Uptake of the COVID-19 Vaccination and its Contributed Factors among Reproductive-aged Women in the Northeast Ethiopia in 2022

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A R T I C L E I N F O	A B S T R A C T
	Background & aim: Ethiopia plans to immunize 20% of its population by the end of 2021. However, there is little data available on the vaccine's current uptake in our nation. This study aimed to assess the uptake of COVID-19 vaccination and its contributors among reproductive-aged women in Dessie Town, Northeast Ethiopia, in 2022. ***Methods:*** A community-based cross-sectional study was conducted in Dessie town, northeast Ethiopia, on February 2022. A multiple-stage stratified sampling method was employed to select 636 reproductive-aged women. A pretested researcher-made, semi structured questionnaire was administered by an interviewer to collect the data. Data were entered into the Epi-data version 4.4.2.1 program and exported to the software SPSS version 25 for additional analysis. Bivariable logistic regression was performed to ascertain the association between each independent variable. ***Results:*** From 636 surveyed reproductive-aged women, 114 (18.1% (95% CI, 15.3%, 21.3%)) uptake the COVID-19 vaccination. Factors such as urban residency (AOR=3.24, 95% CI 1.74, 6.03), primary educational level (AOR=3.66, 95% CI 1.64, 1.71), having children (AOR=2.16, 95% CI 1.32, 3.55), confirmed medical problems (AOR=4.94, 95% CI 2.45, 9.97), favourable attitude (AOR=4.01, 95% CI 2.38, 6.77), and practice of prevention strategies (AOR=3.36, 95% CI 1.91, 5.91) were contributed to the use of the COVID-19 vaccine. ***Conclusion:*** The magnitude of uptake of COVID-19 vaccination is still low. Therefore, addressing the information regarding the vaccine to all women will be important.

Introduction

A novel, extremely contagious coronavirus is the cause of the developing respiratory illness COVID-19. The disease affects almost all people who develop mild to severe symptoms. According to the 2020 WHO weekly report, there were 517,648,631 newly confirmed cases worldwide, and the total number of deaths due to COVID-19 was 6,261,708. Africa accounted for 8,877,980 of the total confirmed COVID-19 cases worldwide (1).

The virus causes more severe respiratory-like symptoms, respiratory distress, and cardiac problems (2). COVID-19 disease is most severe for women, especially pregnant women and those who have childbirth, and comorbidities conditions that raise the risk for COVID-19-related severe illness include heart disease, diabetes, cancer, chronic obstructive lung disease, chronic renal disease, and obesity.

The COVID-19 epidemic has also had a significant impact on people's lives all around the world. Stressful times and psychological anguish are proven to have an impact on women's emotions. It causes the worsening of

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menstrual symptoms in women of reproductive age due to periodic psychological distress (3-4).

Women are more impacted by COVID-19 than men, and the pandemic raised the risk of physical and psychological issues during pregnancy and the postpartum period(5). During the epidemic, women were more likely than males to lose their jobs and income. Particularly single mothers are more prone to experience food insecurity. These COVID-19 socioeconomic effects on women were more severe in low-income countries (6).

All species require reproduction to keep their generations alive. Physical, emotional, and social elements of human reproductive health are all important. Attempts to avoid and contain the COVID-19 pandemic, as well as the virus itself, treatment medicines, disinfectants, isolation circumstances, and other public health precautions, have produced panic and psychological difficulties in certain people, especially women. The pandemic limits access to healthcare, particularly reproductive healthcare, and exacerbates inequities in healthcare delivery. Despite receiving greater healthcare treatments outside of pandemics, women face more physical and emotional issues on average each year than males (7).

One of the most essential measures for avoiding COVID-19's consequences on maternal social, economic, emotional, and health concerns is to get the vaccine. COVID-19 vaccination was supplied to all Ethiopians, especially those who were at high risk without any payment. The extent of COVID-19 vaccination uptake among reproductive-aged women in sub-Saharan Africa, particularly Ethiopia, has yet to be investigated. Then, this study aimed to assess the uptake of COVID-19 vaccination and its contributors among reproductive-aged women in Dessie Town, Northeast Ethiopia, in 2022.

Materials and Methods

The research was done in Dessie city, Northeast Ethiopia from February 1-30/2022. Dessie city has a total population of 209,226 people, of which 105,797 (50.6%) are women and 103,429 (49.4%) are males, according to Ethiopia's population forecast for 2017 (8). A cross-sectional study centred in the community was carried out. All women of reproductive age

who lived in the chosen Kebeles and during the study periods made up the study population.

All reproductive-aged women who resided in the chosen Kebeles for a minimum of six months were included in this research. However, reproductive-aged women who were in grave condition and unable to participate in the interview were not included.

When determining the sample size for this study, a single population proportion formula was used that took into account a 5% margin of error, a 95% confidence level, and a 50% proportion of COVID-19 vaccine uptake among reproductive-aged women. Therefore, the total sample size obtained from the computation with a 1.5 design effect and a 10% nonresponse rate was 636.

The method employed was a multistage stratified sampling technique. Stratified sampling technique was used to divide the 26 Kebeles into two groups: rural and urban. Using the lottery approach, three Kebeles were randomly selected from eight rural Kebeles and six Kebeles from 18 urban Kebeles. The study covered a total of nine Kebeles. After that, each of the chosen Kebeles received a proportionate allocation of the study participants, and each study participant was included using a simple random sampling approach (Figure 1).

Data were obtained through a face-to-face interview by using semi structured questionnaire. The questionnaire was created after reviewing previous similar studies and was modified to fit the local environment (9–14). The questionnaire asked about the respondents' sociodemographic characteristics with 10 questions, reproductive health and other medical characteristics four questions, awareness 5 questions and attitudes towards the COVID-19 vaccine 6 questions, use of COVID-19 preventive measures with 8 questions and reasons for not using COVID-19 vaccine 9 questions; Each questionnaire takes between three and five minutes to complete. The survey was initially written in English before being translated into the regional tongue. Five health extension workers and two health professionals were involved in data collection and supervision.

To guarantee the accuracy of the data, the tool was also tested on 5% of the total sample size

before real data collection on a population outside of the study area. Then, necessary adjustments were made. Two days of training on data gathering techniques, communication skills, and the study's goal were given to data collectors and supervisors to obtain accurate information to decrease errors and bias caused by data collection procedures. Data were double-checked after the day of data collection, and supervisors closely monitored the data collection process. A reliability test was conducted to ensure the internal consistency of the questionnaire, and Cronbach alpha was calculated and found to be 0.89.

After being collected, the data were checked for accuracy, coded, and entered into the statistical program Epi-data version 4.4.2.1 before being exported to the SPSS version 25 program for additional analysis. Tables, graphs, descriptive numerical summaries, and charts were used to present the study's descriptive characteristics. Bivariable logistic regression was performed to ascertain the association between each independent variable and the outcome variable. To control confounders and identify factors that were substantially linked with the outcome variable, all independent variables with a P value less than 0.2 in the bivariate analysis were then entered for the multivariable analysis. An adjusted odds ratio with a 95% confidence interval was used to assess the association's strength, and a P value of less than 0.05 was used to denote a significant association between the independent and dependent variables.

At the end of proposal development, it was submitted to the College of Medicine and Health Science, Wollo University's ethical review board, to approve the study. After approval, a consent letter was submitted to the Dessie health office and for each selected Kebele administration staff to obtain permission for data collection. Each participant gave written informed permission after being fully aware of the study's objectives and procedures. They were also assured that their confidentiality would be maintained and that they had the right to leave the interview at any moment.

Results

The majority of reproductive-age women (53.6%) were between the ages of 25 and 34. However, only 18.7% of women in the reproductive age group were over 35 years old. Four hundred forty-two (69.5%) respondents were Muslim in religion. However, 1.2% of the reproductive-aged women were grouped in other religions, such as protestant and Catholic. Regarding the educational status of reproductive-aged women, approximately 49.5% of the respondents had secondary and higher educational levels.

Regarding the educational and occupational status of their couples, almost 23.4% of their husbands had primary education, and approximately 38.4% of the husbands were government employees (Table 1).

Table 1. Frequency distribution of Sociodemographic variables of reproductive-aged women in Dessie town, Northeast Ethiopia, 2022

Characteristics	Frequency (%) (N=636)
Age	
18-24	176 (27.7)
25-34	341 (53.6)
≥35	119 (18.7)
Religion	
Orthodox	186 (29.3)
Muslim	442 (69.5)
Other	8 (1.2)
Residency	
Urban	390 (61.3)
Rural	246 (38.7)
Marital status	
Single	107 (16.8)
Married	525 (82.6)
Divorced	4 (0.6)
Women's educational status	
No formal education	172 (27)
Primary	149 (23.4)
Secondary and above	315 (49.6)
Women's occupational status	
Housewife	95 (14.9)
Government employ	199 (31.3)
Private	5 (0.9)
Farmer	156 (24.5)
Student	50 (7.9)
Merchant	131 (20.6)
Husband's educational status (n=525)	
No formal education	113 (21.5)
Primary	153 (29.1)
Secondary	124 (23.6)
Higher education	135 (25.8)
Husband's occupation status (n=525)	
Government employee	202 (38.5)
Private	143 (27.2)

Characteristics	Frequency (%) (N=636)
Merchant	79 (15.1)
Student	49 (9.3)
Farmer	52 (9.9)
Monthly income of respondents	
≤1500	260 (40.9)
1501-3000	281 (44.2)
≥3001	95 (14.9)
Media exposure status	
Exposed	418 (65.7)
Not exposed	218 (34.30

Three hundred sixty-eight (57.9%) of the reproductive-age women had at least one child, and over 87.1% of those respondents had no medical conditions. The most prevalent medical condition among reproductive-aged women with recorded medical disorders was hypertension, which accounted for 34.2%, while the least common was heart disease, which accounted for 2.4% (Table 2).

Table 2. Frequency distribution of medical and reproductive health-related variables of reproductive-aged women in Dessie Town, northeast Ethiopia, 2022

Variables	Frequency (%) (N=636)
Did you have children?	
Yes	368 (57.9)
No	268 (42.1)
Did you have confirmed chronic disease	
Yes	82 (12.9)
No	554 (87.1)
Types of medical illness (n=82)	
Hypertension	28 (34.2)
Diabetic mellitus	26 (31.7)
Kidney disease	11 (13.4)
Asthma	15 (18.3)
Cardiac disease	2 (2.4)
Did at least one of your family had history of confirmed chronic disease?	
Yes	80 (12.4)
No	556 (87.6)

Four hundred ninety-one (77.2%) of the respondents heard about COVID-19 vaccines. However, 88.1% of reproductive-aged women responded that the COVID-19 vaccine did not interfere with any medical conditions. Approximately 98.4% of respondents knew that the vaccine decreased the transmission rate of the disease. In addition, 64% of the respondents believed that the vaccine did not affect their health condition, and 69.5% of respondents correctly identified that the vaccine could not treat people who were already ill. Generally, 76.5% of respondents were considered knowledgeable, and 8.6% of the respondents were not knowledgeable (Table 3).

Table 3. Frequency distribution of knowledge and attitude of reproductive-aged women regarding the COVID-19 vaccine in Dessie Town, northeast Ethiopia, 2022

Category	Frequency (%) (N=636)
Knowledge related variables	
Ever heard about COVID 19 vaccine?	
Yes	491 (77.2)
No	145 (22.8
Vaccine does not interfere on chronic medical condition.	
Yes	560 (88.1)
No	76 (11.9)
The vaccine can decrease the transmit rate of COVID-19.	
Yes	626 (98.4)
No	10 (11.6)
The vaccine cannot severely affect my health condition.	
Yes	407 (64.0)
No	229 (36)
The vaccine cannot cure already infected person	
Yes	442 (69.5)
No	194 (30.5)
Attituderelated variables	
The new COVID-19 vaccine is safe	
Agree	587 (92.3)
Disagree	49 (7.7)
The COVID-19 vaccine is essential for us.	
Agree	527 (82.9)
Disagree	109 (17.1)
I will take the COVID-19 vaccine without any hesitation.	
Agree	417 (65.6)
Disagree	219 (34.4)

Category	Frequency (%) (N=636)
I will also encourage my family/friends/relatives to get vaccinated.	
Agree	501 (78.8)
Disagree	135 (21.2)
It is not possible to reduce the incidence of COVID-19 without vaccination.	
Agree	427 (67.1)
Disagree	209 (32.9)
The COVID-19 vaccine should be distributed fairly to all of us.	
Agree	479 (75.3)
Disagree	157 (24.7)

A total of 587 (92.3%) reproductive-aged women agreed that the vaccine is safe, and 82.9% of the respondents thought that it is highly important to minimize coronavirus transmission. However, 65.6% of the respondents agreed to take the vaccine without any hesitation, and 78.8% of respondents agreed to encourage their families to take the vaccine. Three hundred and sixty-two (56.9%) of the respondents had a negative attitude. However, 274 (43.1%) of responders expressed a positive view about the COVID-19 vaccination (Table 4).

Table 4. Frequency distribution of the COVID-19 preventive strategies practice among reproductive-aged women in Dessie Town, northeast Ethiopia, in 2022

Category	Frequency (N=636)
Wash hands with soap and water	
Yes	602 (94.7)
No	34 (5.3)
Covering mouth with elbow while sneezing	
Yes	521 (81.9)
No	115 (18.1)
Keeping physical distancing	
Yes	345 (54.3)
No	291 (45.7)
Wearing facemask	
Yes	304 (47.8)
No	332 (52.2)
Changing travel	
Yes	384 (60.4)
No	252 (39.6)
Reporting COVID-19 symptoms to health	

Category	Frequency (N=636)
facility	
Yes	494 (77.7)
No	142 (22.3)
Stop hand shaking with peoples.	
Yes	279 (43.9)
No	357 (66.1)
Avoiding going to social gathering	
Yes	465 (73.1)
No	171 (12.9)

The majority of reproductive-aged women (94.7%) washed their hands with soap and water, and 81.9% of respondents said they cover their mouth and nose when sneezing. On the other hand, 52.2% of those who polled did not wear masks, while 66.1% of those who did report handshaking with strangers. As a result, 231 (36.5%) of the reproductive-aged women used COVID-19 preventive measures, according to the survey. Four hundred and four (63.5%) of the reproductive-aged women did not follow the COVID-19 preventative strategies to the letter (Table 5).

Table 5. Frequency distribution of reasons for no use of the COVID-19 vaccine among reproductive-aged women in Dessie town, northeast Ethiopia, 2022

Variables	Frequency (%)
Fear of dangers and side effects	96 (18.5)
COVID-19 Vaccine will harm my new born.	140 (27.0)
I have low risk for COVID-19 infection.	73 (14.1)
Vaccine will harm my body.	71 (13.7)
I do not think the vaccine will work.	47 (9.1)
Family members have hesitancy toward COVID-19 vaccine.	53 (10.2)
Vaccine will cause COVID-19 infection.	20 (3.9)
Don't have enough information	6 (1.2)
I prefer other ways of protection	13 (2.5)

The percentage of women in reproductive age who received the COVID-19 immunization was 18.1% (95% CI: 15.3-21.3).

The majority of women (27 percent) did not take the COVID-19 immunization because they felt it may harm the health of their newborn, and 18.5% of the respondents did not take the

vaccine due to fear of side effects. Only 1.2 percent of those polled did not use the vaccine

because they were given insufficient information (Table 6).

Table 6. Factors associated with the uptake of the COVID-19 vaccine among reproductive-aged women in Dessie town, northeast Ethiopia, 2022

Factors	Uptake of COVID-19 vaccine		COR (95%CI)	AOR (95%CI)
	Yes	No		
Residency				
Rural	22	224	1	1
Urban	93	297	3.19 (1.94, 5.24)	3.24 (1.74, 6.03)
Educational status of women				
No formal education	16	156	1	1
Elementary education	36	113	3.11 (1.64,5.90)	3.66 (1.64, 1.71)
Secondary and higher	63	252	2.44 (1.36, 4.37)	1.84 (0.81,4.15)
Occupational status of women				
Housewife	12	83	1	1
Government employee	45	154	2.02 (1.01, 4.03)	0.71 (0.29, 1.75)
Farmer	33	123	1.86 (0.91, 3.8)	1.92 (0.80, 4.57)
Student	8	142	1.32 (0.5, 3.47)	0.51 (0.15, 1.75)
Merchant	17	144	1.03 (0.47, 2.28)	0.71 (0.12-2.43)
Did you have children?				
No	49	319	1	1
Yes	66	202	2.13 (1.41, 3.20)	2.16 (1.32, 3.55)
Having medical illness				
Yes	42	40	1	1
No	73	481	6.92(4.2,11.39)	4.94 (2.45, 9.97)
Exposure to media				
No	66	352	1	1
Yes	49	169	1.55 (1.02, 2.34)	1.58 (0.95,2.63)
Knowledge on COVID-19				
Not knowledgeable	5	59	1	1
Knowledgeable	110	462	2.81 (1.10, 7.17)	2.41(0.81, 7.21)
Attitude toward COVID-19				
Negative attitude	43	319	1	1
Positive attitude	72	202	2.64 (1.74, 4.01)	4.01 (2.38, 6.77)
Practice of COVID 19 prevention strategies				
No	64	340	1	1
Yes	51	181	1.50 (1.00, 2.26)	3.36 (1.91, 5.91)

First, bivariate analysis was applied to each variable. Bivariate analysis identified factors with a P value less than 0.2 that were entered into multivariate analysis to determine the statistically significant associated variables with the independent variable and to control confounding variables. These factors included residency, educational attainment, employment status, having children, having a medical condition, media exposure, knowledge of COVID-19, attitude towards COVID-19, and the use of COVID-19 prevention strategies.

One of the key elements influencing how many women of reproductive age received the COVID-

19 vaccinations was residency. Reproductive-aged women residing in urban areas were 3.24 times more likely to take up the COVID-19 vaccine (AOR=3.24, 95% CI 1.74, 6.03). On the other hand, reproductive-aged women at the primary education level were 3.66 times more likely to take up the COVID-19 vaccine (AOR=3.66, 95% CI 1.64, 1.71).

Women who had at least one child were 2.16 times more likely to take up the COVID-19 vaccine than those who had no children (AOR=2.16, 95% CI 1.32, 3.55). On the other hand, reproductive-aged women with confirmed medical disease were 4.94 times more likely to

take the COVID-19 vaccine (AOR=4.94, 95% CI 2.45, 9.97).

Reproductive aged women with a good attitude toward the COVID-19 vaccine were 4.01 times more likely to take the COVID-19 vaccine than those with a poor attitude (AOR=4.01, 95% CI 2.38, 6.77). In addition, reproductive-aged women who practiced COVID-19 prevention strategies were 3.36 times more likely to take the COVID-19 vaccine (AOR=3.36, 95% CI 1.91, 5.91) (Table 6).

Discussion

The COVID-19 virus caused havoc in many areas of the world within a short period. Using COVID-19 vaccinations is just one of the preventive steps that must be strictly followed in order to control the pandemic effectively and efficiently. Therefore, our study reports that the magnitude of uptake of the COVID-19 vaccine among reproductive-aged women in Dessie town Ethiopia was 18.1% (95% CI 15.3-21.3), which is less than the reports from the study done in Hong Kong (15), Nigeria (16), Malawi (17), eastern Ethiopia (18), and the study done in the other part of Ethiopia (19). This discrepancy could be explained by variations in the study region, study time, and population.

Reproductive-aged women residing in urban areas were 3.24 times more likely to take up the COVID-19 vaccine. The findings are comparable to those of a study conducted in Central Gondar, Ethiopia(20). The conclusion may be explained by the fact that urban-dwelling reproductive-age women have easier access to knowledge about vaccines, are more informed, and comprehend COVID-19 education given by healthcare professionals.

The educational status of the reproductive-aged women was one of the significant factors statistically associated with the uptake of the COVID-19 vaccine. Reproductive-aged women who attended primary education were 3.66 times more likely to be infected with the COVID-19 vaccine. Which is consistent with the study done in Ethiopia. The result is supported by a study performed in Nigeria (16), and southeast Ethiopia (21). This association could be explained by the fact that better-educated women are more aware of the vaccine's benefits in reducing COVID-19 disease and its

consequences. Therefore, reproductive-aged women might be inspired to use the vaccine.

The study also found that women of reproductive age who had at least one child were 2.16 times more likely to receive the COVID-19 vaccine. The statistical link between having children and COVID-19 vaccination uptake among reproductive-aged women could be due to most mothers' anxiety about transmitting COVID-19 disease to their children if they become infected. As a result, they may be more motivated to receive the vaccine than those who do not have children.

Reproductive-aged women who suffered from confirmed medical problems were 4.94 times more likely to take COVID-19 vaccines than those free from any history of confirmed medical problems. Due to reduced immunity, COVID-19 disease becomes more severe in people with confirmed medical conditions such as HIV, asthma, chronic heart disease, kidney disease, hypertension, and diabetes mellitus, which may encourage respondents to use the vaccination to prevent this form of suffering. According to the findings of a study conducted in Spanish, 64% of HIV-positive respondents who tested positive for COVID-19 were hospitalized, 6.4% were admitted to the ICU, and 8.4% died (22). Furthermore, a study conducted at Baqiyatallah University of Medical Sciences in Tehran, Iran, found that chronic hypertension, a higher BMI, CVD, diabetes mellitus, and kidney disease were linked to a poor prognosis following COVID-19 infection (23).

The study also showed that reproductive-aged women who had a positive attitude were almost 4 times more likely to take the COVID-19 vaccine than those who had a negative attitude. The study conducted in central Gondar, Ethiopia supported this finding (20). One possible explanation is that those who had a positive attitude toward vaccines trusted vaccine information and followed the directions provided by various guidelines. Another reason could be that those who have a positive attitude toward the vaccine are more likely to accept it because they want to prevent the disease.

Compared to those who did not correctly practice COVID-19 prevention strategies, the odds of using the COVID-19 vaccine were 3.36

times higher among those who correctly practiced COVID-19 prevention strategies. The findings are in line with a study conducted in Harar, Ethiopia (18) and a study conducted in southeast Ethiopia (21). Taking the COVID-19 vaccine is one of the strategies to minimize the transmission rate of COVID-19. As a result, reproductive-aged women who correctly apply other prevention strategies, such as wearing a face mask, not shaking hands with strangers, and washing with water and soap, may be eligible for the vaccine because women who practice prevention strategies may be aware of the benefits of the COVID-19 vaccine.

The cross-sectional design of the current study may have prevented it from demonstrating a cause-and-effect link. However, our work deals with it. In Ethiopia, the uptake of COVID-19 among women of reproductive age has not yet been evaluated.

Conclusion

The magnitude of uptake of the COVID-19 vaccine among reproductive-aged women was low. Factors such as urban residency, educational status, having children, the presence of a confirmed medical condition, attitudes toward the COVID-19 vaccine, and the practice of COVID-19 preventive measures were significantly associated with the uptake of the COVID-19 vaccine among reproductive-aged women.

To reduce the transmission rate of COVID-19, it is better to address the information regarding the vaccine to all women, including those living in rural areas, and to emphasize those with confirmed medical disease.

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Conflicts of interest

Authors declared no conflicts of interest.

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