistry, pharmacology, and pathology; however, pharmacology and pathology are not standalone programmes of study but are taken as courses in the 400L medicine and surgery programme, hence 400L medicine and surgery students were added in the ballot as a department under faculty of basic medical sciences. Two folded papers were selected blindly after shuffling. This was done one after another for each faculty. A total of seven departments were selected: physiology department and 400L medicine & surgery students studying pharmacology and pathology from the faculty of basic medical sciences, dentistry department from faculty of dentistry, geography & environmental management and sociology department from the faculty of social sciences, petroleum engineering and electrical & electronic engineering from the faculty of engineering.

The third stage involved selection of the classes or levels to be sampled from each department. All levels of study were selected from all the chosen departments. Proportional allocation of the stratified random sampling method was used to determine the number of samples that will be gotten from each department and levels. The class list of each level in each department was obtained and the total number of students in each department ascertained.

[Total number of students from the seven departments = 3101 (Dentistry department: 113; Physiology department: 965; Electrical and electronic engineering: 498; Petroleum engineering: 452; Geography department: 458; Sociology: 464 MBBS Year 4: 151)

The formula below was used to determine the number of students from each department;
*(Total number of students in the department / Total number of students in all the 7 departments) * Adjusted sample size (403)*
[Electrical and electronic engineering: 65; Petroleum engineering: 59; Geography department: 59; Sociology department: 60; MBBS Year 4: 20; Dentistry department: 15; Physiology department: 125]
The formula below was used to determine the number of students from each level;
*(Total number of students in that level / Total number of students in the department) * expected number of participants from that department.*

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Table 1: Number of students in each level in each department and Minimum number of participants from each level in each department

Number of students in each level in each department

Level	Electrical & electronic engineering	Petroleum engineering	Geography department	Sociology department	Year 4 MBBS 151	Dentistry department	Physiology department
100 level	64	66	135	135		14	200
200 level	85	83	50	56		19	250
300 level	160	165	190	190		22	350
400 level	130	80	83	83		15	165
500 level	59	58	-	-		30	-
600 level	-	-	-	-		13	-

Minimum number of participants from each level in each department

Level	Electrical and electronic engineering	Petroleum engineering	Geography department	Sociology department	Year 4 MBBS 20	Dentistry department	Physiology department
100 level	8	9	17	17		2	26
200 level	11	11	6	7		3	32
300 level	21	22	25	25		3	45
400 level	17	10	11	11		3	22
500 level	8	7	-	-		2	-
600 level	-	-	-	-		2	-

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The fourth stage involved selection of students from each class. Simple random sampling was applied with the use of an online random number generator. The online random number generator used was Random Number Generator for Android version 5.0.0. For each class, the class list was obtained. Every student on the class list had their corresponding serial numbers. These serial numbers were inputted in the online random number generator. Then, the required sample size was inputted too. The tool gave list of randomly selected serial numbers and the students whose serial numbers were selected by the online tool were selected. This was done for each level and each department.

Study instrument

A semi-structured self-administered questionnaire was used for this study.

Questionnaires from previous studies were adapted to generate the questionnaire used for the study.[16 23 28 29 41 42] The questionnaire was divided into four sections (according to the aims and objectives of the study) and the consent page.

The first section covered the Sociodemographic information of the students while the second section assessed the knowledge of BLS skills of the participants. The third section assessed the attitude of BLS skills among the participants and Section 4 assessed the practice and associated factors of BLS skills among the participants. The questionnaires were designed using "Microsoft forms" and distributed online. The aim of the research was explained to the students, as well as the instructions on how to fill the questionnaire. The link to the questionnaire was then sent to each selected respondent, and each respondent was followed up until all the responses were received.

Prior to distribution of the questionnaires to the selected students, a pre-test study was done using the clinical undergraduate students from the department of medicine and surgery, University of Port Harcourt (that is, 500 level and 600 level students) since they were not selected to participate in the study. Data collected using a questionnaire will be scored using the following: For knowledge, every correct answer will be scored "1," and wrong answers will be scored "0. Score between 0-4 denotes poor knowledge; score between 5-6 denotes average knowledge; and a score above 7 denotes good knowledge. For attitude and practice, say 'Yes' or 'No'. 'Yes'. Every positive answer is scored '1' and a negative answer scored '0'. A score of 4 and above is graded as positive attitude and a score of 3 and below is graded as negative attitude.

Data analysis

The data was cleaned by inspecting the questionnaires for completeness and analyzed using IBM Statistical Product for Service Solutions (SPSS) version 27[45].

Numerical variables were summarized as means and standard deviations, while categorical data was summarized using proportions and percentages. The association between categorical variables was analyzed using the Chi square test (or Fischer's test, when necessary) and bivariate logistic regression analysis to characterize the dependence of each response variable on explanatory variable and also describe the outcome or response variable. A P value < 0.05 will be considered statistically significant.

Study duration

This study was carried out from April 2024 to July 2024.

Results

Table 2. Sociodemographic summary of study participants

Variables	Frequency	Percentage
Age group		
16-20 years	215	43.5
21-25 years	231	46.8
26-30 years	42	8.5
>30 years	6	1.2
Gender		
Female	204	41.3
Male	290	58.7
Religion		
Christianity	482	97.6
Muslim	6	1.2
Others	6	1.2
Ethnicity		
Bonny	6	1.2
Etche	19	3.8
Hausa	2	0.4
Igbo	164	33.2
Ikwere	58	11.7
Ogoni	28	5.7
Okrika	25	5.1
Others	124	25.1
Urhobo	37	7.5
Yoruba	31	6.3
Faculty		
Basic Medical Science	172	34.8
Dentistry	52	10.5
Engineering	135	27.3
Social Science	135	27.3
Department		
Medicine	32	6.5
Dentistry	52	10.5

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Electrical and Electronics	57	11.5
Geography	69	14.0
Petroleum Engineering	78	15.8
Physiology	141	28.5
Sociology	65	13.2

The table shows the distribution of respondents based on their age classification. The ages of the respondents were between 16 and 38 years, with most of them between 21 and 25 years (46.8%), and the mean age +/- SD was 21.33 +/- 3.31 years.

The table above also reveals the gender characteristics of the respondents. It showed that most of the respondents were males (58.7%; n = 494), while the rest were females. As shown in the table, 97.6% (482) of the study participants were Christians, 1.2% (6) were Muslims, and 1.2% (6) were neither Christians nor Muslims. The table also illustrates the ethnicity of the respondents, of whom 33.2% (164) were Igbos, which made up the majority of the respondents, followed by the Ikwerre tribe (11.7%), with the Hausa tribe having the least population number of 2 (0.4%). Four faculties were chosen for the study, of which 172 (34.8%) participants were undergraduate students from the faculty of basic medical science; 52 (10.5%) participants from the faculty of dentistry; and 27.3% (135) from the faculty of engineering and social sciences. The table also reveals that the highest number of respondents were from the department of physiology (141, 28.5%), with 400 medical students having the lowest number (32, 6.5%).

Table 3. Associated factors of basic life support

Variables	Frequency	Percentage
Have you ever taken BLS training course in the past		
Yes	111	22.5
No	383	383
What encouraged you to take the course (n=111)		
Requirement for work/school	32	28.8
Previous experience proved the importance	9	8.1
Personal choice	59	53.2
Others	11	9.9
If you have taken a BLS training course, when was the last time you attended a training course (n=111)		
Within the last 365 days	43	38.7
Past 2 to 5 years	35	31.5
More than 5 years	9	8.1
I cannot remember	24	21.6
If you meet a person who has just slumped, will you perform CPR?		
Yes	314	63.6
No	180	36.4
Are you willing to undergo training on BLS if provided the opportunity		
Yes	471	95.3
No	23	4.7
Should BLS be incorporated into the curriculum for all university students		
Yes	458	92.7
No	36	7.3

The result shows that 22.5% (111) have taken BLS training courses in the past, 53.2% (59) of them took the course out of their personal choice, 28.8% (32) as a requirement for work or school, 8.1% (9) due to previous experience, and 9.9% (11) due to other reasons not listed above. Out of the 111 respondents who had taken a course on BLS, 38.7% (43) of them took the course within the last 365 days, 31.5% (35) within the past 2–5 years, and 8.1% (9) more than 5 years ago. However, 21.6% (24) of the respondents could not remember when they last took the course. The result also revealed that 63.6% (314) of us are willing to perform CPR when faced with situations that require it, and 95.3% (471) of us are willing to undergo BLS training if provided with the opportunity. Also, 92.7% (458) want BLS to be incorporated into the curriculum for all university students.

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Table 4. Relationship between sociodemographic factors and level of knowledge of BLS among study participants, and Relationship between level of knowledge and attitude towards BLS

Variables	Level of Knowledge n (%)			Df	Test Statistics	p-value
	Poor n (%)	Average n (%)	Good n (%)			
Age group						
16-20 years	147 (49.5)	58 (43.3)	10 (15.9)	6	$\chi2$=29.590	0.0001*
21-25 years	120 (40.4)	66 (49.3)	45 (71.4)			
26-30 years	27 (9.1)	7 (5.2)	8 (12.7)			
>30 years	3 (1.0)	3 (2.2)	0 (0.0)			
Gender					$\chi2$=18.574	0.0001*
Female	103 (34.7)	76 (56.7)	25 (39.7)	2		
Male	194 (65.3)	58 (43.3)	38 (60.3)			
Religion				4	Fisher's Exact=1.377	0.749
Christianity	288 (97.0)	132 (98.5)	62 (98.4)			
Muslim	5 (1.7)	1 (0.7)	0 (0.0)			
Others	4 (1.3)	1 (0.7)	1 (0.7)			
Ethnicity				18	$\chi2$=15.351	0.638
Bonny	5 (1.7)	0 (0.0)	1 (1.6)			
Etche	11 (3.7)	6 (4.5)	2 (3.2)			
Hausa	0 (0.0)	2 (1.5)	0 (0.0)			
Igbo	103 (34.7)	36 (26.9)	25 (39.7)			
Ikwerre	31 (10.4)	36 (26.9)	25 (39.7)			
Ogoni	17 (5.7)	9 (6.7)	2 (3.2)			
Okrika	14 (4.7)	8 (6.0)	3 (4.8)			
Others	78 (26.3)	32 (23.9)	14 (22.2)			
Urhobo	21 (7.1)	10 (7.5)	6 (9.5)			
Yoruba	17 (5.7)	11 (8.2)	3 (4.8)			
Faculty				6	$\chi2$=73.067	0.0001*
Basic Medical Science	84 (28.3)	44 (32.8)	44 (69.8)			
Dentistry	17 (5.7)	23 (17.2)	12 (19.0)			
Engineering	102 (34.3)	32 (23.9)	1 (1.6)			
Social Science	94 (31.6)	35 (26.1)	6 (9.5)			
Department				12	$\chi2$=94.290	0.0001*
Medicine	6 (2.0)	11 (8.2)	15 (23.8)			
Dentistry	18 (6.1)	23 (17.2)	11 (17.5)			
Electrical and Electronics	46 (15.5)	11 (8.2)	0 (0.0)			
Geography	48 (16.2)	19 (14.2)	2 (3.2)			
Petroleum Engineering	56 (18.9)	21 (15.7)	1 (1.6)			
Physiology	78 (26.3)	33 (24.6)	30 (47.6)			
Sociology	45 (15.2)	16 (11.9)	4 (6.3)			

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Variables	Level of Knowledge n (%)			Df	Test Statistics	p-value
	Poor n (%)	Average n (%)	Good n (%)			
Do you think BLS is necessary?						
Yes	288 (97.0)	134 (100.0)	61 (96.8)	2	χ2=4.193	0.123
No	9 (3.0)	0 (0.0)	2 (3.2)			
Do you think BLS is complex and time consuming						
Yes	106 (35.7)	24 (17.9)	12 (19.0)	2	χ2=17.567	0.0001*
No	191 (64.3)	110 (82.1)	51 (81.0)			
I am willing to do mouth to mouth ventilation for a patient in cardiac emergency				2	χ2=3.417	0.181
Yes	203 (68.4)	90 (67.2)	50 (79.4)			
No	94 (31.6)	44 (32.8)	13 (20.6)			
I think mouth-to-mouth ventilation should not be performed on the opposite sex during BLS				2	χ2=9.065	0.011*
Yes	87 (29.3)	26 (19.4)	9 (14.3)			
No	210 (70.7)	108 (80.6)	54 (85.7)			
BLS should not be practiced if the necessary equipment is not found				2	χ2=12.603	0.002*
Yes	126 (42.4)	40 (29.9)	14 (22.2)			
No	171 (57.6)	94 (70.1)	49 (77.8)			
Do you think the knowledge you have is sufficient to help you assist a victim if you encounter one?				2	χ2=7.414	0.025*
Yes	93 (31.3)	48 (35.8)	31 (49.2)			
No	204 (68.7)	86 (64.2)	32 (50.8)			

The result shows that among those with good level of knowledge of BLS, 71.4% were between 21 to 25 years, 60.3% were males 98.4% were Christians, 39.7% were from Igbo and Ikwerre respectively, 69.8% were students in the faculty of basic medical science and 23.8% are in the department of medicine. Among those with average level of knowledge of BLS, 49.3% were between 21 to 25years, 56.7% were females, 98.5% were Christians, 26.9% were from the Igbo and Ikwerre tribe respectively, 32.8% were students in the faculty of basic medical science and 17.2% were from the department of dentistry. Among those with poor level of knowledge of BLS, 49.5% were between 16 to 20 years old, 65.3% were males, 97.0% were Christians, 34.7% were from the Igbo tribe, 34.3% were students in the faculty of engineering, 26.3% were students in the department of physiology. The result also showed that there is a significant association between level of knowledge of BLS and age of the respondents (df =6; x^2=29.590; p-value=0.0001). It also shows that there is a significant association between level of knowledge and gender of the respondents (df=2; x^2=18.574, p-value=0.0001). Furthermore, it shows that there is a significant association between level of knowledge and faculty of the respondents (df=6; x^2=73.067, p-value=0.0001). Finally, there is also significant association between level of knowledge and department of the respondents (df=12; x^2=94.290, p-value=0.0001).

The result also shows that among those that had good level of knowledge, 96.8% thinks that BLS is necessary, 81.0% thinks BLS is not time consuming, 79.4% are willing to do mouth-to-mouth ventilation for a patient, 85.7% think that mouth-to-mouth ventilation should be performed on the opposite sex during BLS, 77.8% agrees that BLS should be performed regardless of the availability of the necessary equipment, 50.8% think that their knowledge is not sufficient to assist a victim.

The table also shows that among those that had average level of knowledge, 100% thinks that BLS is necessary, 82.1% thinks BLS is not time consuming, 67.2% are willing to do mouth-to-mouth ventilation for a patient, 80.6% think that mouth-to-mouth ventilation should be

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performed on the opposite sex during BLS, 70.1% agrees that BLS should be performed regardless of the availability of the necessary equipment, 64.2% think that their knowledge is not sufficient to assist a victim.

It also shows that among those that had poor level of knowledge, 97.0% thinks that BLS is necessary, 64.3%% thinks BLS is not time consuming, 68.4% are willing to do mouth-to-mouth ventilation for a patient, 70.7% think that mouth-to-mouth ventilation should be performed on the opposite sex during BLS, 57.6% agrees that BLS should be performed regardless of the availability of the necessary equipment, 68.7% think that their knowledge is not sufficient to assist a victim.

Also, the result shows that there is a significant association between level of knowledge and the knowledge of the respondents on the time spent and complexity of BLS (df =2; x^2=17.567; p-value=0.0001). It also shows that there is a significant association between level of knowledge and the knowledge of the respondents about the performance of mouth-to-mouth ventilation on the opposite gender (df =2; x^2=9.065; p-value=0.011). The result also shows that there is a significant association between level of knowledge and the knowledge of the respondents about the practice of BLS and the availability/unavailability of the necessary equipment (df =2; x^2=12.603; p-value=0.002). The table also shows that there is a significant association between level of knowledge and the sufficiency of knowledge to assist a victim (df =2; x^2=7.414; p-value=0.025).

Table 5. Linear regression showing significant factors associated with knowledge of BLS among students of University of Port Harcourt.

Factors	Coefficient (B)	Standardized coefficient	95% CI for B	P-value
Age	0.154	0.147	0.068 – 0.239	0.001*
Gender	-0.156	0.065	-0.283 - -0.029	0.016*
Department of study	-0.493	-0.346	-0.610 - -0.376	0.001*

The result shows that there is a significant association between age, gender and department of study with the level of knowledge of BLS of the respondents. The result also shows that for every one-year increase in age, the knowledge of BLS increases by 0.154 units. Age has a moderate positive effect on knowledge of BLS (standardized coefficient of 0.147). There is a 95% chance that the true coefficient value for age lies between 0.068 and 0.239. Although, there is also a 5% chance that it lies outside the range of values. However, the true coefficient is 0.154. Also, the result shows that compared to males, females have a decrease of 0.156 units in their knowledge of BLS (coefficient = -0.156). There is a 95% chance that the coefficient value lies between -0.283 and -0.029, but there is also a 5% chance that it may lie outside the range of values. However, the true coefficient is -0.156. The result also shows that students in non-health related departments have a decrease of 0.493 units in their knowledge when compared to health-related departments (coefficient = -0.493). Department of study has a moderate negative effect on knowledge of BLS (standardized coefficient = -0.376). There is a 95% chance that the coefficient value for department of study lies between -0.610 and -0.376, but there is also a 5% chance that the coefficient may lie outside the range of values. However, the true coefficient is -0.493.

Discussion

This study aims to investigate the determinants of BLS among undergraduate students of University Port Harcourt, Rivers State, Nigeria.

Findings showed that only a little over one-fifth of the respondents had ever taken a BLS training course in the past. This is low considering the rise in the rate of occurrence of conditions that require BLS intervention in our environment. This result was, however, similar to the findings from the cross-sectional study conducted among nurses in Babcock University Teaching Hospital, Ogun State, Nigeria, which showed that only about thirty percent had undergone training on BLS[44], this also corroborate with the findings from an observational study conducted among one thousand seven hundred Portuguese, which showed that about nineteen percent of the respondents had undergone training on BLS[25], but varies from the result seen in the cross-sectional study done among graduating medical students at Dilla University, which showed that sixty-four percent of the students had taken a course on BLS[28]. This high value may be due to the peculiarity of the study population being medical students. The index study, however, involved both medical and non-medical students, which may explain the low proportion of students that have undergone training on BLS.

Also, about half of those who have taken BLS training courses in the past took them based on personal choice, showing that people actually see the importance and feel

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the need to know how to perform BLS. On the other hand, it is encouraging to note that a significant proportion of respondents have taken BLS training within the last year, indicating a relatively low level of recent training in this critical skill. Additionally, the majority of respondents expressed willingness to perform CPR when faced with situations that require it, suggesting a positive attitude towards BLS. Also, the fact that nearly one-quarter of respondents could not recall when they last took a BLS course raises concerns about the retention and application of BLS knowledge over time. Moreover, the finding that only about thirty-two percent of respondents took the course within the past 2 to 5 years and eight percent more than 5 years ago suggests a need for regular refresher training to maintain proficiency.

The overwhelming willingness to undergo BLS training if provided with the opportunity suggests a recognition of the importance of BLS skills and a desire to acquire or update their knowledge. This provides an opportunity for the university to provide regular BLS training programs for students. Furthermore, this study also revealed that about ninety-three percent of the respondents want BLS to be incorporated into the curriculum for all university students. This result was similar to the result seen in the observational study conducted among one thousand seven hundred Portuguese, where nearly hundred percent of the respondents suggested that BLS should be incorporated into the curriculum for all students[25]. However, just a few mentioned that BLS should be integrated into the curriculum of higher and tertiary education[25]. This is because of the nature of the study population and area. The study was not conducted in a tertiary institution; respondents, however, emphasized that the training on BLS should begin in primary school (30.9% suggested initiating training in the 2nd grade, 29.8% in the 1st grade, and 28.6% in the 3rd grade) to show the importance of the need to know and practice BLS. The finding in the index study is also similar to that found among junior doctors and students in a tertiary care medical institute[26], where ninety-four percent of the participants agreed that BLS should be incorporated into the curriculum.

Findings from this research also highlight an interesting demographic pattern among undergraduate students with a good level of knowledge of BLS. The majority of students with good BLS knowledge were between 21 and 25 years old. This result was similar to that seen in a study done among a non-medical population in Gondar Town, Ethiopia, where most of the respondents with good knowledge of BLS were between 18 and 30 years old[22]. The study grouped the respondents into three categories based on age (18–30 years; 30–40 years; >40 years) because of the study population; hence, the exact number of individuals between twenty and twenty-five years old with a good level of knowledge could not be ascertained. Also, in the study done among the graduating class of medical students at Dilla University, it was revealed that the majority of respondents with a good level of knowledge were between twenty-six and thirty years old, followed by those between twenty and twenty-five years old[28]. This finding was different from that seen in this index study.

Also, the index study showed that males are more likely to have a good level of knowledge of BLS than females. This was in keeping with the result seen in the study conducted among the non-medical population in Gondar Town, Ethiopia[22], where it was shown that being male was found to be nearly twice as knowledgeable as being female[22]. This was also similar to the result seen in the institutional-based cross-sectional study conducted among healthcare professionals at the University of Gondar Comprehensive Specialized Hospital, Northwest Ethiopia, where 29% of the male respondents had good knowledge while 18.1% of the female population had good knowledge[29], and also similar to the result seen among the graduating class of medical students at Dilla University, as more males had a good level of knowledge of BLS than females[22]. This indicates a need to target female students specifically with BLS education.

The strong representation of Christians among students with good BLS knowledge may be attributed to the university's location in a predominantly Christian region. The proportion of students with good BLS knowledge in the Faculty of Basic Medical Sciences is expected, given the faculty's focus on healthcare

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education. However, the relatively low representation of students from the department of medicine may indicate a need to strengthen BLS education within the department. In contrast, students with poor knowledge of BLS were predominantly younger. This finding was different from that seen in the study done among a non-medical population in Gondar Town, Ethiopia, where individuals between thirty and forty years old had the highest proportion of respondents with poor knowledge of BLS[22], and that seen in the study conducted among health science and medical graduating class students, where students between twenty and twenty-five years old had the highest contribution to the proportion of students with poor knowledge of BLS[28].

The result also showed that students with poor knowledge of BLS were males; this was similar to the study conducted among health science and medical graduating class students and also the study conducted among the non-medical population in Gondar Town, Ethiopia[28 22]. The high representation of students with poor knowledge of BLS from the faculty of engineering suggests a need to strengthen BLS education in non-health care-related fields.

However, students with poor knowledge of BLS were predominantly students in the department of physiology, which is a department under the faculty of basic medical sciences. This suggests that there is still some level of ignorance or poor knowledge among students studying health-related courses, and there is a need to strengthen their knowledge of BLS as well.

The findings shows that age of the respondents, gender of the respondents, faculty of the respondents, and department of the respondents are significant determinants of BLS.This finding was similar to the result of a cross-sectional study conducted among nurses in Babcock University Teaching Hospital in Ilishan-Remo, Ogun State, showed that age, educational status, year of clinical experience, current assigned work place, resuscitation training and previous exposure to BLS maneuvers were significant determinants of BLS[31] and also that seen in a study conducted among a non-medical population in Gondar Town, Ethiopia, which showed that age, sex, residence, training about BLS, ever hearing about BLS, and exposure to the person in need of BLS were significant determinants of BLS[22]. Also, in an institutional-based cross-sectional study conducted among health care professionals at the University of Gondar Comprehensive Specialized Hospital, Northwest Ethiopia, to assess the determinants of BLS, sex and age were seen to be determinants of BLS, as well as, work experience, number of work settings, educational status, exposure to cardiac arrest cases, CPR training, and reading international CPR guidelines were significant[29]. Furthermore, in the study conducted among health workers in the Upper Denkyiva East Municipality of Ghana, it was shown that gender, grade, educational qualification, department, and years of experience were all significant determinants of BLS[30]. Also, in the cross-sectional study conducted among 167 health science and medical graduating class students of Dilia University, Ethiopia; department, BLS and ALS training, and exposure to the person in need of BLS were significant determinants of BLS[28]. This finding was not similar to that seen in this study. In a cross-sectional study conducted among junior doctors and students in a tertiary care medical institute in India, it was observed that training on BLS was a significant determinant of BLS[26]. Also, another cross-sectional study conducted among health workers in Khyber Teaching Hospital, Reshwar, Pakistan,it was shown that age, designation, number of BLS sessions attended, and time elapsed since the last BLS training session attended were significant determinants of BLS[27]. Age was the only similar determinant seen in the study conducted in Khyber Teaching Hospital, Reshwar, Pakistan.

Strengths and Limitation of the study

It is a descriptive cross-sectional study so it does not have temporal sequence. Hence, it limits the ability to track changes in these determinants over time. However, being a descriptive cross-sectional study, the large sample size of the respondents will provide a representative snapshot of the general population. Also, the findings of this study can be generalized to other undergraduate student population in similar settings, providing insights for policymakers, educators, and healthcare professionals.

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Implications of the findings of the study

Students in healthcare related fields were more knowledgeable about BLS than students in non-healthcare related fields; and males were more knowledgeable about BLS than females, likewise students between 21-25years being more knowledgeable about BLS than students of other age groups. This suggests a need for a comprehensive training in the institution on BLS for all age groups, levels of study, departments and faculties as having a good knowledge, positive attitude and good practice of BLS will help reduces the incidence of mortality associated with cardiac arrest or other medical emergencies that require BLS skills. The government should create policies so that tertiary institutions can incorporate BLS training into their curriculum. The school authorities should make sure that BLS is incorporated into the curriculum of the undergraduate students for all levels and it should be as practical as possible to enable them have hands-ons practice and build their confidence of practicing BLS anywhere the need arises. The students should take advantage of the opportunity and also encourage their peers to participate in the training.

Conclusion

The study found that age, gender, faculty, and department of study were significant determinants of BLS. Medical students (medicine, dentistry, physiology) showed higher knowledge levels than non-medical students (engineering). Participants aged 21-25 years were more knowledgeable. Males had higher knowledge levels than females. However, knowledge did not necessarily translate to practice. The study highlights the need for BLS training for all ages, departments and faculties targeting the female population majorly.

Declarations

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***Conflict of interest*:** None declared

Ethical approval was obtained from the ethical committee of University of Port Harcourt following the laid down protocol. Informed consent was obtained from each of the respondents before proceeding with the data collection.

***Authors' contributions*:** All authors were involved in conceptualization, planning and implementation of the study. All authors contributed to the interpretation of the results, read and approved the final manuscript.

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