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Outcome Evaluation of Public Health Campaign on Acceptability of COVID-19 Vaccine Among Health Science Students in Mwanza Region, Tanzania

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Abstract

Introduction
Public Health Campaigns (PHC) are strategies used to increase the acceptability of an intervention. During COVID-19, similar campaigns were used to motivate the acceptability of vaccines among the Tanzanian population. This study intends to evaluate whether PHCs contribute to the acceptability of the COVID-19 vaccine among Health Science students.

Methods
This is a realistic evaluation conducted using an analytical cross-sectional survey among 580 undergraduate Health Science Students of the Catholic University of Health and Allied Science (CUHAS) in the Mwanza region. The collected data was analyzed using STATA version 18.0. Multivariable logistic regression was used to assess factors associated with the acceptability of the COVID-19 vaccine among Health Science students. All the test statistics were performed at a 5% significant level.

Results
The prevalence of health science students receiving the COVID-19 vaccine was 24.4% (95% CI, 20.9%-28.2%). The PHC intervention was very effective at 72.9%. The information from the public health campaign helped students to understand that the side effects of the COVID-19 vaccine are expected and go away in a few days with AOR 1.72 (95% CI, 1.07-2.75, p-value=0.025). The campaign also helped to increase belief in the COVID-19 vaccine with AOR 2.09 (95% CI, 1.09-3.99, p-value=0.026).

Conclusion
The study concludes that the Public Health Campaigns effectively communicated public health information to encourage Health Science students to overcome their reluctance and get vaccinated. However, vaccine hesitancy is more prevalent than acceptance of COVID-19 vaccines among Health Science students. The study suggests that educational institutions and public health authorities need to take proactive measures to address vaccine hesitancy among Health Science students. This is important to ensure that future healthcare professionals are well-informed about the COVID-19 vaccine and can advocate for vaccination. They can be critical in promoting public health and countering vaccine misinformation within their communities.

Keywords: *Acceptability, Campaign, Public Health Campaign, COVID-19, Health Science students, Vaccine*

INTRODUCTION

The Tanzanian government followed the National COVID-19 Response Plan, which recommended the COVID-19 vaccination as a preventive measure against the COVID-19 pandemic. Globally, studies have shown that countries like the United Kingdom (UK), Qatar, and Israel, with reported increasing population vaccination coverage for COVID-19, had a notable impact in reducing symptomatic infection, disease severity, hospitalization, and deaths among vaccinated individuals, even in the settings with emerging variants compared to the unvaccinated population (Belongia et al., 2007; Bernal et al., 2021; Haas et al., 2021; Pritchard et al., 2021). Therefore, mass programs/intervention campaigns to advocate vaccination against COVID-19 have been initiated as a crucial preventive strategy globally (Jain et al., 2021; Konje et al., 2022).

Since the vaccine's introduction, different PHC strategies

have been and are still being carried out across Tanzania. To increase vaccine acceptability in Tanzania, the Ministry of Health (MoH) used the Fear of Missing Out (FOMO) strategy, which led to concerns that one might miss an opportunity for social interaction (churches, mosques, sports, and other concerts), a novel experience, a memorable event, or a profitable investment to get a vaccine. Therefore, the FOMO approach is guided by the concept of Tusifike Huko *"Let's not get there"* with the tagline Ujanja Kuchanja "Get clever, get vaccinated," which is recently recognized as the national public health campaign for the COVID-19 (MOHCDGEC, 2021c, 2021a). The broad objective of the PHC to scale up the COVID-19 vaccine rollout in Tanzania Mainland was *"to contribute to the realization of reaching national targets of providing complete COVID-19 vaccination to at least 70 percent of Tanzanians aged 18 years and above by December 2022"* (MoH, 2022). This objective is in line with the World Health Organization (WHO) suggestion that for the community to have herd immunity, 60 to 70 percent of the population must be vaccinated (MOHCDGEC, 2021).

While traditional public health campaigns deliver a direct, personal message to address a specific behavior, contemporary approaches recognize the complex web of social, economic, and environmental factors influencing health. To be effective, these campaigns consider not just individual behavior change but also environmental contexts like globalization and technological advancements. By involving a wider range of stakeholders, from policymakers to community leaders, contemporary public health campaigns take a holistic approach to promoting health and well-being (Heath & Heath, 2007; Sweet, 2022). From that note, involving health science students as part of community health workers can likely create a green right for the public health campaign and intervention to succeed, particularly to increase the acceptability of the COVID-19 vaccine.

Furthermore, in justifying why health science students are essential in the vaccination program/interventions, stakeholders in public health argue that it is crucial to increase vaccination rates among health science students since they are more likely to encounter COVID-19 in their practice, also, as the upcoming generation of clinicians and doctors must counsel reluctant individual who takes less precaution measure about the disease infection to at least accept and take the vaccine (Lucia et al., 2020; Mose et al., 2022; Orok, 2022; Ulbrichtova & Svihrova, 2022). In addition on health science students, studies argue that health science students represent a significant part of the healthcare community and are active members of the COVID-19 response (Gala et al., 2022; Jain et al., 2021; Lucia et al., 2020; Ulbrichtova & Svihrova, 2022). However, 61.9% of medical students in the USA are not vaccinated (Gala et al., 2022). In Uganda, a study revealed low levels of acceptance of 37.3% towards the COVID-19 vaccine among medical students, low self-perceived risks of COVID-19, and many had relied on social media that provided them with negative information (Kanyike et al., 2021). Hence, vaccine acceptability remains low among this group of future health professionals.

In Tanzania, little evidence shows the extent of PHC's success in increasing vaccine acceptance among health science students. Therefore, this study aimed to assess the contribution of PHC to strengthening the acceptability of the COVID-19 vaccine and vaccination coverage among health science students. Likewise, it aims to contribute knowledge and information that could be applied in upcoming immunization campaigns to raise vaccination rates among this group of potential future health professionals during a pandemic.

METHODS

Study design and setting

This is the realistic evaluation whereby an analytical cross-sectional survey was conducted to assess the outcome of PHC on the acceptability of the COVID-19 vaccine among health science students at the Catholic University of Health and Allied Sciences (CUHAS) in Mwanza. The study took place at the Catholic University of Health and Allied Sciences (CUHAS) in Mwanza, Tanzania. Established in 2003 as a private institution, CUHAS is among the top-ranked universities in Tanzania, offering more than four healthcare programs, including medicine, nursing, medical laboratory, pharmacy, and others. It admits over 600 undergraduate students annually. In addition, the Mwanza region was chosen due to its high COVID-19 cases second only to the Dar es Salaam region (MoH, 2022). Nevertheless, the CUHAS collaborates with Bugando Medical Centre (BMC) to address regional healthcare challenges. Therefore, this made the place valuable for this study.

Sample size and sampling procedures

The study population comprised all undergraduate health science students enrolled in the Doctor of Medicine, Pharmacy, Radiology, Medical Lab, and Nursing programs at CUHAS in the Mwanza Region of Tanzania (Ulbrichtova & Svihrova, 2022). These programs were selected because, during the second and third year of study, students in all five programs are required to complete clinical rotations and are, therefore, likely to have greater exposure to COVID-19 infection. The study sample consisted of 593 respondents; this estimation was done using Cochran's (1977) formula and other details from previous reports on the status of COVID-19 in Tanzania. The formula considered the prevalence of COVID-19 which was 6.7 percent (MoH, 2022), marginal error of 2.25 percent, and adjusted by a 20 percent non-response rate. Table 1 details the sample distribution across the mentioned program. A simple random sampling technique was used to select study participants to account for selection bias.

The study has a list frame of all students in each program, i.e., Doctor of Medicine students (in years 3, 4, and 5), Pharmacy, Radiology, and Nursing students (in years 3 and 4), and Medical (in years 2 and 3). Thereafter, all students were assigned unique identification (ID) numbers based on

their strata. The study randomly selected participants using Stata software version 18.0 to get an appropriate sample proportion for the study, as indicated in Table 1 below. The study used Class Representatives (CRs) as research assistants to collect the data and make follow-ups.

Table 1: Sample Distribution

Program	Number of students	Sample selected	Percentage
Doctor of Medicine	662	352	59.4%
Pharmacy	113	62	10.5%
Nursing	166	85	14.3%
Radiology	41	30	5.1%
Medical Laboratory	123	64	10.8%
Total	**1,105**	**593**	**100**

Study variables and measurements

The study variables were grouped into major categories named dependent and independent variables. The dependent variable was the acceptability of the vaccine, whereby data on vaccination, willingness/intention to take, and recommend the vaccine to others were collected. All the items of the dependent variable were self-reported and measured using a nominal scale. The independent variables were PHC factors, which were grouped into three domains, i.e., capability factors (16 questions), motivation factors (48 questions), and opportunity factors (16 questions). All the items of the independent variable were self-reported and measured using the 4-Likerty scale (1=strongly disagree, 2=disagree, 3=agree, and 4=strongly agree). To establish the overall status for each domain/element, the dichotomous variables were first created by grouping strongly agree and agree (coded 1), while strongly disagree and disagree (coded 0). Thereafter, the total score was calculated by adding up all the items from each domain/element with ranges 0-16 score, 0-48 score, and 0-16 score for capability, motivation, and opportunity factors, respectively. Remember the following information:

To measure the effectiveness of PHC, the total score was calculated by adding up all the items in three domains - capability, motivation, and opportunity - with a range of 0 to 80. Additionally, a percentage score was calculated for each of the four elements, which was used to determine the overall status. A score of 40% or less implies 'Low', a score between 40% and 70% implies 'Moderate', and a score of 70% or higher implies 'High'.

Data collection tools and procedure

Respondents were surveyed using a prepared, structured questionnaire, which was self-administered to collect data on demographic patterns and obtain information about their previous experiences. The questionnaire consisted of closed-ended questions with three sections. Section one consisted of questions about the demographic characteristics of respondents; section two consisted of questions about PHC (i.e., capability, motivation, and opportunity); and section three consisted of questions about the acceptability of the COVID-19 vaccine. Before going into the field, the tool was pre-tested among forty-one (41) health science students of the Muhimbili University of Health and Allied Science (MUHAS) to test the validity of the research instrument. After that, the study deployed Cronbach's Alpha test to measure the tool consistency, that is, how closely a tool is to an actual sample. In contrast, the coefficient obtained examined the reliability of the data (Taber, 2018). The alpha test was guided by the alpha(α), whereas α of 0.70 or higher is considered an outstanding level of reliability for social science research (Taber, 2018). The Cronbach's Alpha test results established an α=0.899, which implies that the study data are reliable and consistent in generating the information regarding the subject matter.

Data processing and analysis

Data collected from the field were entered and managed using an open data kit (ODK collect) Android version 2022.2.2 under a confidential management procedure to maximize data quality. Thereafter, data from ODK was exported to Stata version 18.0 (Stata et al., USA) statistical software for analysis. Descriptive statistics were employed to describe the study background of participants. Mean/median was used to summarize the age and scaled questions, while proportions and frequency tables were used to summarise categorical variables. Since the outcome variable was measured using the dichotomous scale, bivariable (COR), and multivariable (AOR), logistic regression analysis was carried out to identify variables in PHC factors having a significant association with vaccination status, the p-value of less than 0.05 (significant level) was considered statistically significant.

Ethical consideration

In this study, every student participant received a full explanation of the study and was invited to participate voluntarily. The data collected was used solely for the purpose of this study and was kept confidential. To ensure anonymity, the participants' identities were substituted with codes and securely stored. Participants were reassured that they had the right to decline to participate or to withdraw from the study at any time without any negative consequences or impact on their rights as students at the university. The study proposal secured ethical clearance from the Research and Publication Ethical Committee at MUHAS (Ref.No.DA.282/298/01.C/1637. Additionally, the Catholic University of Health and Allied Sciences (CUHAS) obtained permission to conduct the data collection activity before the study began (Ref: BU/03/5026/Vol.III/1196). All ethical considerations were considered to ensure that the study was conducted ethically and that the rights and welfare of the participants were protected throughout the study.

RESULTS

Socio-demographic characteristics of participants

A total of 593 questionnaires were distributed to participants, and 580 completed questionnaires were returned and used for the study, resulting in a response rate of 97.8%. The median age of the participants was 24 years [IQR, 23-25], with an interquartile range of 23-25 years. Of the participants, 52.4% were male and 47.6% were female. 92.0% of the surveyed students reported being single or unmarried, 6.8% reported having a chronic disease, and 15.8% reported being involved

in a COVID-19 response team during the pandemic.

In terms of information sources about the COVID-19 pandemic, 70% of the students reported using television or media websites as their main source, followed by 56.4% relying on friends, family members, or lectures, and 53.5% using social platforms such as Facebook, WhatsApp, and Twitter (Table 2).

Table 2: Socio-demographic characteristics of the study participants

Variable	Frequency	Percentage
Age (median, [IQR])	24, [23-25]	
Sex (n=574)		
Male	301	52.4
Female	273	47.6
Marital status (n=572)		
Not married	526	92.0
Married	46	8.0
Programme (BSc)		
Medicine	346	59.7
Pharmacy	62	10.7
Nursing	85	14.7
Laboratory	62	10.7
Radiology	25	4.3
Any chronic diseases (n=573)		
No	534	93.2
Yes	39	6.8
Ever been part of any COVID-19 response team/program (n=570)		
No	480	84.2
Yes	90	15.8
The main source of information†		
Ministry of Health website	259	44.7
World Health Organization	282	48.6
Primary care physician	84	14.8
Scientists/Scientific releases	118	20.3
Pharmacists	53	9.1
Social Platform (Facebook, WhatsApp, Twitter., etc.)	310	53.5
Friends/family members/lectures	327	56.4
Television/media website	406	70.0

† = *multiple responses*

Acceptability of COVID-19 Vaccine among Health Science Students

In assessing the acceptability status of the COVID-19 vaccine among health science students (Table 2), the results indicate that about one-quarter of students had received any COVID-19 vaccine 24.4% (95% CI, 20.9%-28.2%), after stratified the acceptability status we found that was high among laboratory student 62.3% (95% CI, 49.6%-73.5%) and lowest to pharmacy students 1.6% (95% CI, 0.0%-11.1%) (Figure 1).

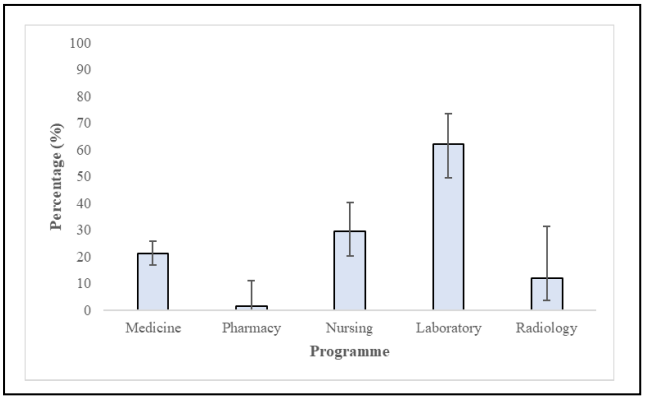

Figure 1: Health Science Students Vaccinated against COVID-19 Across the Programmes

Further, only 24.6% intended to take the COVID-19 vaccine in the future, in this case, in the next three (3) months. Half of the students reported having a close family/friend/relative already vaccinated against COVID-19. More than three-quarters of students are likely to recommend the vaccine to other close relatives and friends (i.e., 54.5% somewhat likely and 27.9% extremely likely). The study used a percentage scale measurement of 1-10 to measure the level of trust and hesitancy regarding the COVID-19 vaccine among students. The purpose was to establish the proportion of student trust and hesitancy of the COVID-19 vaccine. More than half of the students reported trusting the COVID-19 vaccine, with a mean of 5.81 (STD=2.765). Similarly, regarding the hesitancy level, slightly half of the students reported having moderate hesitancy with the COVID-19 vaccine, with a mean of 5.83 (STD=2.823) (Table 3).

Table 3: Acceptance of COVID-19 Vaccine among Health Science Students (n=580)

Variable	Frequency	Percentage
Ever received any dose of the COVID-19 vaccine (n=553)		
No	418	75.6
Yes	135	24.4
Trust of COVID-19 vaccine (Mean, STD)	5.81, 2.765	
Intention to the vaccine in the next three (3) months		
No	399	75.4
Yes	130	24.6
The hesitancy of the COVID-19 vaccine (Mean, STD)	5.83, 2.823	
Close family/friend/relative already vaccinated (n=578)		
No	90	15.6
Not sure	199	34.4
Yes	289	50.0
Recommend vaccine to others (n=578)		
Not at all likely	102	17.6
Somewhat likely	315	54.5
Extremely likely	161	27.9

Hints: STD=Standard Deviation

Public Health Campaign Intervention in Influencing the Acceptability of the COVID-19 Vaccine Among Health Science Students

The study assessed the PHC intervention in influencing the acceptability of COVID-19 among health science students. The PHC factors were grouped into three main domains:

Capability, Motivation, and Opportunity. All the factors were measured using the four Likert scale for the variable's central position; a mean was used. The mean was interpreted following the scale: 1.00-1.74 (Strongly disagree), 1.75-2.49 (Disagree), 2.5-3.24 (Agree), and 3.25-4.0 (Strongly agree). Also, the standard deviation close to zero indicates the mean is stable, and the response is similar, with minimal variation among students participating in this study.

On the capability of PHC intervention, the overall assessment indicates that the PHC intervention had a high capability of 51.4% in influencing students' knowledge and resilience of the COVID-19 vaccine. Regarding the knowledge capability, the highest mean was observed in the PHC information to help students understand that getting a COVID-19 vaccine protects against getting seriously ill even if they get a COVID-19 infection with a mean of 2.78 (STD=0.980). While on resilience, the PHC helps students have full confidence that the Tanzania government makes appropriate efforts to manage COVID-19 with a mean of 2.90 (STD=0.858) (Table 4).

Table 4: Public Health Campaign on Increasing Capability of Getting COVID-19 Vaccine

Variable/Statement	Likert scale				Mean (STD)
	SD N (%)	DA N (%)	AG N (%)	SA N (%)	
Knowledge					
Help to understand that getting a COVID-19 vaccine protects against getting seriously ill even if get a COVID-19 infection	85(14.7)	97(16.8)	252(43.8)	142(24.7)	2.78(0.980)
Help to understand the side effects of the COVID-19 vaccine are normal and go away in a few days.	74(12.9)	139(24.1)	239(41.5)	124(21.5)	2.72(0.944)
Resilience					
More information about the COVID-19 vaccine is needed because the campaign does not provide enough information	64(11.1)	130(22.6)	241(41.8)	141(24.5)	2.80(0.936)
Helps to have full confidence that the Tanzania government makes appropriate efforts to manage the COVID-19	41(7.1)	119(20.7)	270(46.9)	146(25.4)	2.90(0.858)

Total	N (%)
Overall Capability Efforts	
Low capability	38(6.6)
Moderately capability	244(42.1)
High capability	298(51.4)

Hints: SD=Strongly Disagree; DA=Disagree; AG=Agree; SA=Strongly agree; STD=Standard Deviation

On the motivation of PHC intervention, the overall assessment indicates that the PHC intervention highly motivated the students by 69.3%. The motivation includes attitude, perception, risk assessment, trust, confidence in the vaccine, and readiness of health science students to vaccinate against COVID-19 in the future. Regarding the attitude, the PHC information helps students to understand that vaccination will stop the spreading of COVID-19 with a mean of 2.97 (STD=0.840).

On perception, the PHC information helps the student to understand that everyone should get the vaccination with a mean of 2.85 (STD=0.856). On risk assessment, the PHC information helps the students be more concerned about the safety of friends, family members, and relatives, with a mean of 3.11 (STD=0.779). On the readiness of students to vaccinate against COVID-19 in the future, the PHC helps students to increase their intention to learn and understand more about the COVID-19 vaccine. This might indirectly influence the students to vaccinate against COVID-19, with a mean of 3.08 (STD=0.826). Concerning the vaccine's confidence, the PHC helps students understand that COVID-19 is safe with a mean of 3.02 (STD=0.851). Lastly, regarding trust in the vaccine, the PHC helps students believe more in COVID-19, with a mean of 2.93 (STD=0.868) (Table 5).

Table 5: Public Health Campaign on Motivation of Getting COVID-19 Vaccine

Variable/Statement	Likert scale				Mean (STD)
	SD N (%)	DA N (%)	AG N (%)	SA N (%)	
Attitude					
Help to be concerned about the COVID-19 pandemic and think about vaccination.	46(8.0)	105(18.2)	282(48.8)	145(25.1)	2.91(0.863)
Help to understand that vaccination will stop the spreading of COVID-19 .	39(6.8)	92(16.1)	286(50.0)	155(27.1)	2.97(0.840)
Perception					
It helps to understand that everyone should get the vaccination.	41(7.1)	135(23.5)	265(46.2)	133(23.2)	2.85(0.856)
Help to understand that it is impossible to reduce the incidence of COVID-19 without vaccination.	62(11.0)	139(24.7)	240(42.6)	123(21.8)	2.75(0.919)
Risk assessment					
Increase concern about the serious side effects of the COVID-19 vaccine.	38(6.7)	85(14.9)	276(48.3)	172(30.1)	3.02(0.847)
Increased concern about the safety of my friends and family members.	30(5.3)	54(9.5)	307(54.1)	177(31.2)	3.11(0.779)
Intentions					
It helps to increase the intention to vaccinate against COVID-19 .	38(6.6)	112(19.5)	284(49.5)	140(24.4)	2.92(0.835)
Help to increase intention to learn and understand more about the COVID-19 vaccine.	33(5.8)	75(13.2)	277(48.7)	184(32.3)	3.08(0.826)
Confidence					
It helps to increase confidence in vaccine efficacy	40(7.0)	119(20.7)	273(47.6)	142(24.7)	2.90(0.851)
It helps to understand that the COVID-19 vaccine is safe	33(5.8)	103(18.0)	257(45.0)	178(31.2)	3.02(0.851)
Trust					
Help to increase trust about the COVID-19 vaccine	48(8.4)	118(20.6)	276(48.2)	131(22.9)	2.86(0.866)
Help to increase belief on COVID-19 vaccine.	40(7.0)	116(20.4)	258(45.4)	154(27.1)	2.93(0.868)

Total	N (%)
Overall Motivation Efforts	
Low motivation	17(2.9)
Moderately motivation	161(27.8)
High motivation	402(69.3)

Hints: SD=Strongly Disagree; DA=Disagree; AG=Agree; SA=Strongly agree; STD=Standard Deviation

The PHC intervention significantly increased the opportunity for students to get the COVID-19 vaccine by 74.8%. The highest mean on opportunity aspect was observed in the PHC information to increase student awareness about the center's getting the COVID-19 vaccine, with a mean of 3.15 (STD=0.747Followed by the information, students can understand that the vaccine is available at no cost with a mean of 3.09 (STD=0.777). Additionally, the information clarifies that vaccines are available with a mean of 3.08 (STD=0.759). Lastly, the PHC information helps to increase preference for COVID-19 vaccine alternatives with a mean of 2.96 (STD=0.836) (Table 6).

Table 6: Public Health Campaign on Influencing Opportunity of Getting COVID-19 Vaccine

Variable/Statement	Likert Scale				Mean (STD)
	SD N (%)	DA N (%)	AG N (%)	SA N (%)	
Increase preference for COVID-19 vaccine alternatives.	47(8.2)	71(12.4)	313(54.6)	142(24.8)	2.96(0.836)
The information helps to understand that vaccines are available.	23(4.0)	73(12.8)	308(53.9)	167(29.3)	3.08(0.759)
The information helps to understand that the vaccine is free/at no cost.	29(5.1)	60(10.6)	307(54.1)	171(30.2)	3.09(0.777)
Increase awareness about the center to get the COVID-19 vaccine.	24(4.2)	50(8.7)	312(54.6)	186(32.5)	3.15(0.747)
Total					**N (%)**
Overall Opportunity Efforts					
Low Opportunity					19(3.3)
Moderately Opportunity					127(21.9)
High Opportunity					434(74.8)

Hints: SD=Strongly Disagree; DA=Disagree; AG=Agree; SA=Strongly agree; STD=Standard Deviation

Furthermore, 72.9% of the assessment of PHC intervention found it highly effective in disseminating information that could influence health science students to get vaccinated against COVID-19, now or in the future (Figure 2).

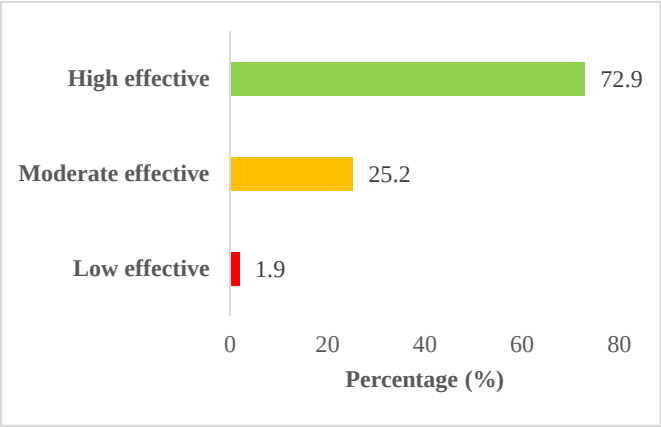

Figure 2: Effectiveness of Public Health Campaign in Dissemination of Health Information about COVID-19 Vaccine

Table 7: Factors of Public Health Campaign Intervention Influencing the Acceptability of the COVID-19 Vaccine among Health Science Students

Variables	Ever received COVID-19 Vaccine		COR, 95% CI	p-value	AOR, 95% CI	p-value
	No N (%)	Yes N (%)				
Help to understand the side effects of the COVID-19 vaccine are normal and go away in a few days.						
Disagree	171(81.8)	38(18.2)	1		1	
Agree	244(71.8)	96(28.2)	1.77, 1.16-2.70	**0.008**	1.72, 1.07-2.75	**0.025**
Helps to have full confidence that the Tanzania government makes appropriate efforts to manage the COVID-19						
Disagree	120(77.4)	35(22.6)	1		1	
Agree	295(74.9)	99(25.1)	1.15, 0.74-1.79	0.532	0.62, 0.35-1.07	0.087
Help to be concerned about the COVID-19 pandemic and think about vaccination.						
Disagree	111(77.6)	32(22.4)	1		1	
Agree	306(75.0)	102(25.0)	1.56, 0.74-1.82	0.530	0.78, 0.40-1.52	0.470
Help to understand that it is impossible to reduce the incidence of COVID-19 without vaccination.						
Disagree	160(82.1)	35(17.9)	1		1	
Agree	247(72.2)	95(27.8)	1.76, 1.14-2.72	**0.011**	1.74, 1.06-2.86	**0.030**
Help to increase concern about the safety of my friends and family members.						
Disagree	53(64.6)	29(35.4)	1		1	
Agree	357(77.8)	102(22.2)	0.52, 0.32-0.86	**0.011**	0.37, 0.19-0.67	**0.001**
Help to increase intention to learn and understand more about the COVID-19 vaccine.						
Disagree	76(73.1)	28(26.9)	1		1	
Agree	333(76.0)	105(24.0)	0.86, 0.53-1.39	0.530	0.48, 0.24-0.94	**0.032**
It helps to increase confidence in vaccine efficacy.						
Disagree	125(82.8)	26(17.2)	1		1	
Agree	290(73.2)	106(26.8)	1.76, 1.09-2.83	**0.021**	1.75, 0.87-3.52	0.117
Help to increase belief in the COVID-19 vaccine.						
Disagree	129(85.4)	22(14.6)	1		1	
Agree	282(72.3)	108(27.7)	2.25, 1.35-3.72	**0.002**	2.09, 1.09-3.99	**0.026**
The information helps to understand that vaccines are available.						
Disagree	78(82.1)	17(17.9)	1		1	
Agree	336(74.7)	1114(25.3)	1.56, 0.88-2.74	0.125	1.88, 0.98-3.62	0.058

Hints: COR=Crude Odds Ratio; AOR=Adjusted Odds Ratio; CI=Confidence Interval; p-value=Probability value

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Factors of Public Health Campaign Intervention Influencing the Acceptability of the COVID-19 Vaccine among Health Science Students

Table 7 presents results on the impact of PHC on people's acceptability to get the COVID-19 vaccine. The results showed that students who believed that the information provided by the PHC helped them understand the temporary nature of the side effects of the COVID-19 vaccine were more likely to get vaccinated compared to those who did not agree. The statistics indicated that there was a 1.77 times higher likelihood of getting vaccinated for those who found the information helpful (95% CI, 1.16-2.70, p-value=0.008). The odds remain unchanged even during multivariate analysis with AOR 1.72 (95% CI, 1.07-2.75, p-value=0.025). Similarly, those who agree that the PHC intervention helps them to understand that it is not possible to reduce the incidence of COVID-19 without vaccination with COR 1.76 (95% CI, 1.14-2.72, p-value=0.011) and AOR 1.74 (95% CI, 1.06-2.86, p-value=0.030) during bivariate and multivariate analysis respectively. Likewise, those students who affirm PHC intervention to help increase belief in the COVID-19 vaccine with COR 2.25 (95% CI, 1.35-3.72, p-value=0.002) and AOR 2.09 (95% CI, 1.09-3.99, p-value=0.026) during bivariate and multivariate analysis respectively. Furthermore, students who agreed that PHC intervention helped them to increase concern about the safety of their friends and family members were less likely to get the vaccine with COR 0.52(95% CI, 0.32-0.86, p-value=0.011), the odds remain the same during multivariate analysis AOR 0.37 (95% CI, 0.19-0.67, p-value=0.001).

However, some factors were only found to be significant during either the bivariate or multivariate analysis. For example, the research shows that Public health campaign (PHC) information increases confidence about vaccine efficacy among students, with a COR of 1.76 (95% CI, 1.09-2.83, p-value=0.021) and an AOR of 1.75 (95% CI, 0.87-3.52, p-value=0.117). On the other hand, students who believe that PHC information enhances their intention to learn and understand more about the COVID-19 vaccine are less likely to take the vaccine compared to those who disagree, with a COR of 0.86 (95% CI, 0.53-1.39, p-value=0.530). However, during the multivariate analysis, the odds remain the same but the significance changes, with an AOR of 0.48 (95% CI, 0.24-0.94, p-value=0.032) (Table 7).

DISCUSSION

This study demonstrated that the PHC effectively spread health information among health students with the tagline "Ujanja Kuchanja" (Get clever, get vaccinated). The success was attributed to various factors, the most significant being the use of popular social platforms like Facebook, WhatsApp, and Twitter, as well as influencers, television, and medical websites.(Jain et al., 2021). However, the efforts do not contribute to the realization of the campaign target/objective that seventy percent of the population vaccinated against COVID-19 by the end of December 2022, in this case, among health science students (Andrews & Foulkes, 2020; Yeager et al., 2018).

Furthermore, the study identified areas of PHC that better influence health science students to get the COVID-19 vaccine. The PHC helps health science students understand that the vaccine has minimal side effects, which are normal and go away in a few days. This information perhaps boosts students' knowledge, builds a strong foundation for emerging issues, and addresses more nuanced concerns regarding the COVID-19 vaccine. This, on the other hand, directly and indirectly positively influences vaccination coverage among this special group. This study's findings align with other studies (Habib et al., 2022; Orok, 2022), which found that despite most students having poor knowledge about the COVID-19 vaccine spectrum, more than half have a positive perception of the vaccine. In Ethiopia, students receive information about the COVID-19 vaccine through government-led mass media such as television and radio, aiming to increase awareness and adherence to vaccine mitigation measures (Mose et al., 2022).

Likewise, the PHC significantly changed health science students' perception that perhaps the COVID-19 vaccine is the only way out and solution to end the pandemic and restore our normal life. According to the Health Belief Model, variations in vaccination intentions can be attributed to the perceived risks and benefits that guide decision-making. (Rosenstock et al., 1988; Shmueli, 2021)These findings align with those of previous studies; despite their health education background, individuals who perceived themselves as at higher risk for infection and were more concerned about the severity of the infection if they were to get sick were more willing to accept the vaccine. This finding resembles the studies that revealed most medical and health science students have poor knowledge about the COVID-19 vaccine spectrum; however, more than half of the medical students have a positive perception of the vaccine. (Habib et al., 2022; Orok, 2022). As reported in other contexts, concerns over the safety of the novel vaccines counterpose the perceived protective impact of the vaccine, supporting findings that vaccine compliance relies on individual risk-benefit perception (Alshurman et al., 2021). Hence, education campaigns that engage health science students and provide accurate and up-to-date information on vaccine safety and effectiveness are important strategies for combatting vaccine hesitancy (Khalis et al., 2021), as we found in this study, campaigns contribute to vaccine updates.

In addition, the PHC significantly increased belief in the COVID-19 vaccine among health science students. This means the campaign has effectively influenced students'

attitudes, perceptions, and trust toward accepting the COVID-19 vaccines. The campaign utilizes strategies such as educational material, awareness campaigns, expert testimonials, and peer influence, such as religious readers, to engage and persuade students. All of these factors can be crucial in encouraging students to support and promote vaccination efforts, as they are future healthcare professionals who may significantly impact public health outcomes (Randolph & Viswanath, 2004).

A negative association between the belief in the campaign's effectiveness in increasing intentions to learn and understand the vaccine and the likelihood of getting vaccinated was established in this study. Thus, the findings suggest that health science students who agree that the campaign helps increase their intentions to learn and understand more about the COVID-19 vaccine have lower odds of vaccinating against COVID-19. This result may seem counterintuitive at first glance, as one might expect that an increased intention to learn and understand the vaccine would translate into a higher likelihood of vaccination. However, it is important to interpret these findings as increased intentions to learn and understand the COVID-19 vaccine, which may lead to more critical thinking and questioning among health science students. They may be more inclined to evaluate the available information, including potential risks and benefits, before deciding to get vaccinated (Herrera-peco et al., 2021). This cautious approach may result in a lower likelihood of immediate vaccination, especially if they are still gathering information and seeking further clarification.

Similarly, a negative association between the belief in the campaign's ability to increase concern for loved one's safety and the likelihood of vaccination was established in this study. This may also seem counterintuitive initially, as one might expect that increased concern for the safety of family and friends would lead to a higher likelihood of vaccination (Orok, 2022). However, it is important to delve deeper into the possible explanations for this result; one could be that increased concern for the safety of loved ones may evoke a sense of fear or anxiety among health science students. This heightened emotional response could lead to avoidance behavior or a desire to protect themselves and their loved ones by avoiding the vaccine. This may be particularly relevant if they have concerns or doubts about the vaccine's safety or efficacy (An et al., 2021; Zaidi et al., 2021).

CONCLUSION

The study concludes that the PHC effectively disseminated public health information to persuade health science students not to be reluctant to get the vaccines. However, the hesitancy outweighs the acceptability of COVID-19 among health science students. Therefore, this study underscores the need for targeted interventions and education programs to address vaccine hesitancy among health science students. By addressing their concerns and providing them with accurate information, we can work towards increasing vaccine acceptance rates and ensuring a higher level of protection against COVID-19 for both health science students and the communities they serve. The same strategies can help build a proactive culture during any emergency or disease outbreak requiring a vaccine as a protective measure.

STRENGTHS AND LIMITATIONS

Some limitations need to be considered when interpreting and applying the results of this study. Firstly, this study used simple random sampling to collect data in one of the universities in the Mwanza region of Tanzania, which may lead to limits of generalizability of the results. Secondly, a cross-sectional study design can limit the derivation of causal conclusions about the role of a public health campaign in encouraging health science students to receive the vaccine. Rather, predict the facets of public health campaigns linked to accepting the COVID-19 vaccine among this cohort of aspiring healthcare professionals. Thirdly, this study was conducted after the vaccine was available, so we assume that at some point, health science students were information about the effectiveness, efficacy, and safety of the vaccine through the mass COVID-19 vaccination campaign, which was conducted nationally, thus perhaps the rate of intention to vaccinate could be influenced by these campaigns. However, our findings could serve as a foundation for the effectiveness of these campaigns in influencing people's acceptability of the COVID-19 vaccine in Tanzania. Also, for the future planning and development of vaccine strategies among health science students, an important group supporting a country's health system.

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CONFLICT OF INTERESTS

We declare that there is no conflict of interest in this study.

AUTHORS' CONTRIBUTIONS

Paul Alikado Sabuni conceived and designed the study, supervised the data collection activity, analyzed the data, and wrote the manuscript in consultation with the other authors Mughwira Mwangu and Thadeus Ruwaichi participated in editing the manuscript.

DATA AVAILABILITY

The data supporting this study's findings cannot be shared publicly but will be available upon request of a researcher(s).

LIST OF ABBREVIATIONS

COVID-19	Coronavirus disease of 2019
CUHAS	Catholic University of Health and Allied Science
FOMO	Fear of Missing Out
MUHAS	Muhimbili University of Health and Allied Science
MoH	Ministry of Health
PHC	Public Health Campaign
WHO	World Health Organization

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REFERENCES

Alshurman, B. A., Khan, A. F., Mac, C., Majeed, M., & Butt, Z. A. (2021). *What Demographic, Social, and Contextual Factors Influence the Intention to Use COVID-19 Vaccines : A Scoping Review*.

An, P. Le, Thi, H., Nguyen, N., Nguyen, D. D., & Vo, L. Y. (2021). The intention to get a COVID-19 vaccine among the students of health science in Vietnam. *Human Vaccines & Immunotherapeutics*, *17*(12), 4823–4828. https://doi.org/10.1080/21645515.2021.1981726

Andrews, J. L., & Foulkes, L. (2020). Peer Influence in Adolescence and Youth : Public- Health Implications for COVID-19. *Trends in Cognitive Sciences*, *24*(8), 585–587. https://doi.org/10.1016/j.tics.2020.05.001

Belongia, E. A., Coleman, L. A., & Donahue, J. G. (2007). correspondence Effectiveness of Influenza Vaccination. *Jama*, 2728–2731.

Bernal, J. L., Andrews, N., Gower, C., Stowe, J., Robertson, C., Tessier, E., Simmons, R., Cottrell, S., Roberts, R., O'Doherty, M., Brown, K., Cameron, C., Stockton, D., McMenamin, J., & Ramsay, M. (2021). Early effectiveness of COVID-19 vaccination with BNT162b2 mRNA vaccine and ChAdOx1 adenovirus vector vaccine on symptomatic disease, hospitalisations and mortality in older adults in England. *MedRxiv*, 2021.03.01.21252652. https://doi.org/10.1101/2021.03.01.21252652

Gala, D., Parrill, A., Patel, K., Rafi, I., Nader, G., Shoaib, A., Swaminath, G., Jahoda, J., Hassan, R., Colello, R., Rinker, D. V, Gala, D., Parrill, A., Patel, K., Rafi, I., & Nader, G. (2022). Factors impacting COVID-19 vaccination intention among medical students ABSTRACT. *Human Vaccines & Immunotherapeutics*, *18*(1), 17. https://doi.org/10.1080/21645515.2022.2025733

Haas, E. J., Angulo, F. J., McLaughlin, J. M., Anis, E., Singer, S. R., Khan, F., Brooks, N., Smaja, M., Mircus, G., Pan, K., Southern, J., Swerdlow, D. L., Jodar, L., Levy, Y., & Alroy-Preis, S. (2021). Impact and effectiveness of mRNA BNT162b2 vaccine against SARS-CoV-2 infections and COVID-19 cases, hospitalisations, and deaths following a nationwide vaccination campaign in Israel: an observational study using national surveillance data. *The Lancet*, *397*(10287), 1819–1829. https://doi.org/10.1016/S0140-6736(21)00947-8

Habib, S. S., Alamri, M. S., Alkhedr, M. M., & Alkhorijah, M. A. (2022). Knowledge and Attitudes of Medical Students toward COVID-19 Vaccine in Saudi Arabia. *Vaccines (MDPI)*, *10*(541), 1–12. https://doi.org/https://doi.org/10.3390/vaccines10040541

Heath, C., & Heath, D. (2007). Made to stick : why some ideas survive and others die. In *Https://Medium.Com/*. United States by Random House. https://medium.com/@arifwicaksanaa/pengertian-use-case-a7e576e1b6bf

Herrera-peco, I., Jim, B., Jos, J., Gracia, E. B. De, & Ruiz-n, C. (2021). Healthcare Professionals ' Role in Social Media Public Health Campaigns : Analysis of Spanish Pro Vaccination Campaign on Twitter. *Healthcare (MDPI)*, *9*(662), 1–12. https://doi.org/https://doi.org/10.3390/healthcare9060662

Jain, J., Saurabh, S., Kumar, P., & Verma, M. K. (2021a). COVID-19 vaccine hesitancy among medical students in India. *Epidemiology and Infection Cambridge.Org/Hyg*, *149*(e132), 1–10. https://doi.org/Epidemiology ahttps://doi.org/10.1017/S0950268821001205

Jain, J., Saurabh, S., Kumar, P., & Verma, M. K. (2021b). COVID-19 vaccine hesitancy among medical students in India. *Epidemiology and Infection*, *149*(e132), 1–10. https://doi.org/https://doi.org/10.1017/S0950268821001205

Kanyike, A. M., Olum, R., Kajjimu, J., Ojilong, D., Akech, G. M., Nassozi, D. R., Agira, D., Wamala, N. K., Asiimwe, A., & Matovu, D. (2021). Acceptance of the coronavirus disease- 2019 vaccine among medical students in Uganda. *Tropical Medicine and Health*, *1*(49:37 Tropical), 1–11. https://doi.org/https://doi.org/10.1186/s41182-021-00331-1

Khalis, M., Boucham, M., Luo, A., Marfak, A., Saad, S., Aboubacar, C. M., Ait, S., Haj, E., Jallal, M., Aazi, F., Charaka, H., & Nejjari, C. (2021). *COVID-19 Vaccination Acceptance among Health Science Students in Morocco : A Cross-Sectional Study*. *December*, 1–10.

Konje, E. T., Basinda, N., Kapesa, A., Mugassa, S., Nyawale, H. A., Mirambo, M. M., Moremi, N., Morona, D., & Mshana, S. E. (2022). The Coverage and Acceptance Spectrum of COVID-19 Vaccines among Healthcare Professionals in Western Tanzania : What Can We Learn from This Pandemic ? *MDP1*, *10*(1429), 1–13. https://doi.org/https://doi.org/10.3390/vaccines10091429

Lucia, V. C., Kelekar, A., & Afonso, N. M. (2020). *COVID-19 vaccine hesitancy among medical students*. *43*(3), 445–449. https://doi.org/https://doi.org/10.1093/pubmed/fdaa230 |

MoH, (Minisitry of Health Tanzania). (2022). *Monthly*

Campaigns To Scale Up Covid-19 Vaccines Uptake In.

MoH, M. of H. T. (2022). *The United Republic Of Tanzania Covid-19 Situation Report: No. 27 From 2nd to 8th April 2022*. *27*, 1–7. https://www.moh.go.tz/report

MOHCDGEC, (Ministry of Health Community Development Gender Elderly and Children). (2021a). *Community Based Strategy To Accelerate Covid-19 Vaccination*.

MOHCDGEC, (Ministry of Health Community Development Gender Elderly and Children). (2021b). *Phase Two Multi Sectoral Accelerated Community Based Covid-19 Vaccination Strategy*. 1–17.

MOHCDGEC, (Ministry of Health Community Development Gender Elderly and Children). (2021c). Tanzania Covid-19 Vaccine Communication and Advocacy Strategy. *Department of Preventive Services-Health Promotion Section*.

Mose, A., Haile, K., & Timerga, A. (2022). COVID-19 vaccine hesitancy among medical and health science students attending Wolkite University in Ethiopia. *PLoS ONE*, *17*(1 1), 1–17. https://doi.org/10.1371/journal.pone.0263081

Orok, E. (2022). Knowledge , attitude and perception of medical students on COVID- vaccines : A study carried out in a Nigerian University. *Frontier in Public Health*, 1–9. https://doi.org/DOI 10.3389/fpubh.2022.942283

Pritchard, E., Matthews, P. C., Stoesser, N., Eyre, D. W., Gethings, O., Vihta, K.-D., Jones, J., House, T., VanSteenHouse, H., Bell, I., Bell, J. I., Newton, J. N., Farrar, J., Diamond, I., Rourke, E., Studley, R., Crook, D., Peto, T., Walker, A. S., … Team, C. I. S. (2021). Impact of vaccination on SARS-CoV-2 cases in the community: a population-based study using the UK's COVID-19 Infection Survey. *MedRxiv*, 2021.04.22.21255913. https://www.medrxiv.org/content/10.1101/2021.04.22.21255913v1%0Ahttps://www.medrxiv.org/content/10.1101/2021.04.22.21255913v1.abstract

Randolph, W., & Viswanath, K. (2004). *Lessons Learned Fromm Publich Health Mass Media Campaigns: Marketing Helath in a Crowded Media World*. 418–437.

Rosenstock, I. M., Strecher, V. J., & Becker, M. H. (1988). Social Learning Theory and the Health Belief Model. *Health Education Quarterly*, *15*(2), 175–183. https://doi.org/10.1177/109019818801500203

Shmueli, L. (2021). *Predicting intention to receive COVID-19 vaccine among the general population using the health belief model and the theory of planned behavior model*. 1–13.

Sweet, M. (2022). Five proven strategies to evaluate public health campaigns. In *Public Health Campaign* (pp. 2–5). (https://kw2madison.com/work/government-public-health. https://kw2madison.com/articles/five-proven-strategies-public-health-campaigns

Taber, K. S. (2018). *The Use of Cronbach ' s Alpha When Developing and Reporting Research Instruments in Science Education*. 1273–1296. https://doi.org/10.1007/s11165-016-9602-2

Ulbrichtova, R., & Svihrova, V. (2022a). Prevalence of COVID-19 Vaccination among Medical Students : A Systematic Review and Meta-Analysis. *Environmental Research and Public Health Article*, *19*(4072), 1–9. https://doi.org/https://doi.org/10.3390/ijerph19074072

Ulbrichtova, R., & Svihrova, V. (2022b). *Prevalence of COVID-19 Vaccination among Medical Students : A Systematic Review and Meta-Analysis*.

Yeager, D. S., Dahl, R. E., & Dweck, C. S. (2018). Why Interventions to Influence Adolescent Behavior Often Fail but Could Succeed. *Perspectives on Psychological Science*, *13*(1), 101–122. https://doi.org/10.1177/1745691617722620

Zaidi, A., Elmasaad, A., Alobaidli, H., Sayed, R., Al-ali, D., Al-kuwari, D., Al-kubaisi, S., Mekki, Y., Emara, M. M., & Daher-nashif, S. (2021). *Attitudes and Intentions toward COVID-19 Vaccination among Health Professions Students and Faculty in Qatar*. 1–23.