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Evaluating the perceptions and practices towards coronavirus and associated factors in metropolitan cities of Amhara region, Ethiopia



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ARTICLE INFO

Article history:

Received 4 August 2021

Revised 20 October 2021

Accepted 25 October 2021

Editor: DR B Gyampoh

Keywords:

Corona virus

Logistic regression

Metropolitan city

Perception and practice

Ethiopia

ABSTRACT

Confirmed cases of coronavirus in Africa, particularly in Ethiopia, are increasing rapidly following improved testing. This study is aimed at assessing the perceptions and practices towards coronavirus among the metropolitan city population of Amhara region, Ethiopia, and examining the associated factors affecting public perceptions and practices regarding coronavirus among the population of metropolitan cities. A total of 1288 randomly selected participants completed a questionnaire designed to assess perceptions and practices towards coronavirus and associated factors. The statistical analysis involved fitting a binary logistic regression model and a chi-square test. Of 1288 study participants, 788 (61.2%) and 500 (38.8%) were male and female, respectively. Their average age and monthly income were 29.2 years and 2484 birr, respectively. Preventive measures followed by the participants involved washing hands with soap and water rubbing for at least 20 s (55.4%) and visiting a doctor when corona symptoms show up (49.5%). Permanent rural residents had lower odds of good perception and practices regarding coronavirus (aOR=0.505; 95% CI=0.15, 0.82) as compared to permanent urban resident participants. Due to misguided perceptions and practices, the prevalence of coronavirus in metropolitan city communities of Amhara region is high. The city of residence, marital status, educational level, permanent residence, and information sources were significantly associated with people's perceptions and practices towards the prevention of coronavirus. Perceptions and practices towards coronavirus had a significant positive correlation in terms of preventive measures against coronavirus. Therefore, the authors would like to recommend if substantive effort from the government and different stakeholders regarding to raising the perception and practices of communities in the cities towards the pandemic and reduce the collateral damage especially the lower income communities who cannot afford basic needs.

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Abbreviations: COVID-19, Coronavirus Disease 2019; WHO, World Health Organization; aOR, Adjusted Odds Ratio; COR, Crude Odds Ratio; CI, Confidence Interval; SPSS, Statistical Package for Social Science; SAS, Statistical Analysis System.

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<https://doi.org/10.1016/j.sciaf.2021.e01027>

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Background

Corona is a highly contagious viral respiratory disease caused by severe acute respiratory syndrome coronavirus-2 [1]. The virus has spread quickly, and confirmed cases have been reported in all countries across the world. As of 20 November 2020, more than 55.94 million confirmed cases are reported, resulting in more than 1.34 deaths worldwide [1]. While Africa looks ahead to coronavirus trajectories for taking possible precautions, its special vulnerability is preventing its response [2]. Confirmed cases of coronavirus in Africa and in particular Ethiopia are increasing rapidly following improved testing. Thus far, Ethiopia ranks the eighth African country next to Morocco for having the highest coronavirus confirmed cases. In Africa, South Africa, Egypt, Ghana, Algeria, Kenya, and Cameroon respectively rank first to sixth. According to reports of the Ethiopian Ministry of Health and Public Health Institute, 111,860 cases of coronavirus are recorded to date in Ethiopia of which 1800 are reported to have died of the virus. As there were no vaccines or cures for the coronavirus, preventive and infection control procedures are of great importance to minimize the spread of the virus [3]. As a result, the Ethiopian government implemented social distancing, banned group gatherings, and instructed the closure of public facilities. Governmental and non-governmental institutions such as schools are closed; the number of workers is reduced to reduce the spread of the disease. The government engaged in raising public perception and practices of prevention through advertisement and social media [1]. In fact, closing schools and others governmental and non-governmental institutions where condensed peoples are located were immediate solution while aggravating the pandemic. However, this couldn't be a sustainable solution as the damage due to prevention practice may be higher [19]. Communities in metropolitan cities of Amhara region are under low income economic status. As a result, instead of closing schools and others institutions it is better to continue the regular activities by keeping the prevention methods suggested by Ministry of Health of Ethiopia as well as WHO such as social distance, washing hand, wearing face mask, etc. Thus far, the Ethiopian government, ministry of health and other governmental and non-governmental stakeholders highly striving to protect the communities from coronavirus by developing awareness and prevention practices towards coronavirus [19]. However, the incidence of corona virus and the death due to corona virus in Ethiopia are still increasing.

The efficiency of these preventive measures is largely affected by the perception and practices of the public towards corona. "Perception" involves knowledge and attitude of individuals towards coronavirus. "Knowledge" refers to the community's or people's understanding about relevant biomedical concepts. "Attitude" refers to thoughts, feelings and actions about a concept that predispose people to act in a preferential manner. "Practice" refers to the extent to which preventive measures have been implemented among the public [4].

Socioeconomic and cultural characteristics are an important determinants of public perception and practices towards coronavirus [5,9,15]. In metropolitan cities including the capital Addis Ababa, the Ethiopian government and city administrations have advised inhabitants against gatherings for cultural and religious events since 05 April 2020. Knowledge, occupation, educational level, monthly income, age, gender, residences areas and practices were important determinant factors that are significantly associated with attitude. Residence area, age, monthly income, marital status, educational level, knowledge, gender, and attitude are significantly associated with practices [9]. The knowledge about COVID-19 of Egyptians, who are not working in the medical field, was significantly lower among the less educated, older, lower income people and rural residents [5]. Though communities had a good knowledge and a positive attitude towards preventive measures against the disease, still more effort is needed from the governments to create more awareness and support the lower economic Strata [1,5,9].

A communicable disease like coronavirus is the worst, especially in populous countries like Ethiopia where social life is of special importance. The lifestyle of Ethiopians is very social where people spend together in holidays, sharing the same dish among member of the family and extended family. The Ethiopian society has unique greeting habits such as shaking hands, hugs, kisses, a culture sharing meals among anyone around [15]. Even after the age of 18, many children do not have the privilege of having a private living room. The larger size of Ethiopian families deprives the children of the comforts of a free private life and thereby leaving Ethiopians especially vulnerable to fast spreading pandemics like corona.

Though, since the onset of the pandemic, there are researches have been done, little attention was given to evaluate perception and practices towards coronavirus based on a data collected from the communities in Northwest Ethiopia. Thus, this research findings helps to fill this gap and enable to be inputs for policymakers, government, researchers and any other interested stakeholders regarding to evaluate the trends of perception and practice towards coronavirus. This study is therefore aimed at assessing the perceptions and practices towards the coronavirus disease among the metropolitan population in the Amhara region, of Ethiopia, and exploring the associated factors affecting the people's perceptions and practices towards coronavirus.

Methods

Study design and data

The study adopted a cross-sectional study design involving participants recruited from the metropolitan cities of the Amhara region. The duration of data collection was six months, August to December 2020. A total of 1288 participants who were randomly selected from six metropolitan cities of the region were included in the sample subjects of study. There were twelve sub cities involved in this study. The sample size was determined using a binary logistic regression with a power

of 80% and a significance level of 5% [1]. The sample size was allocated using a proportional stratified sampling method. A metropolitan city with a higher number of sub-cities had a high number of participants that were recruited for the study.

Data for the study was collected using a questionnaire distributed for the participants in order to assess their perceptions and practices towards corona and associated factors. Training was given for the data collectors on methods of data collection. The investigators checked the completeness and consistency. The data collection process was closely monitored by the principal investigator. After data collection, the data was edited and cleaned to ensure accuracy, consistency and completeness of data.

The questionnaire developed in a prior research was adopted and the questionnaire elicited socioeconomic, cultural, biological, and demographic determinants that are associated with the perceptions and practices of populations towards coronavirus [1,6]. The draft of the questionnaire was first prepared in English and translated into Amharic following standard translation procedures to ensure semantic and content equivalence. To reduce risk of the virus's transmission, wearing mask, social distance, confidentiality and using hand sanitizer were strictly needed during administering the questionnaire. Convenience and stratified sampling approaches were combined in recruiting the participants of the study. The data collection method was self-administered for participants who enable to write and read. While for illiterate respondents the interviewer interviewed the participants and filled the questionnaire.

Inclusion and exclusion criterion

Participants' having no experience in medical field in the metropolitan city and being 18 years old or older were the eligibility criteria for participation in the survey.

Sections of the questionnaire and description

The questionnaire consists of three sections. The first section describes demographic characteristics such as sex, marital status, residence area, etc. of the participants. The second section describes the perceptions of the participants towards corona. This section contains questions that help to assess the knowledge and attitude of the participants towards coronavirus.

Knowledge about coronavirus was assessed using nine multiple choice questions (items) to determine the participants' knowledge of the symptoms and signs, transmission paths, and preventive measures against coronavirus. The values were recorded as "1" for each correct answer and as "0" for each of the incorrect alternatives. Attitudes towards coronavirus were evaluated using eleven items, and which each item was rated on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The attitude of the participants was computed using the mean score of each subscale. Reliability test was made using Cronbach's alpha for the entire scale which equals to 0.79, indicating that the items used to measure the attitudes of the participants were consistent and reliable. Finally, summing up the knowledge and attitude score on the perception of each participant was computed. Hence, the possible perception score ranged from 0 to 68, with a higher score indicating a better perception of the participants.

The participants' practices of preventive measures against coronavirus were assessed using eight items consisting of personal hygiene, wearing face mask, maintaining social distancing, etc. Each item was rated on a 3-point Likert scale ranging from 1 (never) to 3 (always). Cronbach's alpha of practices of the preventive measures against coronavirus of the Likert scale items was 0.82. The possible practice score of the participants ranged from 0 to 24. A higher score indicated a higher level of implementation of the preventive measures. This indicates that the overall possible perception and practices score of participants ranged from 0 to 92.

Variables of the study

The outcome variable of the study, "perception and practices status", was computed from the perception and practices score. The perception and practices status was categorized into two as "good" and "not good" for the perception and practices scores that are greater or equal to 46 and less than 46, respectively. Forty-six is the half of the perception and practices score. In addition, eleven independent variables that showed the participants' characteristics were considered (see Table 1).

Statistical methods

Binary logistic regression

To assess the effect of independent variables on the outcome variable, i.e., "perception and practices status" towards coronavirus, the logistic regression model was employed. The logistic regression is used to detect the association of the categorical outcome variable and a set of factors [7]. When the categorical values of the outcome variable were dichotomous (i.e., success or failure), the binary logistic regression is used. Thus, as perception and practices status measured using dichotomous values of: "not good" (score of < 46), and "good" (score of ≤ 46), the analysis was carried out using the binary logistic regression model. For any binary outcome variable Y (Good=1, and Not good=0) and $X = \{x_1, x_2, \dots, x_p\}$ factors. The probability that the perception and practices of the " i^{th} " individual belongs to "Good=1" of the outcome variable given all

Table 1
Variables description and frequency distribution.

Independent Variables	Categories (codes)	n(%)
Sex	male (0)	788 (61.2)
	female (1)	500 (38.8)
Religion	Orthodox (1)	998 (77.5)
	Muslim (2)	215 (16.7)
	Protestant and others (3)	75 (5.8)
City of residence	Bahir Dar (1)	240 (18.6)
	Dessie (4)	210 (16.3)
	Debre Tabor (5)	203 (15.8)
	Woldya (6)	205 (15.9)
Marital status	Single (1)	609 (48.6)
	Married (2)	546 (43.5)
	Windowed/divorced (3)	99 (7.9)
Education level	No education (1)	108 (8.4)
	Grade 1–8 (2)	189 (14.7)
	Grade 9–12 (3)	412 (32.0)
	College and above (4)	579 (42.3)
Displace	Yes (1)	338 (26.2)
	No (0)	950 (73.8)
Work status	Unemployment (1)	617 (47.9)
	Employment (0)	671 (52.1)
Permanent residence	Urban (0)	157 (12.2)
	Rural (1)	1131 (87.8)
Source of Information about COVID	Friends/family/neighbor (1)	247 (19.2)
	Media (TV, Radio, etc.) (2)	927 (72.0)
	Hospital/health expert (3)	114 (8.8)
Age (in yrs)	Mean	Standard deviation
	29.2	11.7
Monthly Income (in birr)	2484	2850
Outcome Variable		
Perception and practice	Good (1)	805 (62.5)
	Not good (0)	483 (37.5)

possible factors X is given by $P(Y_i = 1|X)$. Thus, the binary logistic regression model is given by [7]:

$$\text{logit}(P[Y_i = 1|X]) = \log\left(\frac{P[Y_i = 1|X]}{1 - P[Y_i = 1|X]}\right) = \alpha + X\beta, \quad i = 1, 2, \dots, 1288 \quad (1)$$

where α is the intercept, X is the matrix of all possible factors and β its corresponding effect.

Data entry and organization were done using SPSS. The data was then exported into SAS and all statistical analysis such as fitting the binary logistic regression and estimating the adjusted odds ratio (aOR) with 95% confidence intervals (95% CI) was computed using SAS version 9.4 and interpreted accordingly.

Ethical considerations

Ethical approval was obtained from the Research and Community Services Committee of the Science College of Bahir Dar University in Ethiopia with reference number REF.RCSCSC/BDU/210/2013. To keep personal information of participants confidential, identification numbers were assigned instead of names. Before completing the questionnaire, all the participants provided informed oral consent and assured that their participation was voluntary.

Results

The independent and outcome variables with the frequency of the participants within the corresponding categories are presented in Table 1. Of the 1288 participants involved in the study, 788 (61.2%) of them were males. The average age was 29.2 years, while the average monthly income of the participants was 2484 birr. 77.5% of the participants were followers of Orthodox Christianity and 12.2% permanently lived in rural areas.

The highest number of the participants were from Bahir Dar city (18.6%) and Gondar city (17.2%) both of which the largest metropolitan cities of the region. The majority of the participants (42.3%) have college and above education levels. More than a quarter (26.2%) of the participants migrated to cities because of coronavirus and for the majority of the participants (72.0%), the sources of information about corona were media (TV, Radio, etc.). Most of the participants (62.5%) had good perception and practices towards coronavirus (see Table 1).

The correct response rates of the participants' perception (knowledge and attitude) and practices towards coronavirus were depicted in Table SM1 and Table SM2, respectively. The participants' perception of coronavirus was the combination

Table 2
Correlation between perception and practices towards COVID-19.

	Perception	Practice
Perception	1.00	
Practice	0.64*	1.00

of participant's knowledge and attitude towards coronavirus (see Table SM1). The correct response rate for the individual knowledge items ranged between 41.4% and 94.0%. Most of the participants provided correct answers to items on recovery from coronavirus (94.0%) and how the virus is transmitted (90.3%). However, the participants were less knowledgeable about the age groups attacked by coronavirus (41.4%), vaccine of coronavirus (46.4%) and whether coughing, sneezing, and contacting were the main ways by which coronavirus was transmitted (47.3%). The frequencies and associated percentages of participants who responded correctly to each item are presented in Table SM1. Attitude items on personal beliefs had response of "strongly agree" on the needs of government needs to quarantine individuals suspected of coronavirus (69.3%). Similarly, the suspected individuals need to go to health institutions (68.3%), and the preventability of coronavirus (64.6%). By contrast, attitude items that belong to in social interaction were mostly responded as strongly disagree about joining relative/neighbor during wedding (31.5%), participating in funeral ceremonies (45.5%), and in religious and non-religious holidays (42.3%). This indicates that though the spread of corona increased over time, social interaction of the community remained high. From a maximum of 4, the overall mean score of the attitude items was 3.55 (SD=1.15). On the other hand, out of a maximum of 68, the overall mean score of perception of participants towards corona was 44 (SD = 2.30), while overall correct response rate on the perception questionnaire was 64.7%. The fact that the mean is above 50% indicates the participants' good perception towards coronavirus.

The overall mean score for the practices of preventive measures items was 2.10 (SD= 0.86) out of a maximum of 3, indicating that the participants implemented the recommended preventive measures against coronavirus. The preventive measures most frequently implemented by the participants included washing hands with soap and water and rubbing for at least 20 s (55.4%) and visiting a doctor when having coronavirus virus symptoms (49.5%). The preventive measures mostly implemented by the participants included not touching the mouth, eyes and the nose (52.0%), and covering the mouth and the nose during sneezing (49.0%).

There was a significant positive correlation (0.64) between the participants' perception and practices towards coronavirus, which indicated that higher perception score of the participants corresponds with higher practices of preventive measures against coronavirus and vice versa (see Table 2).

The bivariate analysis depicts the association between independent variables with perception and practices status (Table 3). The city of residence, marital status, education level, permanent residence, and sources of information were significantly associated (p -value < 0.05) with perception and practices status. The male participants (37.9%) had better perceptions and practices towards corona as compared to female participants (62.1%). Compared to those participants whose sources of information are friends/family/neighbors and hospital/health experts, those participants whose information sources about corona were the media (TV, Radio, etc.) had better perception and practice about corona. Participants who were single marital status (51.1%) compared to their corresponding counterparts. Participants with education level are college and above (45.2%), and whose permanent residents are urban (91.8%) have better perception and practices towards corona.

Model fitting

Table 4 shows the presence of a significant association between perception and practices status, and independent variables. The fitted binary logistic regression model revealed that city of residence, work status, permanent residence area and monthly income were important determinants of the perception and practices of the community towards coronavirus. The estimated odds of the participants to have good status of perception and practices in the cities of Bahir Dar, Gondar, Dessie, Debre Markos and Debre Tabor was respectively 5.197, 6.513, 2.911, 3.284 and 3.035 times that of Woldya city.

Table 4 indicates that compared to communities in Woldya metropolitan city, communities in Bahir Dar, Gondar, Dessie, Debre Markos and Debre Tabor metropolitan cities were more likely to have good perception and practices towards coronavirus. Compared to the unemployed participants, the employed participants had higher odds of having good perception and practice (aOR=1.699; 95% CI=1.250–3.34). The employed participants were less likely to have good perception and practices towards coronavirus owing to their giving more attention to their work rather than to the spread of corona. In this study education level of the respondents haven't significant effect on perception and practice of the communities towards coronavirus. However, employment status have its own significant effect. Unemployed participants were more likely of having good perception and practices. The authors suggest that, this may be because of that the participants become unemployed to prevent coronavirus. Commonly educated participants became unemployed because of coronavirus and to reduce its transmission. Compared to permanent urban resident participants, permanent rural resident participants had lower odds of good perception and practice towards coronavirus (aOR=0.505; 95% CI=0.15, 0.82). For a unit increase of income (in birr), the estimated odds of the participants for having good perception and practices increased by 20% (aOR=1.20; 95% CI=1.01–

Table 3

Bivariate analysis of factors that are associated with perception and practices about coronavirus in metropolitan city population of the Amhara region, Ethiopia.

Independent variables	Perception and practice		P-value
	Good=1 n(%)	Not good=0 n(%)	
Sex			
male	489 (62.1)	280(59.8)	0.328
female	299(37.9)	188(40.2)	
Religion			
Orthodox	627(78.8)	352(75.2)	0.334
Muslim	126(15.8)	85(18.2)	
Protestant and Others	43(5.4)	31 (6.6)	
City of residence			
Bahir Dar	190(23.6)	50(10.4)	0.000
Debre Markos	124(15.4)	84(17.4)	
Gondar	152(18.9)	70(14.5)	
Dessie	118(14.7)	92(19.0)	
Woldya	122(15.2)	83(17.2)	
Debre Tabor	99(12.3)	104(21.5)	
Marital Status			
Single	404(51.1)	205(44.0)	0.008
Married	337(42.6)	209(44.8)	
Window/divorced	50(6.2)	52(11.1)	
Education level			
No education	46(6.2)	52(12.1)	0.000
Grade 1–8	120(16.1)	84(19.6)	
Grade 9–12	242(32.5)	133(31.1)	
College and above	337(45.2)	159(37.1)	
Displaced			
Yes	189(25.2)	119(27.9)	0.179
No	560(74.8)	308(72.1)	
Work status			
Unemployment	400(55.6)	218(50.9)	0.073
Employment	320(44.4)	210(49.1)	
Permanent Residence			
Rural	62(8.2)	84(18.9)	0.000
Urban	693(91.8)	361(81.1)	
Source of Information			
Friends/family/neighbor	140(17.6)	90(22.4)	0.022
Media(TV, Radio, ets)	593(74.5)	269(66.9)	
Hospital/health expert	63(7.9)	43(10.7)	

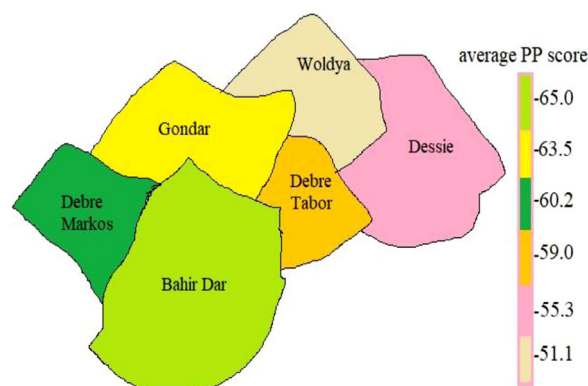


Fig. 1. Distribution of perception and practices (PP) towards coronavirus over six metropolitan cities population of Amhara region, Ethiopia.

1.99). This indicates that the participants who have higher income were more likely to have better perception and practices regarding coronavirus. In addition to aOR, the crude odds ratio (COR) for each covariates was also depicted in [Table 4](#).

[Fig. 1](#) depicts the distribution of average score for perception and practices. Compared to participants from other metropolitan cities, those from Bahir Dar city had better average score for perception and practices. Participants from Woldya city had the worst score for perception and practices towards coronavirus.

Table 4

Fitting binary logistic regression model to estimate the effect of independent variables on perception and practices towards coronavirus in the metropolitan city population of the Amhara region, Ethiopia.

Independent variables	est.(sd.err)	COR(95% CI)	aOR(95% CI)
Sex			
Female(ref.)			
Male	.136(0.232)	1.010 (0.62, 1.05)	1.146 (0.85, 1.35)
Religion			
Orthodox	.208(0.321)	1.433 (1.04, 1.42)	1.231 (0.98, 1.42)
Protestant and Others	-0.276(0.514)	0.875 (0.745, 1.689)	0.759 (0.63, 1.61)
Muslim (ref.)			
City of residence			
Bahir Dar	1.648(0.330)	6.253 (3.49, 10.120)*	5.197 (2.23, 8.76)*
Gondar	1.874(0.424)	6.513 (2.155, 11.33)*	6.513 (1.95, 9.41)*
Dessie	1.068(0.384)	2.911 (1.67, 4.88)*	2.911 (1.67, 4.88)*
Debre Markos	1.189(0.437)	2.99 (1.550, 7.13)*	3.284 (1.66, 5.20)*
Debre Tabor	1.110(0.395)	3.8765 (1.890, 7.238)*	3.035 (2.01, 5.98)*
Woldya (ref.)			
Marital Status			
Married	.061(0.422)	1.564 (0.87, 2.189)	1.063 (0.55, 2.11)
Single	.543(0.432)	2.010(1.57, 3.881)*	1.721 (0.67, 3.01)
Window/divorced (ref.)			
Education level			
No education	-0.031(0.427)	1.840 (1.28, 2.77)*	0.970 (0.78, 2.15)
Grade 1-8	-0.136(0.322)	0.562 (0.43, 1.66)	0.872 (0.33, 1.75)
Grade 9-12	-0.297(0.265)	0.743 (0.45, 1.96)	0.743 (0.45, 1.96)
College and above (ref.)			
Displaced			
Yes	.230(0.263)	1.259 (0.89, 2.50)	1.259 (0.89, 2.50)
No (ref.)			
Work status			
Employment	.530(0.230)	1.782 (1.254, 3.660)*	1.699 (1.250, 3.34)*
Unemployment (ref.)			
Permanent Residence			
Rural	-0.684(0.318)	0.660 (0.25, 0.76)*	0.505 (0.15, 0.82)*
Urban (ref.)			
Source of Information			
Friends/family/neighbor	.190(0.416)	1.219 (0.84, 1.89)	1.209 (0.83, 1.66)
Media(TV, Radio, etc.)	.507(0.365)	1.750 (0.88, 2.92)	1.659 (0.92, 2.56)
Hospital/health expert (ref.)			
Age	-0.07(0.010)	1.930 (1.250, 2.44)*	0.993 (0.79, 1.29)
Monthly Income	0.05(0.010)	4.25 (2.01, 6.18)*	1.20 (1.01, 1.99)*

key: est.= estimate; sd.err= standard error; aOR= adjusted odds ratio;. COR= crude odds ratio
CI= Confidence interval; *= significant variable; ref.= reference.

Discussion

Ever since WHO declared coronavirus as a global pandemic, several studies addressed coronavirus as their research topic. To the best of the research team's knowledge, a study investigating the perception and practices towards coronavirus in the metropolitan cities of the Amhara region, Ethiopia, is the first of its kind. Thus, this study addressed the perception and practices of metropolitan communities in the Amhara region along with its associated factors. A single "perception and practices status" was computed from a combination of knowledge, attitude, and practices of preventive measures against coronavirus among the communities in the cities and recoded into binary outcome. As a result, the binary logistic regression model was employed to determine the effect of covariates on communities' perception and practices towards coronavirus. Moreover, the associations between each covariate and the "perception and practice status" were computed using chi-square test (bivariate analysis). The finding demonstrated that city of residence, marital status, educational level, permanent residence, and source of information had a significant association with perception and practice towards preventive measures against coronavirus.

The study revealed that the prevalence of communities having good perception and practices towards corona in the cities was high (37.5%), a finding which conforms with the results reported by previous studies [16-18]. This finding is also in line with a finding from a study in South Asian countries which reported inadequate levels of knowledge about coronavirus prevention [1]. Many used social interactions and occasions such as wedding (31.5%), funeral ceremony (45.5%), and religious and non-religious holidays (42.3%) for sharing information. The perception and practices of the community were different for different cities, indicating that the cities where metropolitan communities live were important determining perceptions and practices. Compared with communities' in other cities considered in the study, communities in Bahir Dar and Debre Markos cities had better perception and practices against corona. By contrast, many participants from Woldya City lack

enough perception and practices against corona. The fact that Woldya is a boarder city where a lot of commercial exchanges take place may have accounted for this.

Compared with the overall correct response rates reported in other studies conducted among the general populations in China (90%) and Malaysia [8], in this study, the participants' overall correct response rate on the knowledge test was relatively low (66.17%). Compared to the findings reported by a study in Hong Cong where the overall correct response rate on the knowledge test among the participants was 53.8% [1], the response rate of this study was better. More than a third (31.5%) of the participants never followed the updates on the spread of the virus, while over one fourth of the participants (26.4%) did not refrain from going out even when symptoms of corona were reflected on them.

The number of individuals who believe that corona has not yet confirmed vaccines is quite limited (46.4%). In contrast, over half of the participants (53.6%) believe that coronavirus could be prevented through methods such as taking hot beverages like tea, coffee with "Tena Adam", garlic [5], ginger, Black Cumin oil, and traditional alcohol drinks. Since 99.9% of the participants in the region have religion [15], the focus on prevention can be aided by spiritual power. Consistent with an Egyptian study [5] which reported that knowledge about coronavirus was significantly lower among participants of lower income, this study also found that higher income participants were more likely to have good perception and practices towards coronavirus. This finding is also supported by the findings of a study conducted in Hong Kong and Malaysia [1,14] which found that participants with higher income levels were more likely to possess better knowledge about coronavirus.

Consistent with the findings of systematic studies [9,10] which reported that knowledge is positively inter-related with attitudes and practices, in this study, too, a significant positive correlation between perception and practices towards coronavirus was noticed. This indicates that individuals with a high knowledge score demonstrate a more positive perception towards preventive measures and practiced more preventive measures. On the other hand, poor perception was significantly associated with poor practice [11]. Unlike this study, a study carried out in Northwest Ethiopia and Pakistan [10,11] states that age of the participants is an important determinant of knowledge, attitudes, and practices towards corona. Older participants were more likely to have positive attitudes and to involve more associated with the more frequent prevention practice [12,13]. However, those participants who are permanent rural residents were less likely to have good perception and practice towards corona [1,9]. The results indicate that compared to the participants who are permanent urban residents, permanent rural residents held inadequate level of perception and practices towards the prevention of coronavirus.

Overall, the participants in Amhara metropolitan cities had inadequate perception and practices which indicates that there still exists a gap in perception and practices, which needs to be significantly improved in order to manage and control the spread of the pandemic. About one out ten participants (10%) do not know how coronavirus is transmitted while more than half of the participants (58.6%) don't realize that coronavirus infects individuals of older age groups rather than any age group. The authors recommended the participants to have concrete awareness by reducing social desirable bias such as cultures. Besides, the way the participants who are living at metropolitan cities of Amhara region celebrating religious and non-religious holidays exposed to easily transmit communicable diseases like coronavirus. The governments and others non-governmental and private stakeholders needs to work on communities to scale up the awareness and practices towards coronavirus.

Conclusion

In the metropolitan cities of Amhara, the prevalence of communities with inadequate perception and practices towards coronavirus was high. City of residence, marital status, educational level, permanent residence, and source of information were significantly associated with perception and practices of preventive measures against coronavirus. Perceptions and practices towards coronavirus have a significant positive correlation which indicates that more positive perception would help to practice more preventive measures against coronavirus. So many of the people in the studied communities carry on involving in social interactions such as weddings, funeral ceremonies, and religious and nonreligious holidays which could aggravate the spreads of the disease. Therefore, the authors would like to recommend if substantive effort from the government and different stakeholders regarding to raising the perception and practices of the city communities towards the pandemic and reduce the collateral damage especially the lower income communities who cannot afford basic needs.

Data availability

The data used to support the findings of this study are available from the corresponding author upon request.

Ethical approval

Ethical approval was obtained from the Science College Research and Community Service Committee of Bahir Dar University, Ethiopia. To keep personal information of participants in the study confidential, an identification number was assigned instead of their names. All the participants provided informed consent and assured that their participation was voluntary to participate in the study before completing the questionnaire.

Authors' contribution

All the authors participated on data curation.. LMT specified the conceptualization, software, formal analysis, investigation, methodology, supervision, validation, visualization and writing the original draft. ABK and BTF review and edited the manuscript.

Finally, all authors approved the manuscript.

Authors' information

Not applicable.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Funding

This research was funded by Bahir Dar University.

Acknowledgement

We would like to thank our data collectors, the supervisor, the study participants, City Administrative Offices in Amhara region, and Bahir Dar University academic and administrative workers for their cooperation and assistance during the data collection. The manuscript was edited for languages by Berhanu and Ayenew (PhD), department of English Language and Literature, Bahir Dar University.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:[10.1016/j.sciaf.2021.e01027](https://doi.org/10.1016/j.sciaf.2021.e01027).

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