

Practice of COVID-19 prevention measures and their associated factors in Ethiopia

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Abstract

Introduction: The COVID-19 pandemic remains a significant global health concern. Community-level prevention measures are essential for controlling the transmission of the virus. This study aimed to evaluate the practice of COVID-19 prevention measures and identify associated factors in Ethiopia.

Methods: A community-based, cross-sectional study was conducted from November 2020 to January 2021. A total of 8,096 households were sampled from 368 enumeration areas across all regions and two city administrations. The head of the household or a substitute was interviewed. Data were collected using the Computer-Assisted Personal Interview (CAPI) technique. Eight questions were used to assess the level of practice, with scores of 0 and 1 assigned to each response. Scores below the mean were categorized as poor practice, while scores at or above the mean were classified as good practice. Logistic regression was employed to identify factors influencing the practice of COVID-19 prevention measures.

Results: The practice of COVID-19 preventive measures was found to be 30.6%. Significant associations were observed with urban residency (AOR=1.4; 95% CI 1.2-1.6), age over 45 years (AOR=1.29; 95% CI 1.1-1.6), access to radio, television, or the internet (AOR=1.5; 95% CI 1.2-1.7), having a college diploma or higher (AOR=1.5; 95% CI 1.2-1.9), non-governmental employment (AOR=1.8; 95% CI 1.3-2.7), and good knowledge of COVID-19 (AOR=4.15; 95% CI 3.7-4.6).

Conclusion: Approximately one-third of the population adhered to COVID-19 preventive measures. Positive associations were identified with older age, urban residency, access to communication channels, higher education, and knowledge of COVID-19. It is crucial for the government, stakeholders, and media to continue awareness efforts, especially in rural areas, to enhance preventive practices against COVID-19.

Keywords: COVID-19, practice, preventive measures

Introduction

The first human case of COVID-19 was reported in Wuhan City, China, in December 2019. On January 30, 2020, the World Health Organization (WHO) declared the outbreak a Public Health Emergency of International Concern (PHEIC), and on March 11, 2020, the WHO officially declared it a global pandemic (WHO 2019; Chen et al. 2020; Gao et al. 2020; Ramanathan et al. 2020).

COVID-19 is a respiratory illness caused by a novel, single-stranded coronavirus. It is highly contagious and manifests with a range of symptoms, including fever, dry cough, fatigue, myalgia, and dyspnea (WHO 2019; Chen et al. 2020; Gao et al. 2020; Ramanathan et al. 2020; Zhu et al., 2020). Initially, the virus caused significant distress in China, and its rapid global spread has since led to widespread public health challenges (WHO 2020a; Mario Coccia 2021).

The primary mode of transmission is human-to-human contact through respiratory droplets expelled when an infected person coughs, sneezes, or speaks. Additionally, people may become infected by touching surfaces contaminated with the virus and then touching their eyes,

nose, or mouth without washing their hands (Adhikari et al. 2020).

The COVID-19 pandemic has had profound impacts on the global economy, political stability, and human health, exacerbated by various lockdown strategies (Mario Coccia 2021; Qin et al. 2021). Experts have warned that African countries, including Ethiopia, could face severe consequences due to pre-existing vulnerabilities, such as weak healthcare systems, overcrowded living conditions, poor sanitation practices, and high mobility between regions, which could facilitate the unchecked spread of the virus (Ruth, 2020; Amsalu et al. 2021).

In Ethiopia, the public health system is underdeveloped, with inadequate healthcare infrastructure and limited resources. This places a significant burden on efforts to trace, test, confirm, isolate, and treat infected individuals. Therefore, assessing the practice of COVID-19 prevention measures is crucial to mitigating the pandemic's effects (Maru 2020).

The Ethiopian Ministry of Health has focused on surveillance, diagnosis, infection prevention and control, epidemic response coordination, and community health education to rapidly identify cases and minimize the

spread of the disease (Gilbert et al. 2020). Across the globe, nations have adopted various strategies to reduce transmission, prevent further outbreaks, provide care for infected individuals (including those critically ill), and mitigate the broader societal impact of the pandemic on healthcare systems, social services, and the economy (World Health Organization 2020).

Ethiopia is among the African countries most at risk of being severely impacted by the COVID-19 pandemic. Contributing factors include a shortage of trained healthcare professionals and limited material resources. Given these challenges, prioritizing and effectively implementing preventive measures is essential for containing the spread of the virus (FMOH 2020).

Although a few studies have investigated the practice of COVID-19 prevention measures in Ethiopia, findings remain limited and geographically specific. For example, a study conducted in the Amhara region reported that 62% of the population adhered to preventive measures (Asemahagn 2020), while studies in Dire Dawa and southern Ethiopia reported 40% and 20%, respectively (Amsalu et al., 2021; Mola et al. 2021). There is still a notable gap in the literature regarding community-level practices such as facemask use and handwashing, which are critical preventive measures in the fight against COVID-19.

Despite the Ethiopian government's strong commitment to controlling the pandemic, case numbers have continued to rise. As of November 2, 2021, Ethiopia had reported 366,783 confirmed cases, with 6,517 deaths (Graph and Graph, 2021). Although vaccines are now available to prevent infection, there is no definitive antiviral treatment for COVID-19. Consequently, the implementation of preventive measures remains the most effective strategy for controlling the spread of the virus.

This study, therefore, aims to assess the practice of COVID-19 preventive measures and identify associated factors in Ethiopia, providing valuable insights into the current state of public health practices in response to the pandemic.

Materials and Methods

Study Area and Period: The study was conducted across nine regions and two city administrations in Ethiopia, excluding the Tigray region. Data collection occurred from November 2020 to January 2021.

Study Design and Population: A community-based cross-sectional study design was employed to assess the practice of COVID-19 prevention measures. The target population consisted of the heads of households or their substitutes, aged 18 years and older, from selected households in the study areas.

Sample Size and Sampling Techniques: The sample size was determined based on a reported national proportion of 7% positivity in COVID-19 tests (Graph and Graph, 2021), with a margin of error of 5%, a 95% confidence interval (CI), and a design effect of 1.5. The final sample size was 8,096 households. A two-stage stratified cluster sampling method was utilized. Enumeration areas (EA) from the 2019 sampling frame were selected in the first stage. In the second stage, households were randomly selected from these EAs. A total of 368 enumeration areas were chosen, with 258 in urban areas and 110 in rural areas. Twenty-two households were randomly selected from each enumeration area, resulting in a total sample size of 8,096 households.

Data Collection, Instruments, and Procedures: The data collection tool was adapted from the WHO (2020b) and UNICEF (2021) COVID-19 prevention guidelines. The tool was translated into four local languages: Amharic, Oromiffa, Afar, and Somali, to ensure cultural and linguistic relevance. Data were collected using the Computer-Assisted Personal Interview (CAPI) technique, which facilitated efficient and accurate data entry.

Data Quality Control: To ensure data quality, all field staff received comprehensive training, which included an overview of the study questions, an introduction to CAPI, and mock interviews to familiarize the staff with the data collection process. A standardized electronic data collection template was used throughout the study. Continuous monitoring and supervision were implemented during the fieldwork to maintain data accuracy and completeness.

Measurement and Definitions: The dependent variable was the practice of COVID-19 prevention measures, categorized as either "Good" or "Poor." The independent variables included socio-demographic factors: place of residence, age, sex, household monthly income, marital status, occupation, educational status, family size, and knowledge about COVID-19. The level of practice of COVID-19 prevention measures was assessed using eight variables: facemask utilization, handwashing, avoiding touching the face, use of disinfectants for hand cleaning, staying at home, covering the mouth and nose while coughing or sneezing, maintaining physical distancing, and disinfecting surfaces. Each variable was scored as 0 (No) or 1 (Yes), with higher scores indicating better adherence to preventive measures. A mean score across these eight questions was calculated. Participants with scores below the mean were categorized as having poor practice, while those with scores equal to or above the mean were classified as having good practice. Knowledge about COVID-19 was assessed using 22 questions, each scored as 0 (No) or 1 (Yes). Participants who scored below the mean were

classified as having poor knowledge, while those who scored equal to or above the mean were considered to have good knowledge.

Data Management and Analysis: Data consistency was verified, and the data were entered into SPSS version 24.0 software for analysis. Descriptive statistics, including frequencies, proportions, means, and standard deviations, were calculated to summarize the participants' demographic characteristics and prevention practices. Bivariate and multivariable logistic regression analyses were conducted to identify factors influencing the practice of COVID-19 prevention measures. Independent variables, such as place of residence, age, sex, household income, marital status, occupation, educational status, family size, and knowledge, were assessed for their association with preventive practices.

The multivariable logistic regression model included variables with a P-value <0.25 in the bivariate analysis. A P-value <0.05 was considered statistically significant for identifying key factors associated with the practice of COVID-19 prevention measures.

Result

Socio-demographic Characteristics: Eight thousand five participants were involved, making the response rate of 98.9%. The mean age of the respondents was 36.87(SD= ±13.45 years. Fifty-six percent of the respondents were females. Two-thirds (68 percent) were urban residents. Three-fourths of the respondents were married. Around one-third of the respondents did not attend formal school, and twenty-five percent were farmers in occupation. The average annual income of the HHs was 56,774 birr (Table 1).

Table 1: Socio-demographic characteristics of participants, Ethiopia (n=8005)

Variables	Frequency	Percent (unweighted)
Residence		
Urban	5437	68
Rural	2568	32
Age of Respondents		
18-35	4435	55.5
36-64	3131	39.3
>=65	404	5.1
Mean age and SD	38(SD= ±14.55)	
Gender		
Male	3524	44
Female	4481	56
Marital status		
Single	1203	15
Married/ Cohabited	6035	75
Divorced/ Separated	372	4.6
Widowed	395	5
Education status		
No formal education	2680	33.6
Primary school	2177	27.3
Secondary school	1503	18.9
College and above	1610	20.2
Occupation		
Government employee	1060	13
Private employee	853	11
Non-government Employee	178	2.2
Merchant/Trader	989	12.4
Farmer	1911	24
Student	577	7.2
Homemaker/Housewife	1797	22.4
Retired/on pension	166	2.1
Unemployed/Job seeker/	336	4
Other	138	1.7
Working in a highly crowded environment (< 2 m)		
Yes	2226	28
No	5779	72
Having Mass Medias		
Yes	6010	75.4
No	1960	25.6

Knowledge and practice of COVID-19

Knowledge about the cause of COVID-19: Of the total, 51.7%, (95% CI: 50.7–52.8) of the residents have good knowledge about the cause, clinical symptoms, and prevention methods of COVID-19. The majority

(87.9%) of the respondents knew that COVID-19 was transmitted through Coughing/sneezing/ runny nose/congestion/sore throat, three- a fourth of them knew the symptoms of COVID-19 were fever/chills/rigor.

Table 2: Knowledge about COVID-19 Cause, clinical symptoms, and prevention methods, COVID-19 RPBR 2021, Ethiopia

Variables	Frequency	Percent
Level of knowledge		
Knowledgeable	4124	51.7
Not Knowledgeable	3846	48.3
Knowledge about COVID-19 cause	5536	69.5
Knowledge about MoT of COVID-19		
Droplets from infected people	4345	54.5
Airborne	4259	53.4
Direct contact with infected people	6325	79.4
Touching contaminated objects/surfaces	3439	43.1
Fever/chills/rigor	5857	73.5
Cough/sneezing/ runny nose/congestion/sore throat	7003	87.9
Shortness of breath and breathing difficulties/chest pain	3212	40.3
Muscle pain and/or joint pain/ fatigue/general body weakness	1193	15
Headache	3303	41.4
GI symptoms (Diarrhea, nausea, vomiting abdominal pain)	450	5.6
Loss of smell and/or tasting	444	5.6
Knowledge about the Incubation period	3983	50
Knowledge about Prevention mechanisms of COVID-19		
Physical distancing	5770	72.4
Stay at home	1601	20.1
wearing masks	6496	81.5
Wash your hands regularly using soap and water	6554	82.2
Clean with sanitizer	7734	97
Cover your mouth and nose when coughing or sneezing	1214	15.2
Avoid close contact with anyone who has a fever and cough	1181	14.8
Avoid direct contact with surfaces	494	6.2

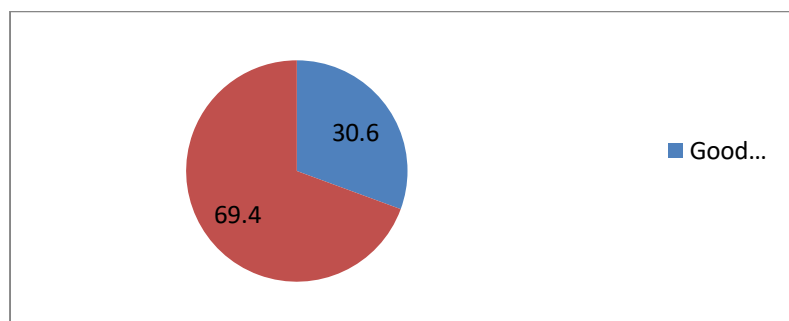


Figure 1: Level practice towards COVID-19 prevention methods

Table 3: Bivariate and Multivariate analysis of factors associated with COVID-19 prevention practice among study participants in Ethiopia, 2021

Variables	Practice		COR (95%)	AOR (95%)
	Good	Poor		
Residence				
Urban	1990	3436	2.72 (2.43-3.06)	1.36 (1.17-1.58)
Rural	446	2098	1	1
Age				
18-27	663	1477	1	1
28-35	748	1547	1.08 (0.95-1.22)	1.10 (0.94-1.28)
36-45	565	1286	0.98 (0.86-1.12)	1.21 (1.02-1.43)
>45	460	1224	0.84 (0.73-0.96)	1.29 (1.07-1.55)
Having radio or TV or internet				
Yes	2141	3869	3.12 (2.73-3.57)	1.45 (1.23-1.70)
No	295	1665	1	1
Marital status				
Single	437	766	1	1
Married/Cohabited	1779	4237	0.74 (0.65-0.84)	0.99 (0.83-1.20)
Divorced	109	263	0.73 (0.56-0.94)	0.90 (0.66-1.22)
Widowed	111	268	0.73 (0.56-0.93)	1.20 (0.88-1.65)
Educational Status				
Unable to read and write	392	1756	1	1
Read and write only	131	401	1.46 (1.67-1.83)	0.96 (0.75-1.23)
Primary school	603	1574	1.72 (1.49-1.98)	1.08 (0.91-1.28)
Secondary school	533	970	2.46 (2.11-2.87)	1.07 (0.89-1.30)
College diploma/TVET	394	529	3.34 (2.81-3.96)	1.05 (0.84-1.31)
Degree and above	383	304	5.64 (4.69-6.80)	1.49 (1.15-1.93)
Family Size				
1-3	865	1559	1	1
4-6	1188	2809	0.76 (0.69-0.85)	0.83 (0.73-0.94)
> 6	383	1166	0.59 (0.51-0.68)	0.79 (0.67-0.93)
Occupation				
Government employee	510	550	2.26 (1.79-2.85)	1.08 (0.82-1.41)
Private employee	368	485	1.85 (1.45-2.53)	1.21 (0.93-1.57)
NGO Employee	97	81	2.92 (2.05-4.17)	1.84 (1.25-2.71)
Merchant/Trader	282	706	0.97 (0.76-1.24)	0.68 (0.52-0.89)
Farmer	286	1607	0.43 (0.34-0.55)	0.70 (0.53-0.92)
Student	188	389	1.18 (0.91-1.54)	0.89 (0.66-1.19)
Homemaker/Housewife	510	1276	0.97 (0.78-1.22)	0.99 (0.78-1.27)
Retired/on pension	58	106	1.33 (0.92-1.95)	1.10 (0.72-1.67)
Unemployed/Job seekers and others	137	334	1	1
Living in a crowded environment				
Yes	933	1292	1	1
No	1503	4242	2.04 (1.84-2.26)	1.40 (1.24-1.57)
Knowledge status				
Knowledgeable	1919	2205	5.61 (5.02-6.26)	4.15 (3.68-4.68)
Not knowledgeable	517	3329	1	1

Practice towards COVID -19 prevention methods: Out of the total respondents, 30.6%, (95% CI: 29.6-31.5) had good practice towards COVID-19 prevention methods (Figure 1), of these 19.5% and 39% used face-masks and washed their hands with water and soap, and/or sanitizer respectively.

Associated Factors with the Practice of COVID-19 Prevention Measures: Study participants who lived in urban areas were 1.4 times more likely to practice COVID-19 prevention methods as compared to residents in rural areas (AOR=1.4; 95%CI:(1.2-1.6)). The odds of COVID-19 prevention practice were 1.3 higher among respondents aged more than 45 years (AOR=1.3; 95%CI: (1.1-1.6)). Study participants who had either radio or television or internet were 1.4 times more likely to comply with COVID-19-related activities compared to respondents who didn't have either radio or television or internet (AOR=1.4; 95%CI: (1.2-1.7)).

Respondents who had a college diploma and above were 1.5 times higher compared to respondents who were unable to read and write (AOR=1.5; 95% CI: (1.2-1.9)). Participants who had family size 4-6 and more than 6 were (AOR=0.8; 95%CI; (0.7-0.9)) and 0.79 (AOR=0.79 95%CI; 0.67-0.93) less likely to practice COVID-19 prevention methods respectively. Respondents who were working at Non-governmental organizations were 1.8 times more likely to practice COVID-19 prevention methods than compared to unemployed or job seekers (AOR=1.8; 95%CI; (1.3-2.7)). Respondents who weren't living in crowded environments were 1.4 times more likely to practice COVID-19 prevention methods than compared to their counterparts (AOR=1.4; 95%CI; (1.2-1.6)). Study participants who were knowledgeable about COVID-19 were 4.2 times more likely to comply or practice COVID-19 prevention activities compared to those who weren't knowledgeable (AOR=4.2; 95%CI; (3.7-4.7)).

Discussion

Three out of ten comply with the practice of COVID-19 prevention measures. Place of residence, older age, having radio or TV or internet, educational status, household income, living in a crowded environment, occupational status, and knowledge of COVID-19 were found to be statistically significant.

No previous similar studies had been done which represents nationally, this makes the study exceptional. Also, representative samples were designed and eligible respondents participated in the study. We used the standard questionnaire for data collection adapted from WHO(WHO 2020b) and UNICEF(World Health Organization 2021) tools. The collected data were sent centrally on a daily basis. Strict follow-up and supervision were done to maintain the quality of the data.

The prevalence of our finding was higher than the study conducted in the southern part of Ethiopia, which was 20% (Mola et al. 2021), and also the study done in Thailand 17% (Srichan et al. 2020). The possible reason might be around three-fourths of the respondents were urban residents and considered that they are near to information regarding COVID-19 prevention methods which might influence positive attitudes to the practice of COVID-19 prevention measures.

However, this finding was lower than the studies conducted in Dire Dawa, Ethiopia, 40.7%(Amsalu et al. 2021), in the Amhara region (62%) (Asemahagn, 2020) and also the studies done in Iran71%(Erfani, Shahriarirad and Ranjbar, 2020) and Indian which was 83.7% (Tomar et al. 2020).

Respondents who had good knowledge about the COVID-19 virus were 4.2 times more likely to practice COVID-19 prevention methods as compared to their counterparts. This finding was consistent with the study in done China and the Amhara region, Ethiopia (Asemahagn, 2020; Zhong et al. 2020). This might be because knowledge is the main modifier of a positive attitude towards the practice of COVID-19 preventive methods, and these activities are practiced after having adequate knowledge of the activities to be performed. Knowledge about the cause, signs and symptoms, mode of transmission, and prevention mechanisms of COVID-19 will increase the prevention practice of individuals(Adhikari et al. 2020).

This finding was lower than the study done in Dire Dawa, Ethiopia; participants who had good knowledge about COVID-19 were 4.2 times more likely to practice COVID-19 prevention measures as compared to their counterparts(Amsalu et al. 2021).

In our findings, an increased level of education was the most significant factor in COVID-19 prevention mechanisms in which respondents who had college diplomas and above were 1.5 times more likely to practice COVID-19 prevention measures as compared to respondents who were unable to read and write. This finding was consistent with the study done in Nigeria, participants who had no formal education were 7 times more likely to have poor practice of preventive measures than those who attended tertiary education('Johnbosco Ifunanya Nwafor ', 2020). This might be that educated women can get access to information and discuss the issues openly and freely. Also, participants with some basic level of education had a better understanding of complications and consequences associated with not using preventive measures to prevent COVID-19 infection.

Respondents who lived in urban areas were 1.36 times more likely to practice COVID-19 prevention methods

as compared to respondents residing in rural areas. Since urban residents are near to information regarding COVID-19 and might have adequate knowledge about the pandemic that leads to the practice of prevention measures.

Study participants who had either radio or television or internet were 1.5 times more likely to comply COVID-19 COVID-19-related activities compared with respondents who didn't have either radio or television internet. The reason might be that educated participants can get access to pertinent information through different mass and social media including the internet, Facebook, and Telegram. They are also more likely to comprehend the information they obtain.

The odds of COVID-19-related prevention practice were 1.3 higher among respondents aged more than 45 years.

Family size had also been significantly associated with COVID-19 prevention methods. Participants who had family sizes 4-6 and more than 6 were 0.17 less likely to practice COVID-19-related prevention activities, respectively. The possible explanation might be if the number of children increases the family size may become crowded which makes it difficult to maintain the recommended distance.

Respondents who were working at Non-governmental organization were 1.8 more likely to practice COVID-19 prevention activities compared to respondents who were unemployed or job seekers. The possible explanation might be working environment is relatively good and it makes it simple to apply prevention practices. The other reason might be income of NGO workers is relatively good and they can easily get COVID-19 prevention materials such as face masks, and sanitizers.

The odds of COVID-19 prevention practice among study participants who weren't living in crowded environments were 1.4 times higher than compared to their counterparts. The possible justification will be such type of environment doesn't create suitable conditions to apply prevention mechanisms for COVID-19 such as physical distancing. The findings will have great implications for policymakers in designing possible strategies for COVID-19 prevention methods.

Strengths and limitations

The study was done at the national level which shows the national figure of prevention practices. The study was done at the household level with eligible respondents; unlike other studies, we did face-to-face interviews in this challenging situation. The findings can be generalized across the country's population. One of the limitations of the study was it did not include an observational study.

Conclusions

More than two-thirds of the study participants hadn't practiced COVID-19 prevention measures. Older age, living in urban areas, and having communication channels increase the level of education, and knowledge have an association with practice of COVID-19 prevention methods. Government, stakeholders, and Media should work continuously on awareness creation activities to increase knowledge of the community which ultimately uses the preventive practices towards COVID-19. Adequate Information about COVID-19 prevention methods should be accessible to rural areas.

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Ethical Considerations

Ethical clearance was obtained from the EPHI Institutional Review Board (EPHI-IRB-315-2020). During the data collection, written informed consent was obtained from each participant.

Competing interests

The author declares that there are no competing interests in this work.

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