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ORIGINAL RESEARCH

COVID-19 Knowledge, Attitude, Practices and Their Associated Factors Among Dessie City Residents, Northeast Ethiopia: A Cross-Sectional Study

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Background: Sufficient knowledge and favorable attitude are among the key determinants for people's adherence to coronavirus disease (COVID-19) precaution measures. Hence, this study assessed Dessie city resident's knowledge, attitude, and practice on COVID-19.

Methods: We used a facility-based cross-sectional study among 424 Dessie city residents from 17 to 21/05/2020. We dichotomized knowledge, attitude and practice scores based on the mean value. We entered the data into EpiData manager software 4.2 and exported to SPSS-20 for data analysis. We run three independent logistic regression analyses to determine factors associated with sufficient knowledge, a favorable attitude, and adequate practice. We defined significant association at a p-value of <0.05.

Results: Among 424 participants, 92.7% have sufficient knowledge about COVID-19, while 96% have a favorable attitude to prevent and control the pandemic. However, the practice was adequate only in 44.6% of the participants. Increasing educational status (AOR: 6.5, 95% CI: 2–21.4), availability of television (AOR: 3.8, 95% CI: 1.4–10.5), having a telephone (AOR: 3.4, 95% CI: 1.3–9.1) and radio (AOR: 4.2, 95% CI: 1.1–15.5) are the factors associated with sufficient knowledge, while sufficient knowledge (AOR: 5.4, 95% CI: 1.7–-17.2), is the only predictor identified for favorable attitude. Similarly, being a farmer (AOR: 0.14, 95% CI: 0.047–0.4), availability of telephone (AOR: 3.1, 95% CI: 1.2–8.2), and sufficient knowledge (AOR: 15.2, 95% CI: 1.9–118) are the predictors of adequate practice.

Conclusion: In the study area, the participant's knowledge and attitude are found to be sufficient to halt coronavirus transmission. However, practice in the vast majority is not adequate to stop coronavirus transmission. Educational status, television, telephone, radio, occupation and knowledge are the significant factors for successful prevention and control of coronavirus. Despite escalating public knowledge, our finding suggests the government to follow some compulsory regulations for uniform implementation of preventive measures.

Keywords: attitude, COVID-19, knowledge, practice, Dessie city

Background

Coronavirus disease 2019 (COVID-19) is a respiratory tract infection caused by a newly discovered coronavirus, that was first recognized in Wuhan city, China, in December 2019. Its mode of transmission is through respiratory droplets, direct contact and feco-oral.[1] So far, it has no proven antiviral to cure it, nor effective vaccine to prevent it.[2] Since its first detection in China, the World Health Organization has been

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advising several preventive measures to curve the spread of the disease. These are, but not limited to, frequent handwashing with soap, movement restrictions, keeping physical distancing, avoiding mass gatherings, utilization of personal protective equipment's, alcohol-based sanitizers, case identification and contact tracing.[3] Following these, an extraordinary measure has been taken by the government of Ethiopia to prevent the entrance of the disease. Community mobilization, public awareness creation and education campaigns have been central to the government's effort.[4] Despite this effort, the country has detected and notified its first COVID-19 case on 13th March 2020,[5] reaching 112,740 cases and 1745 deaths as of December 6/2020.[6] Since then, the government further strengthened its prevention and control strategies to halt the spread of the disease in the country. Among the essential strategies implemented are declaration of a state of emergency on April 8/2020, which contains compulsory components on COVID-19 precaution measures, strict regimen of rigorous contact tracing, isolation, compulsory quarantine, and treatment, concreted media campaign, strict passenger screening, house to house screening, scaling up diagnostic tests and treatment centers and local resource mobilization.

However, the success of such preventive and control measures is reliant on people's adherence to it, which is affected by their knowledge and attitudes towards the disease. Therefore, it is better to assess individual's knowledge, attitude and their practice on COVID-19, which enables to identify where the gap is and to take remedial actions, based on the identified gaps. Thus, to the best knowledge of the investigators, no published evidence assessed the knowledge, attitude and practices of urban residents through face-to-face interviews in the Amhara region, particularly in the study area. Previous studies conducted in the country have failed to assess the practices of COVID-19 preventive measures through an observational approach. Therefore, we assessed Dessie city resident's knowledge, attitude and their practice on COVID-19. The result is important for public health authorities to redirect their anti-corona efforts towards the identified gaps. It also serves as an evaluation study of the existing community-based awareness creation campaigns.

Methods

Study Design and Period

We conducted a facility-based cross-sectional study from May 17–21/2020.

Study Setting and Population

We conducted the study in Dessie city administration health facilities, which is found in the northeast part of the country. It is 401 kilometers far from the capital city of Ethiopia, Addis Ababa. The city is divided into 5 sub-cities with 18 urban and 8 rural kebeles. According to the 2007 Central Statistical Agency report, the city has an estimated total population of 273,305 in 2019/20, of which 49.5% are men. There are 8 health centers, 8 health posts, 2 government hospitals, 3 private hospitals, 38 private clinics, 55 private drug stores, 4 private diagnostic laboratories. Besides, there are two governmental COVID-19 testing laboratories in the city, namely the Amhara Public Health Institute Dessie Branch and Wollo University laboratory center.

All Dessie city residents aged 18 years or more were the source populations. We included all individuals ≥18 years that come to the health facilities in the study period as study subjects. We excluded critically ill and health professionals from the study.

Sample Size and Sampling Technique

We determined the sample size using a single population proportion formula, by considering the following assumptions: 5% margin of error, 95% confidence level, and a prevalence of 50%, considering that it is not known previously. After adding a 10% non-response rate, we got a final sample size of 424 individuals who come from the community. Study participants who visited the selected health facilities in the study period for any reason were taken consecutively until we attained the final sample size.

Data Collection

We collected data through face-to-face interviews using pretested and a structured questionnaire (Supplementary Material 1). The questionnaire is first prepared in English language and then translated to Amharic version, which is the resident's mother tongue and the national working language. We developed the questionnaire from different works of literature and the World Health Organization resources. The questionnaire addressed information on socio-demographic characteristics, knowledge, attitude and practice towards COVID-19. We assessed practice objectively using some observation items. We collected observational data after we prepared a handwashing facility for clients at the health facility entry site. We observed

participants' physical distancing and face mask utilization in their stay in the facility. Eight health professionals took part as a data collector.

Data Quality Assurance

Before the actual data collection period, we conducted pretesting of the questionnaire on 22 individuals and we made necessary modification before applying to the study participants and we excluded those who pretested from the actual study. Training was given for data collectors to enable them to have a common understanding of the objectives of the study and each of the questions in the questionnaire. The principal investigator did daily supervision. Four supervisors supervised the data collection process. We validated the questionnaire, and Cronbach's alpha was estimated to assess the reliability of the questionnaire. We find the internal consistency estimate to be in the acceptable range.

Data Analysis

We entered data into EpiData manager version 4.2 and exported to SPSS 20 for data analysis. Before data analysis, we have done reverse scoring for negatively worded questions. We computed descriptive statistics to describe the data. We conducted logistic regression analyses to identify factors associated with knowledge, attitude, and practice on COVID-19. We defined a statistically significant association at a P-value of less than 0.05. We entered a variable with a P-value of ≤0.2 in the bivariate analysis into the multivariate logistic analysis. Finally, we used a backward stepwise regression method. Adjusted odds ratios with 95% confidence interval were computed to observe the strength of association between the dependent and independent variables.

Operational Definition

Sufficient Knowledge

Eighteen questions were used to measure the participant's knowledge about COVID-19 and a score greater than the mean was considered sufficient. To compute the mean score, participants who answered "Yes" were considered as correct responses and we categorized those "No" and "I do not know" responses as incorrect responses.

Favorable Attitude

We measured attitude using 12 items, each graded as agree, disagree, and I do not know. Then, we dichotomize it into two categories. Finally, participants who positively reacted to at least seven questions were classified as having a favorable attitude. To calculate the mean score, participants who answered "agree/yes" were considered as correct responses while those who answered "disagree/no" and "I do not know" were taken as incorrect response.

Adequate Practice

We asked twelve questions about COVID-19 preventive measures and participants who scored above the mean were taken as having adequate practice.

Results

Socio-Demographic Characteristics of Participants

A total of 424 residents were interviewed. Their age ranges from 18 up to 90 years. The mean age was 34.4 (±13.4 SD) and 45.3% of them are in between 18–29 years. The proportions of female participants were 52.6%. Most participants are married (69.8%) and Muslims (61.8%) in religion. Seventy percent of them have a television in their house and 42.9% are social media users. Further socio-demographic information is available in Table 1.

Knowledge About COVID-19

All participants have heard about the pandemic and 96% of them correctly mentioned its name. Even though the participants have got information from different sources, the most cited ones were television (79%), radio (37%) and social media/facebook (31.6%).

Regarding participant's knowledge about COVID-19 symptoms, 78.8% mentioned fever while 68.9% and 23.6% told us dry cough and shortness of breathing, respectively. The most commonly listed modes of transmission were direct contacts like handshaking (94.3%), respiratory droplets (52.1%) and indirect contacts to contaminated inanimate objects (33.3%). Airborne way of transmission is also mentioned by 37.7% of the participants. The most frequently mentioned preventive measures were frequent hand washing (89.6%), physical distancing (82.8%), avoiding handshaking (54.7%), staying at home (44.6%) and face mask utilization (42.7%).

Eighty-seven percent of the participants mentioned that all age groups and both sexes are at risk of getting infected with the virus. Besides, the elderly (72.4%) and people with chronic diseases (60.6%) were specified as the most vulnerable groups to become severely ill or die. Concerning the activities

Table 1 Socio-Demographic Characteristics of Participants in Dessie City, Northeast Ethiopia (N=424)

Characteristics	Category	Frequency	Percent
Age	18–29	192	45.3
	30–39	114	26.9
	40–49	63	14.8
	50–59	21	5.0
	≥60	34	8.0
Sex	Female	223	52.6
	Male	201	47.4
Religion	Muslim	262	61.8
	Orthodox	157	37.0
	Protestant	5	1.2
Marital status	Married	296	69.8
	Single	98	23.1
	Divorced	21	5.0
	Windowed	9	2.1
Occupation	Employed	97	22.9
	Farmer	38	9.0
	Housewife	102	24.0
	Merchant	56	13.2
	Daily laborer	66	15.6
	Student	40	9.4
	Jobless	25	5.9
Educational status	No formal education	105	24.8
	Primary school	105	24.8
	Secondary school	122	28.8
	Diploma & Degree	92	21.7
Television	No	126	29.7
	Yes	298	70.3
Radio	No	227	53.5
	Yes	197	46.5
Social media user	No	242	57.1
	Yes	182	42.9

following a single COVID-19 case detection, 97.6% mentioned isolation and treatment of the case, while 36.6% mentioned contact tracing and quarantining.

Out of eighteen knowledge items, participants score ranges from a minimum of 4 to a maximum of 18 knowledge scores, with a mean value of 13.96 ±2.6 SD. Half of the study participants have a knowledge score that lies in the 4th quartile, while 41% in the 3rd quartile (Table 2).

Attitude Towards COVID-19

We assessed the participant's attitude using 12 questions. The mean attitude score was 10.8 (±1.8 SD), ranging from 2 up to 12 scores. Most participants (82.8%) score lie in the 4th quartile and 54% answered all the questions positively. Regarding specific attitude items, 91% agreed that the disease can infect African ethnic origins as well, while the remaining 5.7% believe that the disease cannot attack Ethiopians. In line with this, 12.3% of our participants also agreed on the issue that preventive measures are not important for Ethiopians. Besides, 22.2% of the participants agreed on the idea that cultural medications can prevent and/or cure coronavirus. Eighty-three percent of the participants advise their family members about coronavirus, and the same proportion of participants are ready to notify suspected COVID-19 cases to the nearby local authorities. Nine in ten participants (90.6%) have a firm commitment to purchase coronavirus prevention supplies, even at a high cost. The proportion of participants that agrees on the importance of handwashing, physical distancing, staying at home and avoiding mass gatherings in preventing coronavirus infection ranges from 94.6 to 97.6%. Eighty-four percent of the participants believe that coronavirus infection is preventable (Table 3).

Practice on COVID-19 Preventive Measures

The proportion of participants who are washing their hands after touching any other objects was 87%. Meanwhile, 86.6% of the participants reported that their frequency of handwashing has increased with a minimum of two folds as compared to the era of no coronavirus infection. We found the estimated frequency of handwashing to be at least six times per day for 79.2% of the participants. Besides, 85.8% of the study participants were using soap at each handwashing events. Regarding direct contacts like handshaking, 93.2% of the participants have avoided it, while 79% avoided visiting crowded places. On the other hand, 34.7% were implementing staying at home as a prevention method and 89.4% are applying physical distancing strategy. Thirty-four percent of the participants reported that they are using face mask when leaving their home, but we observed that only 21% of the participants were using a facemask at the time of the interview. Similarly, forty-seven percent of our participants mentioned as if they have sanitizers in their home, while only 20% of them have sanitizers at hand during the time of interview. We observed that only 66.3% of the participants washed their hands at the entry to the health facilities. Of those, 95.4% have used soap to wash their

Table 2 Knowledge Items Mentioned by Participants About COVID-19 in Dessie City, Northeast Ethiopia (N=424)

Variables	Category	Frequency	Percent	Variables	Category	Frequency	Percent
Heard of COVID-19	Yes	424	100.0	**Activities following single case detection**			
Name of pandemic	Coronavirus Others	407 17	96 4	Isolation and treatment Contacts tracing and quarantining	Yes Yes	414 155	97.6 36.6
Duration of quarantine	14 days Other	347 77	81.8 18.2	Performing lab tests Disinfection of houses/ utensils	Yes Yes	92 10	21.7 2.4
Death	Yes	366	86.3	**Prevention methods**			
	No Do not know	30 28	7.1 6.6	Frequent hand washing Avoid hand shaking	Yes Yes	380 232	89.6 54.7
Drug	No Yes Do not know	341 28 55	80.4 6.6 13.0	Physical distance Staying at home Alcohol/Sanitizers	Yes Yes Yes	351 189 131	82.8 44.6 30.9
Vaccine	No Yes Do not know	272 39 113	64.2 9.2 26.7	Avoid visiting crowded places Good respiratory hygiene Isolation & treatment	Yes Yes Yes	103 21 23	24.3 5.0 5.4
Case fatality rate is 100%	No Yes Do not know	366 10 48	86.3 2.4 11.3	Avoid touching openings PPE/facemask Follow HCW advice	Yes Yes Yes	74 181 24	17.5 42.7 5.7
Children/young adults did not need care	No	383	90.3	**Who is at risk of getting corona virus infection?**			
	Yes Do not know	20 21	4.7 5.0	All age group and both sex Old peoples	Yes Yes	369 45	87.0 10.6
Asymptomatic case cannot transmit	No Yes	288 82	67.9 19.3	Children's/Young adults Chronic diseases	Yes Yes	11 17	2.6 4.0
	Do not know	54	12.7	**Get severely ill or die with the virus?**			
Only one method is adequate	No Yes Do not know	370 45 9	87.3 10.6 2.1	Old peoples Chronic diseases All age group and both sex	Yes Yes Yes	307 257 38	72.4 60.6 9.0
Source of information				Children's/Young adults	Yes	32	7.5
Television	Yes	335	79.0	**Suspected case definition**			
Radio	Yes	157	37.0	Symptoms plus Travel history	Yes	76	17.9
Social media/face book	Yes	134	31.6	Symptoms Plus Contact History	Yes	73	17.2
Health worker	Yes	60	14.2	Symptoms Plus Occupational risk	Yes	36	8.5
COVID-19 symptoms				Symptoms only	Yes	305	71.9
Fever	Yes	334	78.8	No criteria mentioned		11	2.6
Loss of appetite	Yes	130	30.7	**How do we confirm ?**			
Dry cough Shortness of breathing Common cold symptoms	Yes Yes Yes	292 100 159	68.9 23.6 37.5	Lab test Travel history to abroad Using signs and symptoms	Yes Yes Yes	372 23 24	87.7 5.4 5.7

(*Continued*)

Table 2 (Continued).

Variables	Category	Frequency	Percent	Variables	Category	Frequency	Percent
Mode of transmission				Contact history	Yes	10	2.4
Respiratory droplets	Yes	221	52.1	Knowledge score	1st quartile	2	0.5
Direct contact	Yes	400	94.3		2nd quartile	29	6.8
Indirect contact	Yes	141	33.3		3rd quartile	174	41
Vegetables and uncooked meats	Yes	18	4.2		4th quartile	219	51.7
Airborne	Yes	160	37.7	Knowledge category	Sufficient Insufficient	393 31	92.7 7.3

hands, while 91.8% of them washed their hands appropriately. We observed that 72% of the participants have fully maintained their 2-meter physical distance in their stay to the health facility, while the rest 19.6% of the participants partially kept their physical distance in the facility.

Of the twelve practice items, we found the mean practice score to be 6.3 with ± 1.8 SD and ranging from 2 up to 11 scores. Most participants' score falls in the 2nd (50.9%) and 3rd (38.9%) quartiles (Table 4).

Factors Associated with Knowledge, Attitude and Practice

In the 1st regression model, participant's religion, their educational status, occupation, availability of television, telephone, radio, their age category and social media utilization were found to be the predictors of sufficient knowledge about COVID-19 at a P-value of ≤0.2. However, in multivariate analysis, only participant's educational status, availability of television, telephone and radio remains to be significant predictors of sufficient knowledge about COVID-19. Consequently, the odds of having sufficient knowledge are 6.5 times higher in participants with primary education as compared to participants without formal education (AOR: 6.5, 95% CI: 2.0–21.4). Likewise, participants who have a television in their house are 3.8 times more likely to have sufficient knowledge as compared to their counterparts (AOR: 3.8, 95% CI: 1.4–-10.5). We also find the availability of personal telephone to increase participants' knowledge with over three folds as compared to their counterparts (AOR: 3.4, 95% CI: 1.3–9.1). Similarly, participants who have a radio in their house are 4.2 times more likely to have sufficient knowledge about COVID-19 (AOR: 4.2, 95% CI: 1.1–15.5) (Table 5).

In the 2nd regression model, participant's educational status, their age category, television, telephone and radio availabilities, social media utilization and their knowledge status were found to be the predictors of a favorable attitude towards COVID-19 in bivariate analysis (P≤ 0.2). However, only the participant's knowledge status remains significantly associated with a favorable attitude in the multivariate analysis model. Hence, participants who have sufficient knowledge about COVID-19 are 5.4 times more likely to have a favorable attitude towards COVID-19 prevention (AOR: 5.4, 95% CI: 1.7–17.2) (Table 5).

In the 3rd regression model, sex, religion, occupation, educational status, television, telephone, radio, social media utilization and knowledge status were the candidate variables (P-value ≤0.2) for multivariate regression. Thus, participants who have sufficient knowledge are nearly four times more likely to have adequate practice as compared to their counterparts (AOR: 3.8, 95% CI: 1.04–13.7). Similarly, participants who have personal telephone are three times more likely to implement COVID-19 preventive measures as compared to their counterparts (AOR: 3.3, 95% CI: 1.2–9.2). Conversely, farmer participants are seven times less likely to implement coronavirus prevention strategies as compared to an employed participants. Besides, housewife participants were 72% less likely to have adequate practice as compared to employed participants (AOR: 0.28, 95% CI: 0.15–0.5). Students are also 68% less likely to have adequate practice as compared

Table 3 Attitude of Participants Towards COVID-19 in Dessie City, Northeast Ethiopia (N=424)

Attitude Items	Category	Frequency	Percent
Coronavirus will not infect or kill African origins/Ethiopians?	Agree Disagree I do not know	24 386 14	5.7 91.0 3.3
Do you agree that coronavirus only infects the elderly?	Agree Disagree I do not know	22 396 6	5.2 93.4 1.4
There is no need to bother about COVID 19 preventive measures; let God/Allah protect us.	Agree Disagree I do not know	52 367 5	12.3 86.6 1.2
Avoiding mass gatherings will prevent coronavirus infection?	Agree Disagree I do not know	401 18 5	94.6 4.2 1.2
Frequent hand washing and sanitizer utilization can prevent coronavirus infection?	Agree Disagree I do not know	410 13 1	96.7 3.1 0.2
Staying at home can prevent coronavirus infection?	Agree Disagree	411 13	96.9 3.1
Maintaining physical distance can prevent coronavirus infection?	Agree Disagree	414 10	97.6 2.4
Cultural medications can prevent and/or cure COVID-19?	Agree Disagree I do not know	94 275 55	22.2 64.9 13.0
COVID-19 is a preventable disease?	Agree Disagree I do not know	357 53 14	84.2 12.5 3.3
Do you advice coronavirus prevention strategies for others	No Yes	69 355	16.3 83.7
Are you ready to report a suspected case to the local authority?	No Yes	71 353	16.7 83.3
Commitment to purchase coronavirus prevention commodities at a high cost?	No Yes	40 384	9.4 90.6
Attitude category	1st quartile 2nd quartile 3rd quartile 4th quartile	2 15 56 351	0.5 3.5 13.2 82.8

to employed participants (AOR: 0.32, 95% CI: 0.14–0.7) (Table 5).

Discussion

Good knowledge and positive attitude towards an intervention or a new practice by a target group are among the key determinants for adoption. This study was interested in ascertaining the knowledge, attitude and practice of Dessie city residents on COVID-19. Therefore, when the participant's knowledge was assessed, overwhelming majority (92.7%) showed having sufficient knowledge about COVID-19. This result shows that participant's knowledge on COVID-19 is far broader than any time previously.[7–11] and shows that coronavirus risk communication and awareness creation campaign across the country have made a positive impact on the public knowledge of

Table 4 Practice of Participants on COVID-19 Preventive Measures in Dessie City, Northeast Ethiopia (N=424)

Variables	Category	Frequency	Percent
I wash my hands after touching any other objects	No Yes	55 369	13.0 87.0
In recent days, how many times a day you wash your hands?	1–5 6–10 11–15 16–20 21–30	88 233 82 17 4	20.8 55.0 19.3 4.0 0.9
How much has your hand washing increased as compared to the pre-corona virus era?	The same Two times Three times Four times Five times ≥ Six times	57 224 110 22 4 7	13.4 52.8 25.9 5.2 0.9 1.7
Frequency of soap utilization	Always Sometimes Not using	364 58 2	85.8 13.7 0.5
Do you have sanitizer at home	No Yes	222 202	52.4 47.6
Direct contact like handshaking with someone else?	Yes No	29 395	6.8 93.2
In recent days, have you gone to any crowded places?	No Yes	335 89	79.0 21.0
I am staying at home	No Yes	277 147	65.3 34.7
How many hours did you spend outside the home?	0–4 hours 5–8 hours 9–12 hour	201 114 109	47.4 26.9 25.7
Are you applying physical distancing?	No Yes	45 379	10.6 89.4
Are you using a face mask when leaving home?	No Yes	278 146	65.6 34.4
I avoided touching the eyes, nose and mouth	No Yes	345 79	81.4 18.6
I avoided taking public transportations	No Yes	398 26	93.9 6.1
I cover my cough using elbow	No Yes	371 53	87.5 12.5
I am not practicing any methods	No Yes	416 8	98.1 1.9
Observation part			
Washed his hands at the entry to the health facility?	No Yes	143 281	33.7 66.3

(*Continued*)

Table 4 (Continued).

Variables	Category	Frequency	Percent
Used soap while washing hands (N=281)?	No Yes	13 268	4.6 95.4
Washed hands appropriately (N=281)?	No Yes	23 258	8.2 91.8
Has sanitizer at hand?	No Yes	338 86	79.7 20.3
Was using facemask at the interview?	No Yes	334 90	78.8 21.2
Maintained 2-meter physical distancing?	No Yes Partially	35 306 83	8.3 72.2 19.6
Practice category	1st quartile 2nd quartile 3rd quartile 4th quartile	19 216 165 24	4.5 50.9 38.9 5.7

the disease. This finding is much higher than other studies in the northern part of the country those reported 42.9% and 60.7% knowledgeable participants.[12,13] The variation might be explained by the difference in the characteristics of study participants, change in the study period, inadequate access to COVID-19 information and different knowledge measurement tools used by researchers. Though our study reveals a high level of knowledge among participants, the knowledge varies from one coronavirus transmission and prevention method to another. For instance, the most popular prevention methods known by participants are frequent hand washing and physical distancing, which accounted for 89.6% and 82.8%, respectively. This is comparable with the finding from Addis Ababa city where 85% and 83% mentioned hand washing and social distancing as a COVID-19 prevention measures, respectively.[7] Another online survey conducted in Ethiopia also documented a 90% prevention knowledge of maintaining social distance and frequent hand washing, which is in line with our finding.[14] Avoiding handshaking is the third most popular prevention method cited by participants (54.7%), followed by staying at home (44.6%). In the meantime, the most commonly known mode of transmissions is direct contacts (94.3%), respiratory droplets (52.1%), airborne (37.7%), and indirect contacts (33.3%), which is also comparable with a previous study done in Addis Ababa.[7] Furthermore, a good proportion of participants knew that being elderly (72.4%) and a concomitant chronic illness (60.6%) are among the poor prognostic factors. This result is higher than the finding from Kenya[15] where 64% and 26% of the participants identified the elderly and peoples with weak immune systems as the most high-risk groups to develop severe illness. But our finding is comparable with the 66.6% and 56.6% study finding from northern Ethiopia.[13] The study findings also revealed that television (79%), radio (37%) and social media (31.6%) are the major sources of COVID-19 information. A study from the southern part of the country[16] also revealed that TV/radio is the major source (80.3%) of COVID-19 information. A large majority of study participants (96%) have a favorable attitude towards COVID-19 prevention and control measures. This is because of vast broadcasting about COVID-19 through private and public media and good knowledge of the participants. The result is much higher than previous studies conducted in the country,[16] Uganda (72.4%) and Rivers state Nigeria (80.6%).[17,18] Yet, 12.3% of the participants disagree on the importance of taking preventive measures, while another 22.2% has a trust in cultural medications to prevent and/or cure COVID-19. Interestingly, 83.7% of the study participants admitted that they could recommend the implementation of COVID-19 preventive measures to a friend; indicating their degree of willingness against the disease

Table 5 Predictors of Sufficient Knowledge, a Favorable Attitude and Adequate Practice on COVID-19 in Dessie City, Northeast Ethiopia (N=424)

Variables	Category	Knowledge			Attitude			Practice		
		Sufficient	Insufficient	AOR (95% CI)	Positive	Negative	AOR (95% CI)	Adequate	Inadequate	AOR (95% CI)
Educational status	No formal education	78	27	1	92	13	1	32	73	1
	Primary education	101	4	6.5(2–21.4)*	103	2	4.4(0.9–21.4)	59	46	1.7(0.9–3.1)
	Secondary education	122	0	***	120	2	4.4(0.9–22.7)	53	69	0.9(0.5–1.7)
	Diploma & degree	92	0	***	92	0	***	67	25	3(1.5–5.9)**
Telephone	Yes	368	14	3.4(1.3–9.1)*	372	10	1.3(0.3–5)	205	177	3.3(1.2–9.2)*
	No	25	17	1	35	7	1	6	36	1
Television	Yes	291	7	3.8(1.4–10.5)*	292	6	1.8(0.5–6.1)	164	134	1.2(0.7–2)
	No	102	24	1	115	11	1	47	79	1
Radio	Yes	194	3	4.2(1.1–15.5)*	193	4	1.3(0.3–4.8)	106	91	0.8(0.5–1.2)
	No	199	28	1	214	13	1	105	122	1
Social media	Yes	180	2	0.7(0.1–4.2)	179	3	0.6(0.1–3.2)	109	73	1.2(0.7–2.1)
	No	213	29	1	228	14	1	102	140	1
Knowledge	Sufficient				384	9	5.4(1.7–17.2)*	210	183	3.8(1.04–13.7)*
	Insufficient				23	8	1	1	30	1
Attitude	Positive	384	23					210	197	7.7(0.9–63)
	Negative	9	8					1	16	1
Age	18–29	183	9	1	189	3	1	91	101	
	30–39	106	8	1.38(0.34–5.6)	109	5	0.4(0.01–2.2)	60	54	
	40–49	58	5	2.4(0.5–10.7)	60	3	0.6(0.1–0.6)	36	27	
	50–59	19	2	3.8(0.5–27.1)	18	3	0.2(0.03–1.3)	11	10	
	≥60	27	7	2.1(0.5–9.6)	31	3	0.7(0.1–4.8)	13	21	
Sex	Female	207	16		217	6	1	106	117	
	Male	186	15		190	11	0.5(0.1–1.5)	105	96	
Occupation	Employed	96	1	1	96	1		64	33	1
	Farmer	28	10	2.3(0.15–36)	32	6		10	28	0.14(0.047–0.4)**
	Housewife	93	9	0.85(0.07–10)	101	1		42	60	0.28(0.15–0.5)***
	Merchant	53	3	0.8(0.06–10.6)	53	3		31	25	0.73(0.37–1.45)
	Daily laborer	60	6	4.5(0.29–69.3)	62	4		36	30	0.6(0.3–1.15)
	Student	39	1	0.3(0.01–12.5)	38	2		16	24	0.32(0.14–0.7)**
	Jobless	24	1	1.6(0.04–57)	25	0		12	13	0.64(0.26–1.6)
Religion	Muslim	239	23	1	251	11		121	141	
	Orthodox	149	8	1.1(0.4–3.7)	151	6		88	69	
	Protestant	5	0	0.5(0.0)***	5	0		2	3	

Notes: *P-value: < 0.01, **P-value: 0.01< 0.05. ***Data does not fulfill X^0 assumptions, huge odds ratio.

transmission. Furthermore, 84.2% of the participant's belief that COVID-19 is a preventable disease provided that appropriate preventive measures are implemented uniformly. Generally, this finding suggests a high level of public willingness to stand with the government in combating the disease and the public acceptability of preventive and control measures.

Despite a high level of sufficient knowledge and favorable attitude towards COVID-19, this study found adequate practice only in 44.6% of the study participants; which shows inadequate practice in most participants to halt coronavirus transmission. Thus, the finding is lower when compared with previous studies carried out in the country[9] and abroad,[10,19] where the overall good practice was 52.7%, 88.1% and 67%, respectively.[9,10,19] We might relate the reason to more practice questions (twelve) used in the present study and an observation part to measure practice objectively. Still, our finding is comparable with other studies conducted in the country that reported low practices of participants towards COVID-19 prevention.[9,14,20] This implies that having adequate knowledge and favorable attitude will not always lead to the adoption of a new practice by a target group. These reminds the government to follow some compulsory regulations on COVID-19 preventive measures despite escalating public knowledge. Regarding specific practices, most participants are washing their hands with soap and water (87%), while 93.2% avoided handshaking, 79% stopped visiting crowded places, 89.4% maintain their physical distancing, and 34.7% staying at home. These specific practices seem high and adequate to prevent COIVD-19 as compared to our pooled practice prevalence which is 44.6%. Our findings are higher when compared with previous studies conducted in other parts of the country[8] that reported a specific practice of 77.3%, 53.8%, 33.2%, 33.6% and 1.6%, respectively. The difference is more likely because they conduct the previous study in the early phase of the pandemic, where most preventive and control measures are not intensified by the government.

But even though our participant's specific practice seems satisfactory, we found a big discrepancy between our point in time practice observation and participants' self-report. For instance, the prevalence of handwashing is 87% as reported by participants, whereas the observed handwashing prevalence is 66.3%. Similarly, maintaining physical distancing and facemask utilization is self-reported to be 89.4 and 34.4%, respectively, but 72.2 and 21.2% as per our observation in the health facilities. Likewise, even though 47.6% of the study participants have sanitizers at home, only 20.3% of them were having it at hand. In our observation, we get a relatively low specific practice because of a point in time real data recording procedure or because of over-reporting by some participants on the counter.

To determine the predictors of sufficient knowledge, favorable attitude and adequate practice, we run three independent logistic regressions and each produced a unique combination of risk factors. In the first model, the odd of having sufficient knowledge is 6.5 times higher in participants with primary education as compared to participants with no formal education (AOR: 6.5, 95% CI: 2–21.4). This finding is consistent with other studies conducted in southwest Ethiopia[21] and across the world.[19,22] Similarly, the availability of television in the households resulted in a higher likelihood of having sufficient knowledge (AOR: 3.8, 95% CI: 1.4–10.5), which is also supported by our descriptive finding, where 79% of the participants mentioned television as the primary source of COVID-19 information. Likewise, the likelihood of sufficient knowledge is three to four times higher in participants who have telephone and radio. They also documented similar findings in a study conducted in Kenya.[15] Nonetheless, this finding sounds more when we think of those rural residents that did not have formal education, television, radio and telephone and it implies the importance of choosing and designing appropriate communication media for each segment of the population.

Participants with sufficient knowledge are five and nearly four times more likely to have a favorable attitude and adequate practices, respectively, as compared to their counterparts. This tells us escalating public knowledge of COVID-19 is the cornerstone and the precursor for effective control of the pandemic. The finding is also evidenced in other similar studies carried out in central Nigeria.[14] Also, even though not surprisingly, farmer participants are seven times less likely to exercise COVID-19 precaution measures as compared to employed participants. Likewise, students and housewives are also three times less likely to have adequate practice as compared to employed. We also find personal telephone utilization to increase the odds of implementing COVID-19 prevention precautions with over three folds. This is more likely explained because participants with telephone are more likely to use social media like Facebook and also receive short voice or text messages from the national telecom.

Finally, our study has its own strength and weakness that has to be known to the readers. First, we have tried to incorporate observation part to measure practice besides participants' self-report. Second, this study has tried to avoid the possibility of social desirability bias by actively asking participants to mention the answer under each question rather than telling them the choices and recording their responses. Still, the possibility of false or over-reporting of preventive measures by some participants is not fully excluded from this study.

Conclusions

In the study area, the participant's knowledge and attitude are sufficient to halt coronavirus transmission. However, practice in the vast majority is not adequate to combat the pandemic. Educational status, television, telephone, radio, occupation and knowledge are found to be significant factors for successful prevention and control of coronavirus. Despite escalating public knowledge, our finding suggests the government to follow some compulsory regulations to enable the uniform implementation of COVID-19 precaution measures. Furthermore, COVID-19 interventions should consider identified modifiable factors for successful prevention and control of the pandemic.

Abbreviations

APHI: Amhara Public Health Institute; COVID-19: coronavirus disease 2019.

Data Sharing Statement

We have deposited all relevant data on public data repositoriesAlemu, Tefera (2020), "Mr", Mendeley Data, V1: http://dx.doi.org/10.17632/xk5hg4d5bg.1.

Ethics Approval and Consent to Participate

We got Ethical approval from Amhara Public Health Institute Ethical review committee (Protocol No: H/R/T/T/D/3/791) and a support letter from the research and technology transfer directorate of the institute to get the permission and cooperation of concerned bodies in Dessie city. We got an informed oral consent from each participant, which was approved by the ethical review committee. The interviewers took precautionary measures to prevent COVID-19 cross contaminations. The study was conducted in accordance with the Declaration of Helsinki.

Consent for Publication

Not applicable.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors report no conflicts of interest for this work.

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