

Willingness and motivations towards volunteering during the COVID-19 pandemic: a cross-sectional survey among final year medical students in Lagos, Nigeria

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Abstract

Introduction: Increasing manpower capacity to meet the demands in the healthcare system is important during health emergencies. Medical students have roles to play during a pandemic but their involvement in these duties should be voluntary. The objective of this study was to assess the willingness and motivations of final year medical students in Lagos, Nigeria towards volunteering during the COVID-19 pandemic.

Methods: A descriptive cross-sectional study was conducted among medical students in their sixth (final) year of study at the two public Universities in Lagos, Nigeria using total population sampling technique. A web-based questionnaire was used for data collection and data were analysed using SPSS. Logistic regression analysis was used to predict the willingness to volunteer.

Results: The mean age of the respondents was 23.4years \pm 2.6SD and 62.6% were female. About 65.9% of the medical students were willing to volunteer. Motivational factors which include self-rated good health status [OR: 2.1(95%CI: 1.16-3.6)], self-rated competence to work as a COVID-19 volunteer [OR: 6.5(95%CI: 3.61-11.54)] and availability of adequate protection and personal protective equipment [OR: 3.3(95%CI: 1.74-6.33)] significantly increased the odds of willingness to volunteer after controlling for other variables. Respondents' opinions on settings where medical students can serve as volunteers during the COVID-19 pandemic include case management (21.7%) and telemedicine (85.8%).

Conclusion: Medical students are willing to volunteer during the COVID-19 pandemic. There is a need to prepare and motivate the final year medical students by developing their skills to improve their competence and by providing adequate protection for the willing students to function as volunteers.

Background

Public health emergencies, such as Coronavirus disease 2019 (COVID-19) pandemic, have created a greater demand on numerous essential services and an inadequate capacity to meet that demand [1]. COVID-19, a novel disease caused by severe acute respiratory syndrome coronavirus (SARS-CoV-2), is a highly contagious disease which can cause severe illness [2,3]. COVID-19 pandemic could cause a shortage of healthcare professionals due to illness and increased demand for their services [1]. Increasing manpower capacity in the healthcare system is an important issue to address during health emergencies. Among various ways to solve the problem of manpower inadequacy, recruitment of volunteers is an essential option which deserves attention [4]. Existing literature on emergency planning shows that the biggest challenge may be the identification and recruitment of volunteers [5].

The COVID-19 pandemic affected medical education globally. Medical students were pulled from their hospital rotations and they had online education in some countries. In Nigeria, the Federal and State Governments closed all educational institutions, including universities, to stem the spread of COVID-19 outbreak. This outbreak has required us to address concerns about the participation of medical students in the care of infectious disease patients. The high possibility that medical students in the hospital would

be exposed to COVID-19 and the need to conserve the limited personal protective equipment (PPE) seemed to outweigh the educational benefits of students' participation [6]. During the severe acute respiratory syndrome crisis in Toronto, medical students were pulled from the wards and this was done with good intention and safety in mind; however, some students experienced a great deal of frustration regarding the postponement of their education and research activities [7]. Medical schools should offer students opportunities that would benefit their training needs, patient care, public health and potentially help to prevent workforce shortages [8]. Even though there is no contractual obligation to work, many medical students feel they have a duty to help if they can [9]. Involvement of medical students in these duties should be voluntary [10]; to mandate their involvement would be an abuse of the power of medical school administrators or government over these students.

While final-year medical students worked as "junior" interns in New Zealand; some countries, such as Italy, the United Kingdom, and Ireland engaged their students as health care workers, and some U.S. medical schools graduated their students early [11]. It may be argued that participation of medical students in activities that involve direct patient contact as volunteers will put them at increased risk for contracting COVID-19 infection because they have not completed their undergraduate training and they are not essential workers [12]. They can perform non-clinical roles during the COVID-19 pandemic [10], especially in public health [13]. Medical students could be involved in community surveillance, contact tracing, public health education and counselling [14]. They could help to ensure the implementation of critical preventive policies and participate in teams that promptly and aggressively respond to the pandemic. Medical students could volunteer as staff to hospital or community call centres that offer advice, guidance and services to individuals with symptoms of COVID-19 or exposure to the disease. They could link community members to test centres and they could ensure that adequate information is collected from those who require quarantine [13].

In clinical settings, medical students could provide mostly indirect care such as outpatient clinic call backs, phone triage for hospitals or clinics, staffing state and local health departments, as well as taking history and physical exams in clinics [8,13]. Even in a pandemic, patients with chronic conditions such as hypertension and diabetes need ongoing care; pregnant women need routine checks and discharged patients require follow-up. Many of these tasks can be performed through telemedicine by medical students who can render help to the support groups under the supervision of a trained physician, so there would be no risk of transmission of infectious diseases [8]. Medical students can also remotely assist in the care of patients with COVID-19. They can monitor patients with mild COVID-19 symptoms who are not admitted; expedite care for admitted patients by going through their charts, drafting notes, and ensuring tests are performed; and follow-up with patients after discharge. These roles would need physician supervision but they would reduce the overall burden on clinical teams, improve patient care and medical students' experience [8]. Medical students should not be placed in settings where patient care would suffer or where they would weigh existing care teams down. They should perform roles that is consistent with their completed level of training [8].

Historically, medical students have often assisted the health workforce during health crises and disasters, and research suggests that providing them that opportunity with due care is good for them. During the 1918 pandemic, senior medical students were drafted into service, they had expedited medical board examinations to increase the number of medical personnel available to provide services [15]. In a 1952 polio epidemic in Denmark, groups of medical students were tasked with manually ventilating patients [16]. Medical students were also volunteers during the terrorist attacks in New York City on September 11, 2001, where they helped in various capacities immediately after the tragedy. After the devastation of Hurricane Rita, college leaders at a University College of Medicine in the United States made a crucial decision to cancel classes and provided orientation sessions for students so that they could begin volunteering as soon as possible. Some medical students also stated that “the experience made them even more driven to become the best doctors they can” [9]. Willing volunteers in a study among staff and students at a large university in Canada felt that health sciences students should be strongly encouraged to volunteer during a pandemic [17]. Most medical students in the University of Alberta, Canada believed that healthcare students have an obligation to volunteer during a pandemic [9].

Motivations of students towards volunteering can influence their willingness to volunteer [18]. In addition to the willingness to volunteer, information about factors that motivate individuals and groups, such as medical students, to volunteer in a pandemic is important for the decision makers. Factors that may provide an incentive and motivation to volunteer include personal values (one’s values provide the motivation and inspiration); knowledge (volunteer seeks to gain knowledge and experience); development (the individual can mature and develop psychologically); career enhancement (volunteering to gain useful career-related experience); social concerns (volunteering promotes social relationships and well-being); and protective issues (volunteering addresses feelings of guilt or personal issues) [19,20]. A psychological sense of belonging to a community can enhance the willingness to volunteer [21]. While it is possible for medical students to work for free, providing a modest stipend for them as volunteers would be an acknowledgement of the risk they undertake and the aid they provide [13]. In addition to the benefits to patients and the health care system, allowing willing students to participate in a pandemic will reinforce important values in them; such as altruism, service in times of crisis, and solidarity with the profession [20].

Medical students have roles not only as learners but also as physicians-in-training. Extensive evidence have been provided in studies from western countries with regards to the roles medical students are willing to perform during public health emergencies [6,8,9,13,14,17]. Information from this survey could help determine the roles that medical students in Lagos, Nigeria are willing to perform during a public health emergency such as the current COVID-19 pandemic. In addition to their willingness and motivation to volunteer, this study assessed the opinions of final year medical students about the settings where they feel medical students can serve as volunteers during the COVID-19 pandemic. Information from this study will fill the literature gap and provide evidence for decision makers to develop policies in relation to the willingness of medical students to volunteer in a public health emergency. The aim of this study therefore, was to assess the willingness and motivation of final year medical students in the two public Universities in Lagos, Nigeria towards volunteering during the novel COVID-19 pandemic.

Methods

Study area and site: Lagos State, the economic hub of Nigeria, is the epicentre of COVID-19 outbreak in the country. The state is situated in the south-western part of Nigeria with an estimated population of 21 million as of 2015. There are two public universities with medical schools in Lagos, Nigeria namely: College of Medicine of University of Lagos (CMUL), Idi-Araba and Lagos State University College of Medicine (LASUCOM), Ikeja. The study was carried out in CMUL and LASUCOM. The two Colleges are linked with their separate Teaching Hospitals where the medical students receive their clinical training. The Teaching Hospitals offer specialised healthcare services to the people of Lagos and its adjoining States. There are about 350 final year medical students in CMUL and 70 in LASUCOM. Medical students comprised of undergraduates studying Medicine and Surgery as well as Dentistry. They spend at least six years to complete their training in the medical schools. They start their clinical training in the fourth year, acquire some clinical skills by the fifth year and then complete their clinical training by the end of the sixth year.

Study design and population

This study was a descriptive cross-sectional study. The study populations consisted of medical students in their sixth (final) year of study at CMUL and LASUCOM.

Sample size calculation

The minimum sample size was determined using Cochran formula for descriptive study, $n = z^2pq/d^2$, where z is the standard normal deviation at 95% confidence interval (1.96), p (69.8%) is the proportion of medical students in University of Alberta, Canada who believed that healthcare students have obligations to volunteer in a pandemic (0.698) [9], $q = 1-p$ (0.302) and d is the error of precision at 5% (0.05). The minimum sample size for this study was thus calculated to be 324.

Sampling technique

Total population sampling technique was used. All the medical students in their sixth (final) year of study at CMUL and LASUCOM were invited to participate in this study.

Data management

Instrument for data collection

Data were collected using a semi-structured and self-administered web-based questionnaire comprising questions which assessed sociodemographic characteristics of the respondents, willingness to volunteer during COVID-19 pandemic, factors that can motivate the willingness to participate as volunteers during COVID-19 pandemic and opinions about settings where the respondents feel medical students can serve as volunteers during the COVID-19 pandemic.

Procedure for data collection

The web-based questionnaire as a Google form was sent online to all the e-mail addresses of medical students in their sixth (final) year of study in CMUL and LASUCOM. Data was accrued online over a week. All the participants reviewed the explanation of the study and agreed to participate voluntarily by clicking the confirm button on the online survey form. To prevent duplicate responses, we accepted only one questionnaire per person by tracking internet protocol addresses.

Data analysis

Data was analysed using Statistical Package for the Social Sciences (SPSS) version 20 and summarized as proportions while quantitative data were summarized as means and standard deviation. Opinions of the respondents about settings in which medical students can serve as volunteers were reported as proportions. Chi-square test was done to determine the relationship between categories of independent variables and dependent variable. Initially, a binary regression analysis was performed on each variable. Then independent variables that showed statistical significance at $p < 0.2$ were entered into a multivariate logistic regression model to determine the predictors of the students' willingness to volunteer. Overall, the level of significance was set at 5% ($p < 0.05$).

Dependent variable

Willingness to volunteer during COVID-19 pandemic; respondents were asked whether they will be willing to participate as a volunteer in the COVID-19 pandemic (Yes/No).

Independent variable

The independent variables in this study included sociodemographic characteristics of the respondents measured by age, gender, marital status, previous degrees, place of permanent residence, parents' level of education and average monthly stipend/income. Others were possible motivational factors such as self-rated current state of health; previous experience as a volunteer in any event and healthcare settings; self-rated competence; expected educational experience; moral, ethical and professional obligations and a need for compensation; self-rated knowledge; perception of risk and perception about protection during COVID-19 pandemic.

Ethical Consideration

Ethical approval for this study was obtained from the Health Research Ethics Committee (HREC) of the College of Medicine, University of Lagos (CMUL/HREC/05/20/725). Each participant gave informed consent by clicking the confirm button on the online survey form. No personal information was collected. The participants were informed that it was a voluntary participation, assured of confidentiality of information provided and informed about their rights to withdraw from the study at any point in time.

Results

The web-based questionnaire was sent to 417 medical students and 337 of them participated in this study giving a response rate of 80.8%. The mean age of the respondents was 23.37 years \pm 2.6 SD. About 80.7% of them were less than 25 years old, 62.6% were female and only 10.4% of them had a previous degree before admission into medical school. The majority (80.7%) of the respondents were studying Medicine and Surgery. Other sociodemographic characteristics of the respondents are presented in Table 1.

Table 1

Characteristics of the respondents, their willingness towards volunteering during COVID-19 pandemic and the associated factors (n = 337)

Variables	Total n = 337 n(%)	Willingness		Unadjusted OR(95% CI)	Adjusted OR(95% CI)
		Yes	No		
		n = 222 n(%)	n = 115 n(%)		
Mean Age (years) ± SD					
23.37 ± 2.6					
Age group (years)					
≥ 25	65(19.3)	49(75.4)	16(24.6)	1.75(0.947–3.245)†	1.63(0.325–1.162)†
< 25 (Ref)	272(80.7)	173(63.6)	99(36.4)	1.00	1.00
Gender					
Male	126(37.4)	89(70.6)	37(29.4)	1.41(0.878–2.267)†	1.23(0.753–2.022)
Female (Ref)	211(62.6)	133(63.0)	78(37.0)	1.00	1.00
Medical school					
LASUCOM	30(8.9)	22(73.3)	8(26.7)	1.47(0.634–3.417)	§
CMUL (Ref)	307(91.1)	200(65.1)	107(34.9)	1.00	
Previous degrees					
Yes	35(10.4)	25(71.4)	10(28.6)	1.33(0.617–2.880)	§
No (Ref)	302(89.6)	197(65.2)	105(34.8)	1.00	
Course of study					
Medicine and Surgery	272(80.7)	188(69.1)	84(30.9)	2.04(1.177–3.539)‡	1.99(1.141–3.463)‡
Dentistry (Ref)	65(19.3)	34(52.3)	31(47.7)	1.00	1.00
Religion					
Islam	61(18.1)	42(68.9)	19(31.1)	1.18(0.650–2.139)	§
Christianity (Ref)	276(81.9)	180(65.2)	96(34.8)	1.00	

Variables	Total n = 337 n(%)	Willingness		Unadjusted OR(95% CI)	Adjusted OR(95% CI)
		Yes n = 222 n(%)	No n = 115 n(%)		
Tribe					
Yoruba	250(74.2)	166(66.4)	84(33.6)	1.09(0.656–1.824)	§
Others* (Ref)	87(25.8)	56(64.4)	31(35.6)	1.00	
Place of permanent residence					
Within Lagos	252(74.8)	166(65.9)	86(34.1)	1.00(0.595–1.679)	§
Outside Lagos (Ref)	85(25.2)	56(65.9)	29(34.1)	1.00	
Place of residence when school is in session					
Off campus	10(3.0)	8(80.0)	2(20.0)	2.11(0.441–10.113)	§
On-campus (Ref)	327(97.0)	214(65.4)	113(34.6)	1.00	
Parents' level of education					
Tertiary	289(83.1)	39(68.4)	18(31.6)	1.15(0.624–2.114)	§
Secondary (Ref)	57(16.9)	183(65.4)	97(34.6)	1.00	
Average monthly income					
≥ 18,000 Naira	264(78.3)	178(67.4)	86(32.6)	1.36(0.799–2.329)	§
< 18,000 Naira (Ref)	73(21.7)	44(60.3)	29(39.7)	1.00	
SD = Standard Deviation, OR = Odds Ratio, CI = Confidence Interval, Ref = Reference value, †=p < 0.20, ‡=p < 0.05					
Others* = Igbo, Hausa, Urhobo, Ijaw, Idoma, Igala and non-Nigerian tribes, §=Variable not included					

Willingness to volunteer in COVID-19 pandemic: About 65.6% (222/337) of the respondents were willing to volunteer in COVID-19 pandemic. Willingness to volunteer varied significantly by the course of study; a higher proportion of those who were studying Medicine and Surgery were willing to volunteer compared to those studying Dentistry ($P < 0.05$). A higher proportion of older (75.4%) and male (70.6%) medical students were willing to volunteer compared to younger (63.6%) and females (63.0%) medical students.

Even though there was no statistically significant difference, a higher proportion of the medical students from LASUCOM were willing to volunteer than those from CMUL. Similarly, a higher proportion of those who had previous degrees were willing to volunteer compared to those who had no previous degree. There were no significant differences in the other sociodemographic variables reported. (Table 1)

Sociodemographic characteristics as predictors of willingness to volunteer. The significant predictors of willingness to volunteer were age, gender and course of study. However, after adjusting for covariates in the multivariate analysis, respondents in Medicine and Surgery class [OR: 1.99 (95%CI: 1.141–3.463)] were significantly more willing to volunteer during the COVID-19 pandemic. (Table 1)

Motivational factors as predictors of willingness to volunteer during COVID-19 pandemic

When examining the relationship between willingness to volunteer and possible motivational factors, 12 variables were considered in the bivariate analysis (Table 2). Ten of the variables were significantly related to willingness to volunteer on binary logistic regression models. These included respondents self-rated current health status, previous experience as a volunteer in any event or previous experience as a volunteer in healthcare settings, self-rated competence and knowledge of preventive strategies for COVID-19. Other variables that were significantly related to willingness to volunteer were respondents' belief that experience from volunteering is a form of education; that medical students have moral, ethical and professional obligation to volunteer; that medical students as volunteers should be given stipends only; that adequate protection and protective equipment will be available for the volunteers and that COVID-19 is highly contagious and are anxious about being infected. Those who believed medical students as volunteers should be given monetary compensation and those who required parental permission to make a decision were less likely to be willing to volunteer.

Table 2

Motivations of medical students towards volunteering during COVID-19 pandemic, associated factors and predictors of willingness to volunteer (n = 337)

Variables	Willingness		Unadjusted OR(95% CI)	Adjusted OR(95% CI)
	Yes n = 222 n(%)	No n = 115 n(%)		
Self-rated current health status				
Good	157(74.4)	54(25.6)	2.73(1.711–4.351)‡	2.06(1.161–3.636)‡
Fair (Ref)	65(51.6)	61(48.4)	1.00	1.00
Previous experience in volunteering (event)				
Yes	217(67.6)	104(32.4)	4.59(1.555–13.553)‡	3.05(0.748–12.395)
No (Ref)	5(31.2)	11(68.8)	1.00	1.00
Previous experience as volunteer in an hospital and healthcare settings				
Yes	163(71.2)	66(28.8)	2.05(1.276–3.297)‡	1.42(0.763–2.644)
No (Ref)	59(54.6)	49(45.4)	1.00	1.00
Self-rated competence-COVID-19 volunteer				
Competent as COVID-19 volunteer	183(83.9)	35(16.1)	10.73(6.335–18.159)‡	6.45(3.606–11.543)‡
Not competent as COVID-19 volunteer (Ref)	39(32.8)	80(67.2)	1.00	1.00
Believes experience from volunteering is a form of education				
Yes	210(69.1)	94(30.9)	3.91(1.847–8.275)‡	1.32(0.500–3.494)
No (Ref)	12(36.4)	21(63.6)	1.00	1.00
Believes medical students have moral and professional obligations to volunteer				
Yes	97(76.4)	30(23.6)	2.20(1.342–3.602)‡	1.27(0.678–2.392)
No (Ref)	125(59.5)	85(40.5)	1.00	1.00

Variables	Willingness		Unadjusted OR(95% CI)	Adjusted OR(95% CI)
	Yes	No		
	n = 222 n(%)	n = 115 n(%)		
Believes medical students as volunteers should be given monetary compensation				
Yes	190(64.0)	107(36.0)	0.44(0.197–0.998)	§
No (Ref)	32(80.0)	8(20.0)	1.00	
Believes medical students as volunteers should be given stipend only				
Yes	58(77.3)	17(22.7)	2.04(1.124–3.699)‡	1.30(0.627–2.686)
No (Ref)	164(62.6)	98(37.4)	1.00	1.00
Self-rated knowledge of COVID-19 preventive strategies				
Good	202(69.7)	88(30.3)	3.10(1.650–5.819)‡	1.23(0.552–2.725)
Poor (Ref)	20(42.6)	27(57.4)	1.00	1.00
Perceives COVID-19 as a highly contagious disease and anxious about being infected				
Yes	217(67.2)	106(32.8)	3.69(1.205–11.267)‡	2.30(0.464–11.369)
No (Ref)	5(35.7)	9(64.3)	1.00	1.00
Believes adequate protection and protective equipment will be available for volunteers				
Yes	119(86.2)	19(13.8)	5.84(3.340–10.203)‡	3.32(1.739–6.329)‡
No (Ref)	103(51.8)	96(48.2)	1.00	1.00
Requires parental permission to volunteer				
Yes	133(64.3)	74(35.7)	0.83(0.519–1.320)	§
No (Ref)	89(68.5)	41(31.5)	1.00	

Variables	Willingness		Unadjusted OR(95% CI)	Adjusted OR(95% CI)
	Yes	No		
	n = 222	n = 115		
	n(%)	n(%)		

OR = Odds Ratio, CI = Confidence Interval, Ref = Reference value, †=p < 0.20, ‡=p < 0.05, §=Variable not included

However, after adjusting for all the other motivational variables; self-rated health status [OR: 2.06 (95%CI: 1.161–3.636)], self-rated competence as a COVID-19 volunteer [OR: 6.45 (95%CI: 3.606–11.543)] and belief that adequate protection and protective equipment will be available for the volunteers [OR: 3.32 (95%CI: 1.739–6.329)] were the significant predictors of willingness to volunteer in COVID-19 pandemic.

Settings in which medical students can work as volunteers in COVID-19 pandemic: All the respondents were asked to indicate where they feel medical students can work as volunteers during COVID-19 pandemic in variety of settings. About 21.7% were of the opinion that medical students could volunteer for case management of COVID-19 patients while 75% felt that medical students could work in hospital setting under the instruction and supervision of a certified doctor. However, about 74.5% felt medical students could volunteer in telemedicine unit or phone triage to schedule appointment, 72.1% felt medical students can support mental health of COVID-19 patient and their contacts through phone calls and 85.8% felt medical students could help support groups such as the hypertensive and diabetic patients as well as pregnant women. Of note, while 85.2% of the respondents felt medical students could participate in virtual education and counselling of community members on the prevention of COVID-19, 60% felt medical students could be involved in contact tracing of infected patients and their contacts and 40.1% felt they could be involved in active case search in the communities and hospitals. (Table 3)

Table 3

Settings in which medical students can serve as volunteers during COVID-19 pandemic (n = 337)

Settings	Agree n(%)	Indifferent n(%)	Disagree n(%)
Case management of COVID-19 Patients	73(21.7)	60(17.8)	204(60.5)
Under the instruction and supervision of certified doctor in hospital setting	255(75.7)	32(9.5)	50(14.8)
Telemedicine unit/phone triage to schedule appointment and reduce patients' visit to the hospital	251(74.5)	48(14.2)	38(11.3)
Supporting mental health of COVID-19 patients, their contact and the survivors through phone calls	243(72.1)	36(10.7)	58(17.2)
Helping support groups such as the hypertensive and diabetic patients as well as expectant mothers through telemedicine/ phone calls	289(85.8)	23(6.8)	25(7.4)
Virtual education and counselling of the community members on prevention and control of COVID-19	287(85.2)	23(6.8)	27(8.0)
Surveillance activities such as contact tracing of patients and their contacts	205(60.8)	37(11.0)	95(28.2)
Surveillance activities such as active case search in the communities and hospitals	135(40.1)	48(14.2)	154(45.7)
Working with research groups on COVID-19 research activities	254(75.4)	33(9.8)	50(14.8)
Collection and distribution of medical supplies to healthcare workers and hospitals	274(81.3)	23(6.8)	40(11.9)
Development of information, educational and communication materials such as info grams and posters	196(58.2)	48(14.2)	93(27.6)
Organization of support/donation and distribution of materials such as face mask to the community members	242(71.8)	40(11.9)	55(16.3)
Virtual tutoring and training of younger medical students	238(70.6)	44(13.1)	55(16.3)
Multiple responses were allowed			

Discussion

In this descriptive cross-sectional web-based study conducted among final year medical students of public tertiary institutions in Lagos, Nigeria, the rate of willingness to volunteer during the COVID-19 pandemic was 65.6% and factors such as the course of study, self-rated health status, self-rated competence as a COVID-19 volunteer and belief that adequate protection and protective equipment will

be available for volunteers were the significant motivators of willingness to volunteer during the COVID-19 pandemic.

Based on our review of literature, this is one of the first studies that assessed the willingness and motivation of final year medical students in Nigeria towards volunteering during a public health emergency such as COVID-19 pandemic. In this study, we found relatively high level of willingness to volunteer with about 66% of the respondents expressing their willingness to volunteer during the current COVID-19 pandemic. This is consistent with the findings from studies among residents in northern China and university nursing students in Canada where 65.7% and 67.9% of the respondents were willing to volunteer in emergencies and pandemic respectively [22,23]. However, this rate is higher when compared to the findings among university students and staff in Canada where 49.2% of them were willing to volunteer during an influenza pandemic [17]. There is an indication that there may be other factors that influence an individual concerning the willingness to volunteer in a public health emergency.

Our findings suggested that students of Medicine and Surgery were twice more likely to be willing to volunteer during COVID-19 pandemic. This finding may be in line with the fact that students of Medicine and Surgery receive training on general patient care as compared to students of Dentistry who are specially trained on only a particular region of the body. However, at the time of this study, both groups of students had received training in Community Health. These findings may have implications on decisions and choices of the groups of medical students recruitment efforts should be focused on. However, previous studies among medical students did not specify the particular groups that the medical students belong [6,9,14]. This is particularly so as the training institutions may be more specialized in the settings of these previous studies. Before controlling for the confounders in this study, willingness to volunteer during COVID-19 pandemic increased with age, and was associated with the male gender. These are also important factors to focus on because it has been suggested that recruitment strategies work better if aimed at the characteristics of a particular group [24].

Self-rated health status predicted the willingness to volunteer during COVID-19 pandemic. Good health status is necessary for an individual to work especially in healthcare settings. Past volunteerism was an important predictor of willingness to volunteer as most of our respondents who were willing to volunteer have a history of volunteering in any event (67.6%); and in health care settings or hospitals (71.2%). This is similar to the findings among university students and staff in Canada [17]. Medical students can develop skills which can boost their confidence while volunteering. Self-rated competence and self-rated knowledge were strong predictors of willingness to volunteer during the COVID-19 pandemic. This is similar to previous findings among residents in northern China which also showed that high level of confidence and self-efficacy are significant predictors to participate in volunteering [22]. Medical students will need the knowledge, competence and confidence to be able to volunteer in the COVID-19 pandemic. Training and education on public health emergency preparedness should be part of the curriculum for medical students. Respondents who believed experience from volunteering is a form of education were more likely to be willing to volunteer and this is consistent with previous studies [19,20,25]. Medical students are in training and would seek for knowledge where they can gain it. The experience during a

pandemic is a teachable, rare and important moment; medical students should be encouraged to learn and participate as volunteers wherever and whenever they can.

Most respondents who believed that medical students have moral, ethical and professional obligations to help were more likely to be willing to volunteer in COVID-19 pandemic. Medical and nursing students in Canada had similar belief [9,17,23]. Medical students should be encouraged to volunteer at the level which is commensurate with their level of training [8]. Respondents who believed medical students as volunteers should be paid a stipend only were more likely to be willing to volunteer while those who believed in monetary compensation for medical students as volunteers were less likely to be willing to volunteer. This is in line with the previous submission that medical students may be paid a modest stipend to acknowledge their efforts as volunteers [13]. Respondents who perceived COVID-19 as highly contagious and were anxious about being infected were still more likely to be willing to volunteer. This could be an indication of medical students' values; such as altruism, service in times of crisis, and solidarity with the profession [6,19,20]. Respondents who believed adequate protection and protective equipment will be available to volunteer were more likely to be willing to volunteer. This was a strong predictor that was still retained after controlling for other variables in the multivariate regression analysis. This finding is similar to the report of a study among health professionals in Japan where being protected by the hospital were related to higher motivation and lower hesitation to work during a pandemic [26]. Medical students would require protection in terms of safety and health insurance, as well as personal protective equipment that will be commensurate with the level of risk they may be exposed to as COVID-19 volunteers.

Medical students expressed their opinions about the settings in which they feel they can serve as volunteers during the COVID-19 pandemic. About 21.7% of the respondents were of the opinion that medical students can work as volunteers on case management of COVID-19 patients. This may be highly risky for medical students and it has been suggested that they should not be involved in direct patient's care [12]. However, almost three quarters of the respondents were of the opinion that medical students can work under the instruction and supervision of certified doctors. Suggestions about involvement of medical students in hospital settings include only indirect patient's care such as outpatient clinic call backs and phone triage for hospitals or clinics [8,10]. Majority of the respondents in this study were of the opinion that medical students can use telemedicine/phone to schedule patient appointment, support mental health of COVID-19 patients and their contacts and also to help support groups such as pregnant women and patients with chronic diseases; these activities are in line with the previous suggestions [8,10]. Majority of the respondents also felt that medical students can be involved in virtual education and counselling of the community members and virtual tutoring of younger students. They can achieve this through mass media and social media platforms. Only about half of the respondents were of the opinion that medical students can be involved in contact tracing, active case search and other surveillance activities. They might have categorised these activities as field work and may, therefore, prefer to work in the hospital or clinical settings. Contact tracing can also be done remotely and medical students can be involved in these activities. There is a high demand for health workforce in public health activities during a pandemic such as COVID-19 and medical students should be encouraged to volunteer for that [13,14].

The strength and limitations of this study should be recognized. The response rates of web-based questionnaires may be similar and more effective to that of mailed questionnaires in settings where the study population has access to e-mail and the Internet [27,28]. This study concentrated on the two public universities in Lagos, south-west Nigeria; the outcomes may be different when all the zones of the country are considered. Due to the cross-sectional design, causal conclusion cannot be drawn from this study. The results are based on expressed willingness to volunteer in COVID-19 pandemic, we cannot conclude on who will become actual volunteer. The likelihood of volunteering might also diminish with increasing mortality rate. However, this study provided useful information for planning and policy formulation.

Conclusion

Medical students are willing to volunteer in COVID-19 pandemic. Self-rated good health status, self-rated competence to work as a COVID-19 volunteer and availability of adequate protection and personal protective equipment were the most likely motivators of willingness to volunteer. Efforts should be made to translate willingness to actual involvement in the public health emergency response system. There is a need to prepare final year medical students to develop adequate skills that will improve their competence and provide adequate protection for the willing students to function as volunteers during COVID-19 pandemic. Planning and debate should begin before the pandemic becomes overwhelming and expectations of the roles of medical students during the crucial period should be a subject of stakeholders' discussion in Nigeria. Early involvement of medical students in the appropriate roles and settings can help prevent the impending manpower shortage during a pandemic.

Abbreviations

COVID-19

Coronavirus disease 2019

SARS

Severe acute respiratory syndrome

SPSS

Statistical Package for the Social Sciences

PPE

Personal Protective Equipment

CMUL

College of Medicine of University of Lagos

LASUCOM

Lagos State University College of Medicine

HREC

Health Research Ethics Committee.

Declarations

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Authors' contributions

AAA: Conceptualization and concept review; literature review; study design; data collection, data review, analysis and interpretation; drafted and edited the manuscript. KSO: Concept review; study design; data interpretation; edited the manuscript. OOO: Concept review; data analysis and interpretation; edited the manuscript. AAR: revised and edited the manuscript. BAO: Concept review; data interpretation; edited the manuscript. AO: Critically reviewed and edited the manuscript. All the authors have read and agreed to the final manuscript.

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Availability of data and materials

The datasets generated and analysed during the current study are available from the corresponding author on reasonable request.

Ethical approval and consent to participate

This study was conducted in accordance with the relevant guidelines and ethical principles contained in the Declaration of Helsinki which was approved by the Health Research Ethics Committee (HREC) of the College of Medicine, University of Lagos (CMUL/HREC/05/20/725). The study participants gave informed consent to participate in this study.

Consent for publication

All authors made substantial contributions to this work and approved it for publication. The study participants consented to the publication of the research findings.

Competing interests

The authors declare no competing interest.

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