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COVID-19 vaccine hesitancy and associated factors among medical students in Tanzania: Evidence from the Catholic University of Health and Allied Science, Mwanza region

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Abstract

Background: Since the outbreak of COVID-19, the government of Tanzania has made efforts and initiatives to protect its citizens. These efforts and control measures are aligned with WHO guidelines and the National Response Plan for Controlling the COVID-19 Outbreak. Unlike other control measures, the Vaccine remained a promised solution to end the COVID-19 pandemic. Therefore, this study aims to determine the COVID-19 hesitancy level and associated factors among medical students. Furthermore, it aims to provide valuable insights and information that can be applied in future immunization campaigns/strategies to improve vaccination rates among this particular group of future medical professionals during the pandemic.
Methods: This is an analytical cross-sectional survey conducted to assess the COVID-19 vaccine hesitancy and associated factors among 580 undergraduate medical students at the Catholic University of Health and Allied Science (CUHAS) in Mwanza region, Tanzania. Data was collected through a structured questionnaire and analyzed using STATA version 18.0 to extract descriptive and inferential statistics to determine the factors influencing COVID-19 vaccine hesitancy in this particular group of future medical professionals. All the statistics were obtained at a 5% significant level.
Results: The vaccine hesitancy was 75.6% (95% CI, 71.9%-79.2%). Thus, more than half (54.3%) of the medical students do not trust the efficacy of the COVID-19 vaccine with an AOR of 2.96 (95% CI, 1.80-4.86, p-value<0.001); likewise, the safety of Vaccine AOR 0.1.89 (95% CI, 1.11-3.21, p-value=0.019). Further, students who do not prefer free riding (i.e., letting others get the vaccine and believing to get the beneficial effect of herd immunity without being vaccinated) were less likely to deny the Vaccine than those who prefer free riding AOR 0.31 (95% CI, 0.31, 0.13-0.75, p-value=0.009). Despite insignificant odds, too much politics behind the COVID-19 vaccine influences vaccine hesitancy with AOR 1.14 (95% CI, 0.61-2.15, p-value=0.676).
Conclusion: The study concludes that despite the efforts to communicate public health information to encourage people to overcome vaccine hesitancy and receive Vaccines, the reluctance to get vaccinated against COVID-19 remains higher than the acceptance rate among medical students.

Keywords: COVID-19, Hesitancy, Medical students, Vaccine

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Introduction

The Coronavirus disease of 2019, popularly known as COVID-19 or UVIKO-19 in the Swahili language, is still a global pandemic threat with little known about the impact of the disease and Vaccines on the human race. The pandemic has also impacted African nations, including Tanzania, with severe costs to lives, economies, and community social functioning (Konje et al. 2022; Pritchard et al. 2021). Unlike other control measures, the Vaccine is a promised solution to end the COVID-19 pandemic (Konje et al., 2022; Pritchard et al. 2021).

From that regard, to prevent an increase in COVID-19-related morbidity and death that is exacerbated by the nation's inability to handle severe and critical cases and the advent of novel virus strains, also, in line with the global response, like other least developing countries in Africa, Tanzania accepts and introduces vaccines as an essential measure to maintain community and population well-being. The Ministry of Health (MoH) has developed a guideline for COVID-19 vaccination to ensure immunization services align with the National Immunization Strategy (NIS) of Tanzania from 2021 to 2025 (Haonga 2022; MoH 2021). While there are several COVID-19 vaccines under development and use, the country will only use COVID-19 vaccines approved and registered by the Tanzania Medicines and Medical Devices Authority (TMDA).

In phase one, the vaccination strategy program targeted vulnerable groups, including people with high comorbidities, health workers (HWs), Community health workers (CHWs), business people who frequently travel, and medical students (Jain et al. 2021a; Kumar 2021). Phase two ideally focuses on the public health spectrum, that everyone is vulnerable to risks when it comes to COVID-19. Hence, vaccination programs must be provided to all eligible people at less cost if not fully subsidized by the government and other health entities internationally.

Until February 2023, however, the total number of eligible Tanzanians fully vaccinated against COVID-19 was slightly over 32,093,594, translating to about 45% of the total population and 87% of the target population above 18 years (MoH 2022; WHO 2022). In justifying why medical students are essential in the vaccination program/interventions, stakeholders in public health argue that it is crucial to increase vaccination rates among medical 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, Kelekar, and Afonso 2020; Ulbrichtova and Svihrova 2022).

Focusing on medical students, studies argue that medical 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. 2021a; Lucia, Kelekar, and Afonso 2020; Ulbrichtova and 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 is known on the determinants of COVID-19 vaccine hesitancy. Therefore, this study aims to determine the COVID-19 hesitancy level and associated factors among medical students. Furthermore, it aims to provide valuable insights and information that can be applied in future immunization campaigns/strategies to improve the vaccination rate among this particular group of future medical professionals during the pandemic.

Methods

Study design and setting.

This analytical cross-sectional survey was conducted to assess the COVID-19 vaccine hesitancy among medical students enrolled in different schools of Catholic University of Health and Allied Science (CUHAS) in Mwanza.

Study subjects and sampling methodology.

The study population comprised all undergraduate students enrolled in the Doctor of Medicine (DoM), Pharmacy, Radiology, Medical Lab, and Nursing programs at CUHAS in the Mwanza Region of Tanzania. These programs were selected because, during the second and third year of study, students in all five programs must complete clinical rotations and are, therefore, likely to have greater exposure to COVID-19 infection. The study sample size consisted of 593 respondents, and this estimation was done used Cochran's (1977) formula as well as including other details from previous report status of COVID-19 in Tanzania, whereby the prevalence of COVID-19 was 6.7 percent (MoH 2022), marginal error of 2.25 percent, and adjusted by 20 percent non-response rate. Furthermore, a simple random sampling technique was used to select students to participate in this study.

Data collection tools and procedures

Students were interviewed using a prepared structured questionnaire, and data on demographic patterns and information about their previous experiences were obtained. The questionnaire consisted of close-ended questions with three (3) sections. Section one consisted of questions about the demographic characteristics of respondents; section two, questions about vaccine hesitancy; section three consisted of questions about the acceptability of the COVID-19 vaccine. From that regard, the researcher developed a tool for data collection (a questionnaire) based on other similar studies (Hanna et al. 2022; Id et al. 2022; Islam et al. 2021; Kaur et al. 2022; Unicef, USAID, and CADRES 2021), such as the standard tools by the Centre of Disease Control (CDC) on assessing the acceptability of the COVID-19 vaccine (CDC, 2021) and WHO guide on communicating with the community about COVID-19 vaccine of 2021). Before going to the field, the tool was pre-tested among forty-one (41) medical students of the Muhimbili University of Health and Allied Science (MUHAS) to test the validity of the research instrument, including the consent form and questionnaire.

Data Analysis

Variables and measures

The study variables were grouped into major categories named dependent and independent variables. The dependent variable was the acceptability of Vaccines, whereby data on vaccination, willingness/intention to take, and recommend vaccines to others were collected. All the items of the dependent variable were self-reported and measured using a nominal scale. The independent variable was vaccine hesitancy, which was grouped into five (5) domains: convenience, politics of COVID-19 vaccination, perceived risk of infections, safety concerns, free riding, and vaccine deniers. All the independent variable items were self-reported and measured using a nominal and Likert scale.

Statistical analyses

Data collected 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 Corp, College Station, TX, USA) statistical software for analysis. Descriptive statistics were employed to describe the study background of participants. However, mean/median was used to summarize the age and scaled questions, while proportions and frequency tables were deployed to summarise categorical variables. Since the outcome variable was measured using the dichotomous scale, therefore, logistic regression analysis in this case bivariable (COR), and multivariable (AOR) analysis was carried out to identify variables in hesitancy factors having a significant association with vaccination status, the p-value of less than 0.05 (significant level) was considered statistically significant.

Ethical Consideration

Every participant, in this case, a medical student, was fully informed about the study and asked to participate voluntarily. The data collected was used only for this study and kept confidential. Participants' identities were replaced by codes and kept secure to ensure confidentiality. Participants were assured that refusing to participate or withdraw from the study was and will not result in any penalties or affect a student's rights while at the university. The study proposal secured ethical clearance from the Research and Publication Ethical Committee at MUHAS (Reference number: BU/03/5026/Vol.III/1196). Additionally, permission to conduct the data collection activity was obtained from the Catholic University of Health and Allied Sciences (CUHAS) before the study began. 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

Demographic Profile of the Students

In total, 580 medical students were enrolled in the study; the median age was 24, interquartile range [IQR, 23-25 years]. More than half of the students (52.4%, n=301) were male compared to 47.6% (n=274) female. 92.0% (n=526) of all surveyed students reported being single/unmarried, 6.8% (n=39) reported having a chronic disease, and 15.8% (n=90) reported ever being involved in any COVID-19 response team during the management of the pandemic. Regarding the main source of information about the COVID-19 pandemic, 70% (n=406) of all medical students reported using television/media websites, followed by 56.4% (n=327) relayed on Friends/family members/lectures, while 53.5% (n=310) used Social Platforms (Facebook, WhatsApp, and Twitter., etc.) (Table 1).

Table 1: Demographics Characteristics (N=580)

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 †		

Variable	Frequency	Percentage
Ministry of Health website	259	44.7
World Health Organization (WHO)	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 Medical Students

The study assesses the acceptability status of the COVID-19 vaccine among medical students (Table 2). Results indicate that about one-quarter of medical students had received any COVID-19 vaccine 24.4% (n=135, 95% CI, 20.9%-28.2%). Further, only 24.6% (n=130) intend to take the COVID-19 vaccine in the future, in this case, in the next three (3) months. Half of the medical students reported having close family/friend/relative already vaccinated against COVID-19, While more than three-quarters of medical students are likely to recommend the Vaccine to other close relatives and friends (i.e., 54.5% somewhat likely and 27.9% extremely likely).

Moreover, the study used the percentage scale measurement of 1-10 to measure the level of trust and hesitancy about the COVID-19 vaccine among medical students. The purpose was to establish the proportion of medical students' trust and hesitation to get COVID-19 vaccines. Slightly more than half of the students reported trusting the COVID-19 vaccine, with a mean of 5.81 (SD=2.765). Similarly, to the hesitancy level, slightly half of the students reported having moderate hesitancy of the COVID-19 vaccine with a mean of 5.83 (SD=2.823) (Table 2).

Table 2: Acceptance of COVID-19 Vaccine among Medical Students

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, SD)	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, SD)	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

Hesitancy of COVID-19 Vaccine Among Medical Students

The study was to identify persistent hesitancy factors that hinder medical students from getting the COVID-19 vaccine even after implementing public health campaign intervention. The purpose was to highlight the key issues that stakeholders in health sectors can focus on to impact public health behavior among medical students.

The hesitancy factors were grouped into six (6) domains: convenience, political issues, perceived risk of infections, safety concerns, free riding, and vaccine denials (Table 3). On the convenience spectrum, slightly more than half of the medical students (54.3%, n=315) do not trust the efficacy of the COVID-19 vaccine, followed by 37.4% (n=217) do not trust the safety of COVID-19 vaccine, and 28.8% (n=167) do not trust the safety of any vaccine. Further, more than half of the medical students affirm that there is too much politics behind the COVID-19 vaccine in Tanzania (i.e., 40.7% agreed and 28.5% strongly agreed). Likewise, 54.4% (n=314) of all medical students affirmed that they did not trust the government health officials in promoting the COVID-19 vaccine (i.e., 39.5% Agreed and 14.9% Strongly agreed).

Regarding the perceived risk of infections, 30.7% (n=178) of students are little concerned about getting COVID-19 infections. While on the Vaccine's safety, 42.7% (n=247) affirm the Vaccine to be moderately safe. Also, 48.5% (n=281) are somewhat likely to take the COVID-19 vaccine if it helps to protect themselves and others. Nevertheless, one quarter (25.1%, n=140) of all students affirm that they are not eligible to get a COVID-19 vaccine, and 26.2% (n=152) relayed the benefits from the protection and overall vaccination efforts of others already vaccinated. Lastly, 18.6% (n=215) affirmed never taking the COVID-19 vaccine even if it is made mandatory by the university (Table 3).

Table 3: Hesitancy Factors Persist Even After Public Health Campaign Intervention among Medical Students (n=580)

Variable	N (%)
Convenience†	
Do not trust the safety of ANY vaccine	167(28.8)
Do not trust the safety of COVID-19 vaccines	217(37.4)
Do not trust the efficacy of COVID-19 vaccines	315(54.3)
Not afford to pay for COVID-19 vaccines	87(15.0)
Not afford to pay for transport to get to a COVID-19 vaccination location	66(11.4)
Politics of COVID-19 vaccination	
There is too much politics behind the COVID-19 vaccine in Tanzania.	
Strongly disagree	57(9.8)
Disagree	122(21.0)
Agree	236(40.7)
Strongly agree	165(28.5)
Don't trust government health officials to promote the COVID-19 vaccine.	
Strongly disagree	73(12.6)
Disagree	191(33.0)
Agree	228(39.5)
Strongly agree	86(14.9)
Perceived risk of infections	
Concerned about getting COVID-19	
Not at all concerned	78(13.5)
A little concerned	178(30.7)
Moderately concerned	166(28.6)
Very concerned	158(27.2)

Variable	N (%)
Safety concerns	
Concerned about the Safety of COVID-19 vaccine	
Not at all safe	74(12.8)
A little safe	152(26.3)
Moderately safe	247(42.7)
Very safe	105(18.2)
Likelihood of taking COVID-19 vaccine if it helps protect others	
Not at all likely	87(15.0)
Somewhat likely	281(48.5)
Extremely likely	211(36.4)
Freeriding	
If eligible to get a COVID-19 vaccine	
No	140(25.1)
Yes	417(74.9)
Benefit from the protection and overall vaccination efforts of others who are already vaccinated	
Strongly disagree	79(13.6)
Disagree	99(17.1)
Neutral	249(43.0)
Agree	116(20.0)
Strongly agree	36(6.2)
Vaccine deniers	
Take the COVID-19 vaccine if mandated by the heads of your institution.	
No	107(18.6)
Not sure	252(43.9)
Yes	215(37.5)

† = *multiple responses*

Furthermore, the researcher used logistic regression to identify factors in hesitancy domains associated with not receiving the COVID-19 vaccine (i.e., 1=No and 0=Yes) (Table 4).

The bivariate results revealed that being part of any COVID-19 response team/program reduces the chance of vaccine denial compared to being involved with COR 0.26 (95% CI, 0.16-0.42, p-value<0.001). The odds remain unchanged even during multivariate analysis AOR 0.29 (95% CI, 0.16-0.54, p-value<0.001). Medical students who do not trust the safety of the COVID-19 vaccine are more likely not to be vaccinated compared to those who trust the safety with COR 1.79 (95% CI, 1.17-2.75, p-value=0.007). The odds remain unchanged even during multivariate analysis AOR 0.1.89 (95% CI, 1.11-3.21, p-value=0.019). Also, students who do not trust the efficacy of the COVID-19 vaccine are more likely not to be vaccinated compared to those who trust the efficacy with COR 2.47 (95% CI, 1.65-3.68, p-value<0.001) and AOR 2.96 (95% CI, 1.80-4.86, p-value<0.001) during bivariate and multivariate analysis respectively. Medical students who are very concerned about getting COVID-19 infectious are less likely to deny the Vaccine compared to those who are not all concerned with COR 0.17 (95% CI, 0.08-0.36, p-value<0.001) and AOR 0.40 (95% CI, 0.16-0.98, p-value=0.045). On free riding, medical students who affirm to be eligible to get a COVID-19 vaccine were less likely to denial the Vaccine compared to those who affirm not being eligible with COR 0.15 (95% CI, 0.07-0.31, p-value<0.01) and AOR 0.31 (95% CI, 0.31, 0.13-0.75, p-value=0.009) respectively.

However, some of the factors were only significant during bivariate or multivariate analysis. This includes the fact medical students who are extremely likely to take the COVID-19 vaccine if it helps protect others were less likely to deny the Vaccine compared to those who are not at all likely with COR 0.12 (95% CI, 0.05-0.27, p-value<0.001)

while during multivariate analysis AOR 0.47, (95% CI, 0.17-1.32, p-value=0.152). Lastly, the medical students who intend to accept the COVID-19 vaccine if it is made mandatory by the head of the institution (university) were less likely to deny the Vaccine compared to those who did not at all accept with COR 0.20 (95% CI, 0.10-0.38, p-value<0.001) while AOR 0.48 (95% CI, 0.22-1.03, p-value=0.060).

Table 4: Hesitancy factors associated with COVID-19 vaccine acceptability among medical students even after public health campaign intervention.

Variables	Ever received COVID-19 Vaccine		COR, 95% CI	p-value	AOR, 95% CI	p-value
	Yes N (%)	No N (%)				
Ever been part of any COVID-19 response team/program.						
No	91(19.9)	366(80.1)	1		1	
Yes	43(48.9)	45(51.1)	0.26, 0.16-0.42	**<0.001**	0.29, 0.16-0.54	**<0.001**
Do not trust the safety of COVID-19 vaccines.						
No	98(28.2)	249(71.6)	1		1	
Yes	37(18.0)	169(82.0)	1.79, 1.17-2.75	**0.007**	1.89, 1.11-3.21	**0.019**
Do not trust the efficacy of COVID-19 vaccines.						
No	83(33.6)	164(66.4)	1		1	
Yes	52(17.0)	254(83.0)	2.47, 1.65-3.68	**<0.001**	2.96, 1.80-4.86	**<0.001**
There is too much politics behind the COVID-19 vaccine in Tanzania.						
Disagree	45(26.0)	128(74.0)	1		1	
Agree	90(23.7)	290(76.3)	1.13, 0.75-1.71	0.555	1.14, 0.61-2.15	0.676
Don't trust government health officials to promote the COVID-19 vaccine.						
Disagree	64(25.0)	192(75.0)	1		1	
Agree	71(24.1)	224(75.9)	1.05, 0.71-1.55	0.800	0.72, 0.39-1.32	0.287
Concerned about getting COVID-19						
Not at all concerned	10(13.2)	66(86.8)	1		1	
Moderately concerned	52(16.3)	268(83.8)	0.78, 0.37-1.62	0.506	1.04, 0.44-2.48	0.921
Very concerned	73(46.5)	84(53.5)	0.17, 0.08-0.36	**<0.001**	0.40, 0.16-0.98	**0.045**
Likelihood of taking COVID-19 if it helps protect others						
Not at all likely	7(8.2)	78(91.8)	1		1	
Somewhat likely	40(15.3)	221(84.7)	0.50, 0.21-1.15	0.103	0.81, 0.29-2.28	0.688
Extremely likely	88(42.7)	118(57.3)	0.12, 0.05-0.27	**<0.001**	0.47, 0.17-1.32	0.152
If eligible to get a COVID-19 vaccine						
No	8(6.1)	123(93.9)	1		1	
Yes	124(30.9)	278(69.2)	0.15, 0.07-0.31	**<0.001**	0.31, 0.13-0.75	**0.009**

Variables	Ever received COVID-19 Vaccine		COR, 95% CI	p-value	AOR, 95% CI	p-value
	Yes N (%)	No N (%)				
Benefit from the protection and overall vaccination efforts of others who are already vaccinated						
Disagree	49(28.5)	123(71.5)	1		1	
Neutral	49(20.9)	186(79.2)	1.51, 0.96-2.39	0.076	1.28, 0.71-2.30	0.405
Agree	36(24.8)	109(75.2)	1.21, 0.73-1.99	0.464	1.29, 0.67-2.51	0.438
Take the COVID-19 vaccine if mandated by the heads of your institution.						
No	14(13.3)	91(86.7)	1		1	
Not sure	30(12.6)	208(87.4)	1.07, 0.54-2.11	0.853	1.23, 0.56-2.69	0.607
Yes	88(43.1)	116(56.9)	0.20, 0.10-0.38	**<0.001**	0.48, 0.22-1.03	0.060

Discussion

This study about acceptability focuses on vaccination status against COVID-19 among medical students and establishes the hesitancy level. While only a quarter of them reported vaccinating against COVID-19, more than half of medical students hesitate or are reluctant to receive the Vaccine (Kanyike et al. 2021; Mohammed et al. 2022). The high level of vaccine hesitancy among medical students is concerning, given their role as future healthcare professionals. It is crucial for medical students to not only have access to accurate and reliable information about the Vaccine but also to have a strong belief in its safety and effectiveness (Gala et al. 2022; Lucia, Kelekar, and Afonso 2020; Ulbrichtova and Svihrova 2022). Their acceptance and endorsement of the Vaccine can significantly influence public perceptions and attitudes toward vaccination. It is evident that hesitance is due to concerns about the Vaccine's safety, efficacy, and long-term effects Addressing these concerns and providing clear, evidence-based information is essential to build trust and increase vaccine acceptance among medical students (Gala et al. 2022; Habib et al. 2022; Jain et al. 2021b; Kanyike et al. 2021; Mohammed et al. 2022).

Moreover, interventions and educational programs should be developed to specifically target medical students and address their unique concerns. These programs should focus on providing accurate information about the COVID-19 vaccine, addressing any misconceptions, and emphasizing the importance of vaccination in protecting public health. Additionally, fostering open and respectful dialogue about vaccine hesitancy among medical students can help address their concerns and provide a platform for discussion and clarification.

In addition, the concept of freeriding, as measured by the perception of eligibility for the Vaccine, is an important factor to consider in

understanding vaccine hesitancy among medical students. Freeriding refers to individuals who may feel they are not directly impacted by a particular issue or believe that others will take responsibility for addressing the issue, leading to a lack of personal motivation to take action. In the context of COVID-19 vaccination, the low odds of hesitancy among medical students who perceive themselves as eligible for the Vaccine can be attributed to several factors. First, eligibility criteria are often based on established guidelines prioritizing high-risk individuals or those in specific occupations, such as healthcare workers and people with chronic or long-term diseases (Abila et al. 2020).

Therefore, medical students, being part of the healthcare profession and response team, may perceive themselves as eligible due to their role in patient care and exposure to infectious diseases. This perception of eligibility may contribute to a stronger sense of responsibility and a greater understanding of the importance of vaccination. Secondly, medical students are likely to have a higher level of knowledge and understanding of vaccine efficacy and safety due to their education and training in healthcare. They are more likely to be familiar with the scientific evidence supporting the COVID-19 vaccine and may have greater trust in the regulatory processes and guidelines governing its use. This increased knowledge and trust can reduce hesitancy and increase their willingness to accept the Vaccine.

While the lack of statistical significance may indicate that the relationship between political concerns, distrust in government health officials, and vaccine hesitancy among medical students is not strongly supported by the data, it is still important to acknowledge the potential influence of these factors (Bonell et al. 2020; Tatar and Wilson 2021).

The perception of politics influencing the Vaccine can contribute to hesitancy by fostering skepticism and doubts about the safety and efficacy of the Vaccine. Similarly, lacking trust in government health officials may undermine confidence in their recommendations and communication efforts (Randolph and Viswanath 2004).
Therefore, addressing these concerns and building trust is crucial in promoting vaccine acceptance among medical students. It is essential to provide transparent and reliable information about the Vaccine's development, regulatory processes, and the scientific evidence supporting its safety and effectiveness. Open dialogue, clear communication channels, and engagement with medical students can help address their specific concerns and provide reassurance. Collaborative efforts between healthcare institutions, government bodies, and educational institutions can play a vital role in building trust and countering vaccine hesitancy.

Conclusion

The study concludes that despite the efforts communicated public health information to encourage people to overcome vaccine hesitancy and receive Vaccine, the reluctance to get vaccinated against COVID-19 remains higher than the acceptance rate among medical students.

Recommendation

The ministry of health (MoH) and other stakeholders in Health sectors should implement targeted communication and educational in this case campaigns specifically designed for medical students. These campaigns should focus on providing accurate, evidence-based information about the COVID-19 vaccine, addressing concerns related to politics, and building trust in government health officials. Moreover, utilize various channels, such as workshops, seminars, online platforms, and peer-to-peer discussions, to effectively reach and engage medical students.

Limitation of the study

This study was conducted only among medical students in the Mwanza region, the results from this study may be difficult to project to all medical schools in Tanzania. Likewise, this study prioritizes understanding the core factors behind student vaccine hesitancy, such as misinformation exposure, while acknowledging the potential role of communication channels. Finally, the questionnaire was self-administered, suggesting the possibility of information bias. Therefore, to enhance generalizability, the researcher ensured the study sample was large enough to include all medical students from all Five (5) programs. This helped to ensure that the findings represent a wider range of medical

students' perspectives. However, the findings of this study can be applied with caution and within the context of medical students so as to impact the public health behaviour among this targeted group across the Tanzania context.

Finally, a pre-test of the questionnaire and revising for clarity and content were done before releasing the final form. This helped minimize the risk of participants misunderstanding the questions and ensures clarity as well address information bias associated with self-administered questionnaires.

Data availability

The data that supports the findings of this study cannot be shared publicly but will be available upon request of a researcher.

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