


COVID-19 vaccine hesitancy among health professionals in a tertiary care center at the University of Gondar Specialized Hospital, Ethiopia: A cross-sectional study

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Abstract

Background: COVID-19 is a highly communicable disease that can be transmitted from animal-to-human and human-to-human contacts. It is still now a major global threat for which vaccination remains the ultimate solution to protect it, especially healthcare professionals are the first frontiers to fight against the COVID-19 virus which makes them at higher risk of this disease. Therefore, to reduce the spread of COVID-19, we need to improve the acceptance of COVID-19 vaccines is crucial. The aim of this study was to assess the vaccine hesitancy of the COVID-19 vaccine among health professionals who worked at the University of Gondar Specialized Hospital.

Methods: A cross-sectional survey was conducted between 1 May and 10 June 2021. And the data were analyzed using Statistical Package for Social Sciences version 26. A chi-square test was conducted and to assess the associations between socio-demographic characteristics, perceived risk of COVID-19, attitude, and acceptance of COVID-19 vaccine, a *p*-value of less than 0.05 was considered to declare statistical significance.

Results: We surveyed 319 health professionals with a response rate of 67.87%. Of these, 74.9% (239) were male, and 81.2% (259) of health professionals were perceived exposed to COVID-19 without testing. 87.7% of respondents would like to vaccinate their parents. 66.2% (208) of them have accepted the COVID-19 vaccine. 54.85% (175) of health professionals had a good attitude and 45.8% (146) of health professionals were received the first-round COVID-19 vaccine.

Conclusion: This study showed that more than 60% of health professionals had good acceptance of COVID-19 vaccination during the pandemic period. Regarding vaccine safety profile may reduce the vaccination in the future. To increase vaccine uptake in response to the COVID-19 pandemic, COVID-19 vaccination programs should be redesigned to remove barriers to vaccine acceptance. Knowledge and attitude toward the COVID-19 vaccine should be promoted.

Keywords

Acceptance, COVID-19, health professionals, vaccine, Ethiopia

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Introduction

COVID-19 is a highly spreadable disease that can be transmitted via animal-to-human and human-to-human interactions. The recent incidence was for the first time informed in December 2019 among patients with clinical symptoms of viral pneumonia in Wuhan, which is the capital city of Province Hubei, China. On 30 January 2020, the WHO stated that coronavirus disease 2019 (COVID-19) a global health problem called pandemic.^{1,2} By diminishing economic activities, transportation, and social interaction, causing changes in

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the patterns and modes of social interaction imposing Ethiopian governments to suspend the election process, and above all, COVID-19 the cause for millions of people and different mechanisms were practiced to control but the transmission of the virus was not reduced. For example, various medication and biological products—like hydroxychloroquine, remdesivir, convalescent plasma, and tocilizumab—were tried to manage COVID-19 patients with no definite therapeutic effect.^{3,4} Different protective community health measures like stay at home, hand washing, proper utilization of face masks, and social distancing have been employed with limited success.

The first mass immunization program begins in early December 2020 and the number of vaccination doses ordered is updated from time to time. More than 13 types of various vaccines (across four platforms) have been administered.⁵ In 2015, the World Health Organization (WHO) Strategic Advisory Group of Experts on Immunization defined vaccine hesitancy as a delay in acceptance or rejection of vaccine without consideration of the availability and affordability of the vaccine.⁶ AstraZeneca vaccines produced by Serum Institute of India (SII) were delivered to Ethiopia on 6 March 2021 with the aim of enhancing immunity to a recent pandemic in COVID-19 infections which can differ in form and strength depending on when and where it occurs and which type of vaccine is developed, as multiple studies confirmed. High vaccine acceptance and administration may be required to stop the COVID-19 pandemic globally. However, less research was done in the low-income countries which led to a decrease the vaccination coverage and increase transmission and mortality rate.

Healthcare professionals (HCPs) are the primary frontiers to control COVID-19 which makes them at higher risk of this highly transmittable virus. Therefore, to reduce the transmission of COVID-19 increase, the acceptance of COVID-19 vaccination is critical. However, immunization program success depends on high vaccine acceptance versus rejection rates by healthcare providers, who play a crucial role in vaccination.⁷ If the acceptance of health professionals is poor, they will not appropriately vaccinate another individual because their attitude toward the vaccine is not good. Nowadays there are so many sources of information that have positive and negative impacts on acceptance. Public opinions on a vaccine are increasing vaccine acceptance, but negative information about the vaccine has also an impact on vaccine acceptance.

A survey was done on Israel populations, which included both medical and non-medical professionals assessed the current vaccination acceptance rates and evaluated whether participants would agree to take a vaccine once becomes available. The study showed that the rate of vaccine distrust was high among medical professionals than non-medical ones, which depended on the personal risk–benefit perception, which may depend on misinformation about vaccine safety profile and efficacy.⁸

Due to the speedy manufacturing of the COVID-19 vaccine, many of the study participants were non-adherent and increased fears about the safety of the vaccine.⁹ Even though, a person who believes that they are at a higher risk of illness and older individuals had greater vaccine acceptance. Vaccine uptake and not perceiving vaccines to cause side effects, health professionals with a positive attitude toward vaccination and perceiving limited practical difficulties of vaccination, general knowledge about COVID-19 vaccine, social influences and trust in the government information, and having increased information about the vaccine. Safety concerns, perceived low severity of illness, lack of awareness, and belief in alternative medicine are the common reasons for refusing vaccination of health professionals.¹⁰

In Ethiopia, there are so many justifications that have not accepted the vaccine like religious and traditional believe, attitudinal beliefs, and cultural adaption of flu virus that affect the acceptance. Many health professionals were infected with the virus, healthcare providers are at higher risk to the virus. Although educational movements will increase their attitude and acceptance of the COVID-19 vaccine, this study aimed to assess the acceptance and attitude of the COVID-19 vaccine among health professionals in Gondar Specialized Referral Hospital, Ethiopia.

Methods

Study setting and period

The study was conducted at the University of Gondar Specialized Hospital, Gondar, Ethiopia. Gondar is one of the most well-known historical cities in Ethiopia, which is located in the northwestern part of the country, 747 km away from Addis Ababa, the capital city of the country. Based on a prediction from the 2007 National Census data, its population is projected at about 227,100. The university was established in 1954, and it is the oldest medical training institution in Ethiopia. This comprehensive specialized hospital currently serves more than five million people in its catchment area. It has more than 1200 health care professionals, 600 beds in five different inpatients departments and 14 wards, and 14 different units giving outpatient services to the patients. Also, this hospital serves as a referral hospital found in the Northwest part of Ethiopia. The study was conducted from 1 May to 10 June 2021.

Study design

The participants were recruited using a simplified snowball sampling technique where invited candidate participants were requested to pass the invitations to their email account. The survey was estimated to take ~5 min to complete. To collect the complete data, a set of questions were created and established. The questionnaire contains three sections, the first one is socio-demographic data, the second section was

medical and general vaccine knowledge history, and the final section was attitude and acceptance of the COVID-19 vaccine. Data were collected through a pre-tested and validated questionnaire established by the authors after complete reviews of the currently available published research. The questions were pre-tested among 25 individuals, and the data were not included in the reports.

Population and sampling source population

All health professionals employed at the CMHS, University of Gondar Specialized Hospital practicing in different units of the hospital. Healthcare professionals who worked during the study period and actively responded to the email survey were eligible to participate in the study. Healthcare professionals who had no email account and were unwilling to respond were excluded from the study. The participants were employed using convenience and snowball sampling techniques. The snowball sampling is useful for subjects that are not easily available due to high work overload.

Study variables

The response variable was acceptance of COVID-19 vaccine in health professionals. To assess the acceptance, the respondents were provided with the following information: general socio-demographic information perceived risk of COVID-19 virus, immunization history, and attitude toward vaccine are considered as an explanatory (independent) variable.

Some of the independent variables were collected. Socio-demographic characteristics (age, sex, year of study, and academic field of study), attitude toward a general vaccine and COVID-19 vaccine, and medical condition of the employers.

Data collection tool and technique

Invitations to participate in the study, accommodated by Google Forms, and were disseminated on an email communication platform. This email was chosen since more than 90% of health professionals currently use this platform and the users are relatively varied across age groups and other socio-demographic characteristics.¹¹⁻¹³ The prepared questionnaire had three sections which include socio-demographic characteristics, the second section about general knowledge, and attitudes toward vaccines and immunization, and the final section on acceptance, and attitude about COVID-19 vaccine.

Statistical analysis

The completed questionnaires were extracted from Google Forms and exported to Microsoft Excel for checking, sorting, categorizing, and coding, and then transferred to

Statistical Package for Social Sciences (SPSS) version 26 for analysis. Frequencies and percentages were used to express different descriptive variables and a chi-square test was conducted to the presence of association among the variables. p -value < 0.05 was considered as statistical significance.

Ethical considerations

Ethical approval of the research was obtained from the ethical review board of the School of Pharmacy, the University of Gondar, and the study was done by following the Helsinki Declaration as revised in 2013. The study participants were informed properly about the study purpose clearly in the questionnaires and confidentiality of the participant was guaranteed by collecting the data anonymously.

Results

Socio-demographic characteristics

The response rate to the emailed survey was 67.87% (319). Of those, 74.9% (239) of respondents were male, of all respondents 67.4% (215) were married, and 78.7% (251) were ≤ 35 years old. 94.7% (302) had degrees and above, and 22.9% (73) were nurses, 85.6% (273) had no comorbid condition. And 28.2% (90) of health professional income were 5500–8000 ETB (Table 1).

General knowledge and practice about vaccine

Among 319 health professionals, 62.4% (199) wear considered as vaccines are safe, and 45.8% (146) received the first phase round COVID-19 vaccine. Among the respondents, 81.2% (259) of study participants perceived that they had been exposed to COVID-19 without confirmation with testing. If a COVID-19 vaccine was available with the desired efficacy, 87.8% (280) of health professionals would encourage their parents to take the vaccine (Table 2). Most professionals are worried about the pandemic due to fear of infected family members 71.5% (228), fear of becoming infected me 4% (12), and fear of death 51.74% (181) (Figure 1). Among all the respondents, 4.7% (15) were tested themselves, 4.4% (14) were positive for COVID-19, and 51.27% (165) of their neighbors were tested positive (Table 1).

Attitude and acceptance of health professionals toward COVID-19 vaccine

Among 319 health professionals, more than 50% of health professionals had a good attitude 54.7% (175) and 66.77% (213) accept the COVID-19 vaccine. Only 12.2% (39) of health professionals would not accept the vaccine and recommend it to their parents if the vaccine was available with the desired efficacy (Table 2). Health professionals trusted

Table 1. Socio-demographic characteristics of study participants (N=319).

Characteristics	Frequency (N)	Percent (%)
Sex:		
Male	239	74.9
Female	80	25.1
Age group (years):		
≤35	250	78.4
>35	69	21.6
Profession:		
Medical doctor	51	16
Nurses	73	22.9
Pharmacy	50	15.7
Midwifery	43	13.5
Laboratory	32	10
Anesthesia	10	3.1
Physiotherapy	18	5.6
Optometry	12	3.8
Others	30	9.4
Education:		
Diploma	17	5.7
Degree	192	60.2
MSc	86	27
Above MSc	24	7.5
Monthly income:		
<3500	15	4.7
3500–5500	74	23.2
5500–8000	90	28.2
8000–10,000	79	24.76
>10,000	61	19.12
Marital status:		
Married	215	67.4
Unmarried	104	32.6
Do you have a comorbidity (any chronic disease)?		
Yes	46	14.4
No	273	85.6
Do you have kids?		
Yes	168	52.7
No	151	47.3
Who of the following tested positive for COVID-19?		
Myself	15	4.7
A family member	14	4.4
A friend	66	20.7
Neighbor	165	51.27
College	100	31.35
No one	82	25.7

sources of information about the COVID-19 vaccine are health care providers 67.7% (216), scientific articles 55.2% (176), media (television/radio) 35.11% (112), and pharmaceutical company reports 22.26% (71) (Figure 2).

The perceived risk of COVID-19 without testing was high 81.2% (259) which increase the acceptance rate of the COVID-19 vaccine (62.9% vs 37.1%, p -value=0.003; Table 3). Chi-square analysis revealed that a good attitude

Table 2. General knowledge and practice about vaccination characterization (N=319).

Characterization	Frequency (N)	Percent (%)
In general, vaccines are safe.		
Strongly agree	83	26
Agree	116	36.4
Neutral	90	28.2
Disagree	30	9.4
Have you or someone you know ever had a bad reaction to a vaccine?		
Yes	118	37
No	201	63
Have you received the influenza vaccine?		
Yes	78	24.5
No	241	75.5
Have you received the COVID-19 vaccine?		
Yes	146	45.8
No	173	54.2
Do you think that you may have been exposed to or infected with COVID-19 (without testing)?		
Yes	259	81.2
No	60	18.8
If a COVID-19 vaccine was available with the desired efficacy, would you encourage your parents to get the vaccine?		
Yes	280	87.8
No	39	12.2

toward the COVID-19 vaccine was significantly higher likely to accept new COVID-19 vaccine (p -value=0.0001), as were those who had general vaccine safety acceptance (p -value=0.001). Participants with a previous bad reaction to the vaccine were no significant association to accept the vaccine (p -value=0.231). Gender, chronic illness, marital status, and taking influenza vaccine had not shown statistically significant differences in the acceptance rate (Table 3).

Discussion

Vaccination is the best way of controlling infectious illnesses, although success is confronted by groups and individuals who choose to refuse or reschedule vaccines.⁹ Vaccine hesitancy plays a significant role in the risk of vaccine-preventable disease epidemics and vaccine coverage.¹⁰ This study aimed to assess the acceptance and attitude on COVID-19 vaccine among health professionals who worked at the University of Gondar Specialized Hospital. In this case, medical doctors, nurses, pharmacy, midwifery, laboratory, anesthesia, physiotherapy, optometry, and others were selected to participate in the study. The present findings represent a wide range of socio-demographic factors that influence the acceptance of the COVID-19 vaccine. Thus, the current finding will be critical in improving COVID-19 vaccination-related programs through health education programs and awareness creation.

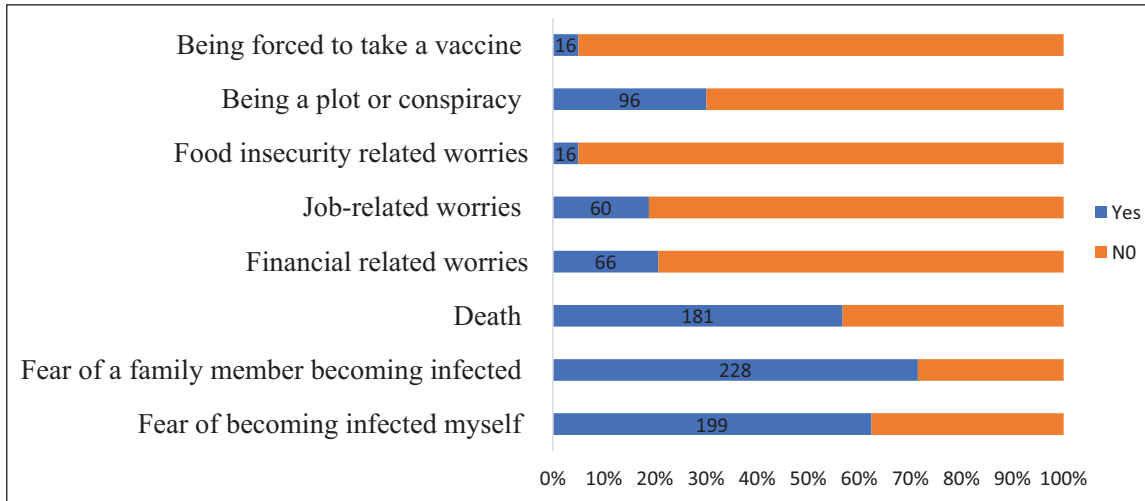


Figure 1. The most worried problem of health professionals to COVID-19 pandemic (N=319).

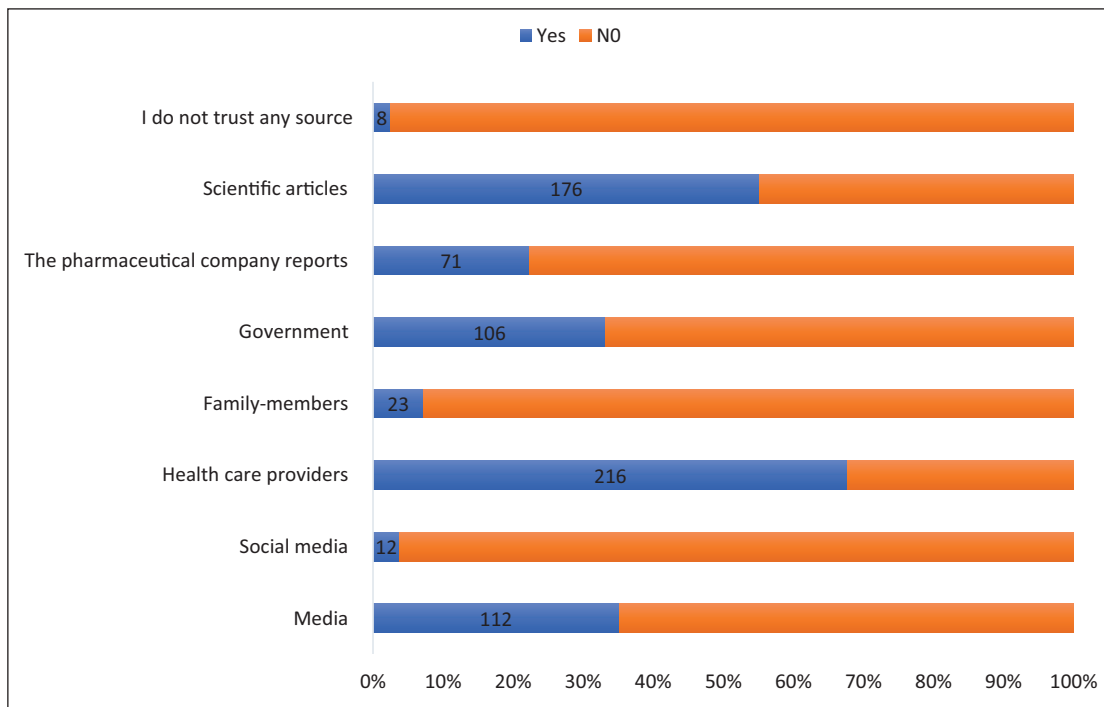


Figure 2. The most trusted source of information about COVID-19 vaccines (N=319).

In this study, among 319 health professionals, 54.7% had a good attitude and 66.77% of health professionals accepted the COVID-19 vaccine. The good attitude and high acceptance toward COVID-19 vaccination among the health professionals reflected the high recognition of the importance of vaccines in controlling COVID-19 infection and the strong demand for the vaccine. A similar study conducted in Ethiopia revealed that only 31.4% are willing to accept the COVID-19 vaccine, the remaining 21.3% and 47.3% are undecided or disagree to take the COVID-19 vaccine,

respectively.¹¹ The acceptance rate of the COVID-19 vaccine is higher in this study when compared with similar studies conducted in Bangladesh (40%),¹² Ethiopia (31.4%),¹¹ Greece (57.7%),¹⁴ Russia (54.8%),¹⁵ and Saudi Arabia (64.7%).¹³ However, the acceptance rate of the COVID-19 vaccine is lower in this study when compared with similar studies conducted in China (88.6%),¹⁵ the United Kingdom (76.9%),¹⁶ or other European countries (ranging from 62% to 80%).¹⁷ Similar studies conducted from 19 countries having 13,426 respondents revealed that the total acceptance of

Table 3. Association between socio-demographic characteristics and acceptance of COVID-19 vaccine (N=319).

Characteristics	COVID vaccine acceptance		Chi-square	p-value
	Yes (%)	No (%)		
Sex:				
Male	154 (64.4)	85 (35.6)	2.34	0.126
Female	59 (73.75)	21 (26.25)		
Age (years):				
≤35	172 (68.8)	78 (31.2)	2.144	0.143
>35	41 (59.4)	28 (40.6)		
Marital status:				
Single	65 (62.5)	39 (37.5)	1.269	0.260
Married	148 (68.8)	67 (31.2)		
Education:				
Diploma	17 (100)	0	13.922	0.003
Degree	130 (67.7)	62 (32.3)		
MSc	48 (55.8)	38 (44.2)		
Above MSc	18 (75)	6 (25)		
Do you suffer from chronic diseases?				
Yes	32 (69.6)	14 (30.4)	0.189	0.664
No	181 (66.3)	92 (33.7)		
In general, vaccines are safe.				
Agree	138 (69.35)	61 (30.65)	49.9	0.001
Disagree	75 (62.5)	45 (37.5)		
Have you or someone you know ever had a bad reaction to a vaccine?				
Yes	74 (62.7)	44 (37.3)	1.391	0.238
No	139 (69.2)	42 (30.8)		
Have you received the influenza vaccine?				
Yes	47 (60.3)	31 (39.7)	1.975	0.160
No	166 (68.9)	75 (31.1)		
Do you think that you may have been exposed to or infected with COVID-19 (without testing)?				
Yes	163 (62.9)	96 (37.1)	9.136	0.003
No	50 (83.3)	10 (16.7)		
Would you encourage your parents if you get the desired efficacy COVID-19 vaccine?				
Yes	207 (73.9)	73 (26.1)	52.88	0.001
No	6 (20.7)	23 (79.3)		
Have you received the COVID-19 vaccine?				
Yes	123 (84.2)	23 (15.8)	37.05	0.0001
No	90 (52.02)	83 (47.98)		
Attitude toward COVID-19 vaccine:				
Good	132 (62)	43 (40.6)	13.096	0.0001
Bad	81 (38)	63 (59.4)		

COVID-19 vaccines ranges from 54.8% to 88.6%.¹⁵ Furthermore, Western countries showed higher acceptance of COVID-19 vaccines (59%–75%).¹⁵ Therefore, there is an urgent need for an awareness campaign about the safety and effectiveness of the COVID-19 vaccine to be designed and implemented by Ethiopian public health officials aiming to increase acceptance rates for the COVID-19 vaccine by the Ethiopian general population.

In Ethiopia, there is a big difference between the acceptance rate of the COVID-19 vaccine and other vaccination

programs as the study done to evaluate the acceptance of the human papilloma vaccine exhibited that the majority of the participants (81.8%¹⁸ and 81.3%¹⁹) accepted that human papilloma vaccine should be given to their teenage girls. Similarly, previous studies conducted in Ethiopia also revealed that only a small number of the participants were vaccine refusal and non-receipt toward the expanded program on immunization coverage survey.²⁰ This difference in the vaccine hesitancy particularly to the COVID-19 vaccine could be due to a wrong attitude that the vaccine may not be properly substantiated for efficacy and safety. In addition, this shows the variance in community awareness toward the two pandemics in terms of the infection risk, disease severity, vaccine importance, and some factors like cultural or social factors across the participants.

This study showed that 37.6% of the respondents had safety worries about the COVID-19 vaccine once it is given. This finding is not in agreement with a previous similar study conducted in the United States that the majority of the respondents (63%) reported that they were worried about the safety of the COVID-19 vaccines.²¹ A study done in Bangladesh showed that 95.99% of HCPs showed positive attitudes about the availability, efficacy, safety, and necessity of the COVID-19 vaccine.²²

In this study, fear of family members becoming infected with COVID-19 (71.5%) is the most worrying problem of health professionals to COVID-19 pandemic, followed by fear of becoming infected themselves (62.4%), death (51.74%), being a plot or conspiracy (30.1%). This finding is consistent with a previous similar study that family members being infected (73.1%) is the most worried problem of health professionals to COVID-19 pandemic followed by fears of death (30.0%), and then anxieties of becoming infected themselves (27.3%). A similar finding was also reported by Mertens et al.,²³ fear of family members becoming infected with COVID-19 and health anxiety were the most worried problem of health professionals to COVID-19 pandemic. Such a high percentage of fear over loved ones getting infected could be attributed to the reports identifying elderly people with chronic diseases such as hypertension, diabetes, chronic respiratory disease, and weakened immune systems as a high-risk group to get infected with COVID-19.²⁴

In this study, healthcare providers (67.7%), scientific articles (55.2%), media (television/radio) (35.11), government (33.22%), and pharmaceutical company reports (22.26%) are the most trusted source of information about vaccines. This finding is consistent with previous similar studies conducted in Jordan, health care providers the most trusted source of information about vaccines, followed by pharmaceutical companies' reports, and the national Jordanian government, social media, and family members.²⁵ Likewise, a study conducted in the United States revealed that health care professionals were the most trusted source of information about vaccines, followed by national messengers, and the Food and Drug Administration (FDA).²⁶ The current

findings are consistent with a previous similar study conducted in the United States, the respondents stated that health care providers were the most trusted source of information about vaccines.²⁷ A further study conducted in South Carolina revealed that scientists were the most trusted source of information about vaccines, followed by healthcare providers, and health agencies.²⁸ In this study, the trust of the health professionals in the government as a source of information for COVID-19 vaccines is revealing of the health care professionals' trust in the registration procedure of vaccines and the health care system in Ethiopia. Although it noticed that the trust in most sources among the respondents was low as compared to previous studies, this could be accredited to variance in health systems, demographics, scientific communication, and governance.

Limitations

One of the limitations in this research was the unequal selection of respondents from the different departments and a small number of samples that may not be representative for generalization. And the response to online studies was also low, particularly that it was not incentivized. Another limitation could be the lack of power calculation for estimation of sample size (the number of health professionals to participate) in this study. Sampling bias due to snowball sampling used in the study reduces the representativeness of the study. Self-selection bias may also have happened due to some potential respondents may not have Internet access, and thus not being aware of the presence of the survey at the time of data collection through email.

Conclusion

This study showed that more than 60% of health professionals had good acceptance of COVID-19 vaccination during the pandemic period. Regarding vaccine safety profile may reduce the vaccination in the future. To increase vaccine uptake in response to the COVID-19 pandemic, vaccination programs should be redesigned to remove barriers to vaccination convenience. Furthermore, health education and communication from authoritative sources will be important to alleviate health professional concerns about vaccine safety.

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Availability of data and materials

The data sets generated and/or analyzed during the study are not available in public due to the prerequisite of confidentiality upon which the study was permitted by the institutional review board and consent was secured from the study participants but are available from the corresponding author on reasonable request.

CRedit author statement

C.A.D., Z.D.K., and A.E.W.: Conceptualization, Data curation, Investigation, Methodology, Project administration, Resources; B.W., D.K., and A.E.W.: Software, Supervision, Validation; Visualization; C.A.D., Z.D.K., B.W.A., D.W., D.K.Y., A.E.W., A.E.K.: Roles/Writing—original draft; Writing—review & editing.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethical approval

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Informed consent

Written informed consent was obtained from all subjects before the study.

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Supplemental material

Supplemental material for this article is available online.

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