



Willingness to Receive COVID-19 Vaccine and Associated Factors among Students of Higher Education Institutions: The Case of Rift Valley University, Adama, Central Ethiopia: A Cross Sectional Study

Endashaw Mandefro Kidane^{1*}, Tilaye Workineh²

¹Department of Public Health, Rift Valley University, Adama, Ethiopia

²Department of Public Health, Adama Specialized Hospital and Medical Collage, Adama, Ethiopia

ABSTRACT

Introduction: The accelerated global spread of COVID-19 and its high death rate have prompted the world health organization to implement vaccination as an effective way to curb the spread of the disease. Accordingly, Ethiopia has launched a national vaccination campaign against the disease. However, the willingness of people to receive the vaccine was considered as an important prerequisite for the success of the vaccination campaign. The aim of this study was to assess the magnitude of willingness towards COVID-19 vaccination and associated factors among students at Rift valley university, Adama, Ethiopia, in 2022.

Methods: A cross-sectional study was conducted from January 10 to January 25, 2022 among 490 randomly selected students at Rift valley university, Adama campus. Data was collected by using an interviewer administered questionnaire and was entered into Epi Info version 7 and exported to SPSS version 21 for cleaning and analysis.

Results: The proportion of willingness to receive the COVID-19 vaccine was 60.2% (95% CI: 55.9, 64.5). Being male (AOR: 2.72; 95% CI: 1.14, 2.76), having a family history of COVID-19 infection (AOR: 1.2, 95% CI: 1.07, 1.54), having ever taken any vaccine (AOR: 1.7, 95% CI: 1.14, 2.27), and respondents believing the COVID-19 vaccine has no severe side effects (AOR: 2.3, 95% CI: 1.27, 3.01) were all positive predictors of willingness.

Conclusions: The proportion of willingness to get the COVID-19 vaccine among students of higher education institution in Adama town was far lower than that of the nationwide expected result. Male sex, having a family history of COVID-19 infection, having ever taken any vaccine, and the thought of respondents that the COVID-19 vaccine has no severe side effects were independent predictors of willingness to receive the vaccine.

Keywords: Willingness; COVID-19; Vaccination; Cross sectional; Willingness; Side effects

Received:	07-April-2023	Manuscript No:	IPQPC-23-16096
Editor assigned:	10-April-2023	PreQC No:	IPQPC-23-16096 (PQ)
Reviewed:	25-April-2023	QC No:	IPQPC-23-16096
Revised:	07-June-2023	Manuscript No:	IPQPC-23-16096 (R)
Published:	14-June-2023	DOI	10.36648/1479-1064.23.31.5.35

Corresponding author: Endashaw Mandefro Kidane, Department of Public Health, Rift Valley University, Adama, Ethiopia
Tel: 910405818; E-mail: endasu.2017@gmail.com

Citation: Kidane EM, Workineh T (2023) Willingness to Receive COVID-19 Vaccine and Associated Factors among Students of Higher Education Institutions: The Case of Rift Valley University, Adama, Central Ethiopia: A Cross Sectional Study. Qual Prim Care. 31:35.

Copyright: © 2023 Kidane EM, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original author and source are credited.

Abbreviations: USA: United States of America; UK United Kingdom; COVID: Corona Virus Disease; SARS: Severe Acute Respiratory Syndrome; SPSS: Statistical Package for Social Science; SD: Standard Deviation; WHO: World Health Organization; RVU: Rift Valley University

INTRODUCTION

The first human cases of Corona Virus Disease (COVID-19), which is caused by the novel Coronavirus, subsequently named SARS-CoV-2, were first reported by officials in Wuhan City, China, in December 2019. As of December 1, 2021, the world health organization has reported 262,866,000 confirmed cases of COVID-19 globally, of which 5,224,519 were died. Ethiopia has also reported 371,672 confirmed cases of the disease and 6,771 deaths.

The disease not only results in high morbidity and mortality but also imposes a significant socio-economic burden globally in general and in developing countries in particular. It is estimated that in sub-Saharan Africa, COVID-19 has pushed an additional 9.1% of the population into extreme poverty of the 873 million people living in the sub-Saharan African countries for which we can make a projection, 168 million (or 19.3% of the population) can no longer afford their pre-COVID-19 level of food consumption at the end of an 8-week lockdown. About 38.1 million people (3.6%), including 3.9 million children under 5 years old, are very severely food deprived as a result of the burden of the disease. If full lock downs were extended to all sub-Saharan African countries, 77 million people and 10.9 million children could fall into extreme hunger.

The accelerated worldwide spread of the disease and its multidimensional effects have urged WHO to initiate a more effective and efficient method of preventive measures in an attempt to suppress its terrifying spread. As a result, WHO has recommended vaccination against the disease as a safe, efficient, and effective approach to control the disease and to prevent its associated morbidity and mortality? Accordingly, as of December 13, 2021, a total of 8,200,642,671 vaccine doses have been administered worldwide, of which 2% are administered in Africa, which is very small. Ethiopia has also launched a national COVID-19 vaccination campaign on November 16, 2021. Since the start of the vaccination campaign, only 1.45 million people (1.3%) have been fully vaccinated, falling far short of the national target of 20% of the population being vaccinated by the end of 2021. To increase this low vaccination coverage, enhancing the willingness of people to be vaccinated is a key factor. However, studies in different countries revealed that a significant number of people lacked willingness towards vaccination against the disease, citing reasons such as fear of side effects of the vaccine, lack of trust in the safety and effectiveness of the vaccine, and the likes (7-14). To the knowledge of the investigator, there has not been a study conducted to assess the magnitude of willingness to take COVID-19 vaccines among University students. Therefore, the objective of this study is to assess the magnitude of

willingness towards COVID-19 vaccination among students at Rift valley university and its determinant factors [1-7].

MATERIALS AND METHODS

Study Area and Period

This study was conducted at Rift Valley University (RVU), a private higher education institution, Adama campus from January 10 to January 25, 2022, which is located in Adama city, 95 km East of Addis Ababa, and the capital of Ethiopia. The university began to operate with five diploma programs. It currently provides education and training in the fields of health sciences, technology, and social sciences. It has enrolled 2673 students in various fields of study, both in degree and postgraduate programs. The university is not only engaged in teaching but also in research and community service.

Study Design and Sampling Procedure

An institution based cross-sectional study was conducted by including 422 students to assess the willingness to receive the COVID-19 vaccine and factors associated with it. A single population proportion formula was used to estimate the sample size. Stratified random sampling technique was used to recruit study participants with proportional allocation to sample size (Figure 1).

$n = (Z_{\alpha/2})^2 \frac{p(1-p)}{d^2}$, 95% confidence level ($Z_{\alpha/2} = 1.96$), assuming that 50% of students have willingness to COVID-19 vaccine ($P = 0.5$), 5% margin of error ($d = 0.05$).

$$n = (Z_{\alpha/2})^2 \frac{p(1-p)}{d^2}$$

$$n = \frac{(1.96)^2 \cdot 0.5(1-0.5)}{(0.05)^2} = 384$$

Then adding 10% non-respondent rate the total sample size is $384 + (384 \times 10\%) = 422$

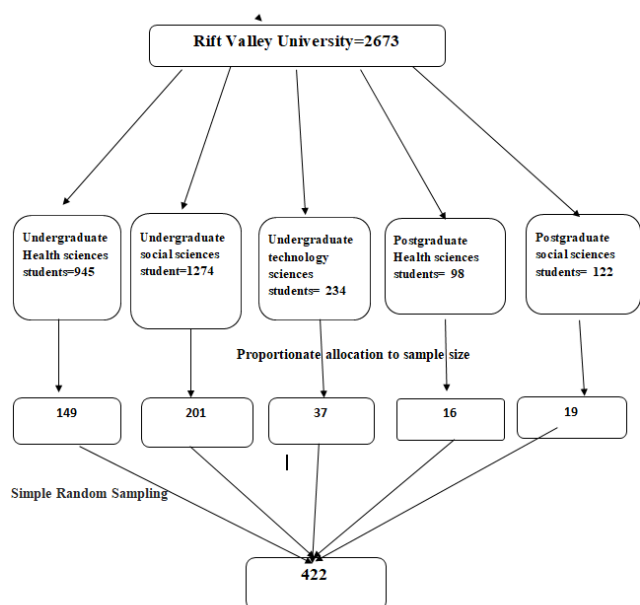


Figure 1: Diagrammatic presentation of sampling procedure.

Data Collection Technique and Procedure

An interviewer administered questionnaire which was developed after reviewing relevant literature was used to collect the data. Before the actual data collection the questionnaire was adapted from a similar study and tailored to the context of the study area. Verbal consent was taken from study participants just before data collection. The questionnaire includes sociodemographic characteristics, thought of vaccine safety and effectiveness, and previous vaccine and medical history. Four health professionals who had first degrees were trained and engaged in data collection [8-12].

Data Quality Assurance

The questionnaire was written in English, translated into the local language, and pre-tested on 21 (5% of the total sample size) students of Harambe university. The questionnaire was

developed in the English language, and then translated into “Afaan Oromoo” language for data collection purposes and then retranslated back into the English language in collaboration with a translation expert to check its consistency. The one day training was given to data collectors and supervisors. The collected data were checked for completeness and clarity by the principal investigator daily. Data cleaning and cross-checking were done before analysis.

Data Management and Analysis

The data were coded, checked for completeness, and entered into Epi-Info-7 then exported to SPSS version 20 for data processing and analysis. Descriptive statistics such as frequency distribution for categorical variables and numerical summary measures for continuous variables were performed. Bivariate logistic regression analysis was used to assess the crude relationship between independent variables and the outcome variable. Variables in the bivariate logistic regression with a p-value ≤ 0.25 were further selected as candidate for the multivariate logistic regression analysis. The final fitted model was assessed for multicollinearity and goodness of fit using the Hosmer and Lemeshow test. Adjusted Odds ratios and P-value<0.05 at 95% confidence interval was used to identify the independent predictors of willingness to vaccine acceptance [13-15].

RESULTS

Sociodemographic Characteristics of Respondents

A total of 422 study participants were included in the study, with a 100% response rate. The mean age of the respondents was 20.2 years (SD ± 1.9 years). More than half, 243 (57.6%) of the respondents were above 18 years of age. About 275 (65.1%) were males. Orthodox and Muslims account for 162 (38.4%) and 126 (30.0%) of the total respondents, respectively (Table 1).

Table 1: Sociodemographic characteristics of respondents, January 10-25/2022.

Variables	Frequency	Percent
Age	<18	42.4
	>19	57.6
Sex	Female	34.9
	Male	65.1
Religion	Orthodox	38.4
	Muslim	30
	Protestant	22.9
	Others	8.7

Respondents' Information Related to COVID-19 and its Vaccine

All respondents heard about COVID-19. Only 43 (10.2%) had a history of COVID-19 infection, while 70 (16.5%) had a family history of COVID-19 infection. Nearly one-quarter of study participants, 95 (22.6%), rate "COVID-19 is a severe disease," while 126 (30.6%) and 162 (38.4%) rate the disease as "moderate and mild." "Almost all 406 (96.3%) had heard about the COVID-19 vaccine. The mass media (TV/radio) and social media (Facebook and Telegram) were the most common

sources of information about the COVID-19 vaccine for the majority of respondents. Nearly half 207 (49.0%) of the respondents identified hospitals as COVID-19 vaccine access points, while the rest mentioned health centers and private health facilities as the access points. A larger proportion of study participants 345 (81.8%) mentioned that the COVID-19 vaccine service is given for free (Table 2).

Table 2: Information related to COVID-19 and its vaccine among respondents, January 10–25, 2022.

Variables		Frequency	Percent
Previous history of COVID-19	Yes	43	10.2
	No	379	89.8
Family history of COVID-19	Yes	70	16.5
	No	352	83.5
Rate the severity of COVID-19	Very severe	95	22.6
	Moderate	129	30.6
	Mild	162	38.4
	I do not know	35	8.2
Heard about COVID-19 vaccine	Yes	406	96.3
	No	16	3.7
Source of information about COVID-19 vaccine	Electronic mass media (Radio/TV)	324	78
	Social media (Face book, Telegram, ...)	54	12.7
	Others	44	10.3
Information about the place of delivery of COVID-19 Vaccine	Public health center	72	17.1
	Public hospital	207	49
	Private health facilities	103	24.5
	Other source	39	9.4
Service charge for COVID vaccine	Paid	76	18.2
	Free	24	81.8

Respondents' Thoughts on Vaccine Effectiveness, Safety, and Related Factors

A higher proportion, 346 (82.2%), of the respondents had a previous history of vaccination for any type of diseases other than the COVID-19. About 249 (59.0%) of respondents reported that vaccines can protect against infectious diseases. More than half, 234 (55.5%) of them reported that the COVID-19 vaccine is effective to protect against COVID-19. On

the other hand, 271 (64.3%) reported that the COVID-19 vaccine had severe side effects. The side effects reported were blood clotting 274 (65.3%), death 118 (28%), and infertility 50 (12%) (Table 3).

Table 3: Previous history of vaccination, thought on vaccine effectiveness, safety and related factors among respondents, January 10-25/2022.

Variable		Frequency	Percent
Ever taken any vaccine	Yes	346	82.2
	No	74	17.8
Your thought vaccines protect against infectious diseases	Yes	249	59
	No	173	41
Your thought COVID-19 vaccine effective in protecting against COVID-19	Yes	234	55.5
	No	187	44.5
Your thought COVID-19 vaccines have severe side effects	Yes	271	64.3
	No	151	35.7
Side effects as per your thought/ heard from others	Health complications	275	65.3
	Death	118	28
	Infertility	50	12
	Others	28	6.7

Respondents' willingness towards COVID-19 vaccination: Of the 422 respondents included in the study, 254 (60.2%) (95% CI: 55.9, 64.5) had a willingness to receive the COVID-19 vaccine. Of those, 48 (11.5%) took the first round vaccine and the rest were willing to receive the vaccine.

Factors Related to Respondents' Willingness to Receive COVID-19 Vaccination

Based on bivariate logistic regression analysis to select candidate variables for multiple logistic regression analysis, variables such as age, sex, year of study, family history of COVID-19, vaccination service charge for COVID-19 vaccine, having ever taken any vaccine, believing COVID-19 vaccine is effective, and thought of COVID-19 vaccine having severe side effects had a p-value less than 0.25. These variables were exported to multiple logistic regression analysis and found that respondents' sex, family history of COVID-19, having ever taken any vaccine, the thought of respondents that the

COVID-19 vaccine is effective, and that the COVID-19 vaccine has severe side effects were statistically significant associations with willingness to receive the COVID-19 vaccine at a p-value less than 0.05. Males' willingness to take COVID-19 vaccine was 2.7 times of their counterpart, AOR: 2.72; 95% CI: 1.14, 2.76). On the other hand, respondents that had a family history of COVID-19 infection were 1.2 times more likely to be willing to get the vaccine (AOR: 1.2; 95% CI: 1.07, 1.54). Those who reported that the COVID-19 vaccine is effective to protect against COVID-19 were 3.8 (AOR: 3.8, 95% CI: 2.46, 5.64) times more likely to be willing to take the vaccine. Similarly, those who reported no severe side effects from the COVID-19 vaccine were 2.3 (AOR: 2.3, 95% CI: 1.27, 3.01) times more likely to be willing to take the vaccine (Table 4).

Table 4: Factors associated with willingness to receive the COVID-19 vaccine among respondents, January 10–25, 2022.

Variables		Willingness to COVID-19 vaccine		COR (95%CI)	AOR (95% CI)
		Yes No (%)	No No (%)		
Age	<18	99 (39.3)	80 (47.2)	1	1
	>18	154 (60.7)	89 (52.8)	0.73 (0.46, 1.34)	0.53 (0.42, 1.22)
Sex	Female	104 (41.0)	43 (25.6)	1	1
	Male	150 (59.0)	124 (74.4)	2.02 (1.24, 2.76)	1.72 (1.14, 2.06)*
Family history of COVID-19 infection	Yes	39 (15.3)	31 (18.5)	1.3 (0.97, 1.67)	1.2 (1.07, 1.54)*
	No	215 (84.7)	136 (81.5)	1	1
Ever taken any vaccine	Yes	198 (78.0)	149 (88.7)	2.2 (1.44, 2.84)	1.7 (1.14, 2.27)*

	No	56 (22.0)	19 (11.3)	1	1
Thought COVID-19 vaccine is effective to protect COVID-19	Yes	105 (41.7)	128 (76.4)	4.53 (2.56, 6.54)	3.83 (2.46, 5.64)*
	No	149 (58.3)	56 (33.6)	1	1
Thought COVID-19 vaccines have severe side effects	Yes	185 (72.9)	86 (51.3)	1	1
	No	68 (27.1)	82 (48.7)	2.6 (1.47, 3.11)	2.3 (1.27, 3.01)*

Note: * Significantly associated with willingness to take COVID-19 vaccine.

DISCUSSION

This study was conducted to assess the magnitude of willingness to receive vaccination against COVID-19 and its determinant factors among Rift Valley university students. Accordingly, 295 (60.2%) (95% CI: 55.9, 64.5) of the respondents were willing to receive the COVID-19 vaccine.

The proportion of willingness in this study was more or less similar to the results from a study conducted among students at Wolkite university, Ethiopia, where 58.8% of the students were willing to take the vaccination. However, it is higher than in a study conducted in the Southern region of Ethiopia, Wolaita Sodo, where a lower proportion of willingness was reported, 45.5% and a systematic review and meta-analysis result in Africa. The reason for the difference might be that the current study was conducted among students while the latter involved the general population. The proportion of willingness in this study was far less than that of the result of an instrumental variable probit study done nationwide in Ethiopia where a higher proportion of willingness for COVID-19 vaccines in the Oromia region, which was 92.3%. The reason for the lower willingness of people in this study as compared to the nationwide study could be that the former study was conducted at a time when fear of people toward COVID-19 reached its peak, which is far less than the results of this study, which may be due to the fact that the data collection tool method in the former study was electronic. According to a nationwide longitudinal study done in the USA in November 2020, adults' willingness to be vaccinated for COVID-19 declined from 71% in April to 53.6% in October, which is analogous to this study. Regarding the factors associated with receiving the COVID-19 vaccine, this study showed being male increased willingness by 2.72, which is similar to results from a study conducted in Japan and a school based study among Austrian adolescents. Studies from the UK and a worldwide systematic review also showed females had less willingness to be vaccinated. This could be because females in many countries, particularly developing countries, believe that vaccination has a negative impact on their fertility. On the other hand, respondents who had a family history of COVID-19 infection were 20% more likely to be willing to take the vaccine. This may be because of the experience of respondents to the severity of the disease. Respondents who had ever taken any vaccine had 70% more willingness than those who had no history of vaccination. This could be because a previous history of vaccination can decrease phobias related to vaccination. Other studies reported consistent findings that those vaccinated against

influenza during the 2019-2020 flu seasons were more willing to be vaccinated against COVID-19. Those who reported that the COVID-19 vaccine is effective to protect against COVID-19 were 3.8 times more likely to be willing to take the vaccine. This is because of supportive thoughts towards accepting the COVID-19 vaccine. Similarly, those who reported no severe side effects from the vaccine were 2.3 times more likely to be willing to take it. According to a study done in Ethiopia, the intention of taking the second round of the COVID-19 vaccine was affected by the fear of side effects of the vaccine. Similarly, a study from China reported that decreasing willingness to accept the COVID-19 vaccine was associated with increasing concerns from people about vaccine safety. Therefore, adequate information for people on vaccine safety and effectiveness issues is crucial to building the public's trust and achieving higher uptake rates of vaccinations.

CONCLUSION

The proportion of willingness to receive the COVID-19 vaccine among private higher education students was 60.2%, which was far less than the nationwide study conducted in Ethiopia. Being male, having a family history of COVID-19 infection, having ever taken any vaccine, and thinking that the COVID-19 vaccine is effective and that the vaccine has no severe side effects were predictors of willingness towards COVID-19 vaccination. Therefore, efforts should be made to change the negative perceptions of students towards the COVID-19 vaccine through targeted, planned, and organized health education programs with particular attention to vaccine effectiveness and safety.

ETHICAL APPROVAL AND INFORMED CONSENT

The ethical approval was obtained from RVU research ethical review board. Accompanying letter of permission was also obtained from the university. Before the actual data collation informed consent was taken from study participants. Study participants were also told the right to participate or withdrawal from the study any time. Confidentiality was assured through coding of the questionnaire anonymously. Privacy of the respondents was also maintained.

FUNDING

No funding was provided for this study.

COMPETING INTERESTS

The authors declared there was no any conflict of interests either in data collection, analysis, interpretation, financial issue or in other ways.

AUTHOR'S CONTRIBUTIONS

Both authors were equally involved in all processes of the study including conceptualizing the research title, proposal writing, data collection, analysis, report write up and the preparation of the final manuscript and selection of journal for publication.

ACKNOWLEDGEMENTS

It is my pleasure to express my gratitude to RVU for giving me the relevant base line data on students' statistics and giving financial support to conduct the research. My gratitude also goes to Dr. Daniel G/Tsodik (PhD of public health, assistant professor, department of public health Arsi university) for giving me technical assistance in analysis and manuscript write up. I would like to be grateful also to study participants for proving me the required information to realize the study.

REFERENCES

1. Shah S. Covid-19 Pandemic and Vaccine (2021) *Univers J Med Sci.* 9(01):1-3.
2. Teachout M, Zipfel C (2020) The economic impact of COVID-19 lockdowns in sub-Saharan Africa. *Int Growth Centr.* 2020:1-9.
3. Wondimu W, Girma B (2020) Challenges and silver linings of COVID-19 in Ethiopia—short review. *J Multidiscip Healthc.* 13:917-922.
4. Zikargae MH (2020) COVID-19 in Ethiopia: Assessment of how the Ethiopian government has executed administrative actions and managed risk communications and community engagement. *Risk Manag Healthc Policy.* 13:2803.
5. Salali GD, Uysal MS (2020) COVID-19 vaccine hesitancy is associated with beliefs on the origin of the novel Coronavirus in the UK and Turkey. *Psychol Med.* 19:1-3.
6. Belsti Y, Gela YY, Akalu Y, Dagneb B, Getnet M, et al. (2021) Willingness of Ethiopian population to receive COVID-19 vaccine. *J Multidiscip Healthc.* 14:1233.
7. Daly M, Robinson E. Willingness to vaccinate against COVID-19 in the US: Representative longitudinal evidence from April to October 2020. *Am J Prev Med.* 60(6):766-773.
8. Ruiz JB, Bell RA (2021) Predictors of intention to vaccinate against COVID-19: Results of a nationwide survey. *Vaccine.* 39(7):1080-1086.
9. Kourlaba G, Kourkouni E, Maistreli S, Tsopele CG, Molocha NM, et al. (2021) Willingness of Greek general population to get a COVID-19 vaccine. *Glob Health Res Policy.* 6(1):1-10.
10. Faezi NA, Gholizadeh P, Sanogo M, Oumarou A, Mohamed MN, et al. (2021) Peoples' attitude toward COVID-19 vaccine, acceptance, and social trust among African and Middle East countries. *Health Promot Perspect.* 11(2):171.
11. Mesele M (2021) COVID-19 vaccination acceptance and its associated factors in Sodo town, Wolaita zone, Southern Ethiopia: Cross-sectional study. *Infect Drug Resist.* 14:2361-2367.
12. Ayenew MKH, Abebe T (2022) COVID-19 vaccine hesitancy among medical and health science students attending Wolkite university in Ethiopia. 17(1):e0263081.
13. Wake AD. The acceptance rate toward COVID-19 vaccine in Africa: A Systematic Review and Meta-analysis (2021) *Global Pediatrics Health.* 8:2333794X211048738.
14. Oyekale AS (2021) Willingness to take COVID-19 vaccines in Ethiopia: An instrumental variable probit approach. *Int J Environ Res Public Health.* 18(17):8892.
15. Katsuyama H, Yoda T (2021) Willingness to Receive COVID-19 vaccination in Japan. *Vaccines (Basel).* 9(1):48.