

# Social work responses and household-level determinants of coronavirus preparedness in rural Ethiopia

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## Research

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# Abstract

## Background

The novel coronavirus (2019-nCoV) arisen in Ethiopia in early March at its capital city (Addis Ababa) and is now spreading to different administrative regions of the country. This study aimed to assess the attentiveness of the rural community to COVID 19, social work response, and major factors that affect rural community preparedness and response to COVID 19 in Ethiopia.

## Methods

Descriptive statistics was used to analyze the data collected from a total of 190 sample respondents. Econometric model particularly a probit model was used to identify these major factors that affect rural households' preparedness for the pandemic.

## Results

Rural households recognize little about COVID 19 and in response, a few community groups, which consist of youth and university students, religious leaders, and elders were engaged to reduce the consequence of COVID 19. Results from the probit model employed indicate that literacy status (household head and family member), gender, age, and economical status of the households; extension information on COVID 19, cash income from non/off-farm activities, participation in community groups, and ownership of mobile phone with a household all influence households preparedness. The main barriers include a lack of information on COVID 19 and financial constraints.

## Conclusions

Commitment to preparedness and response to COVID 19 by the rural community increases with enhancing proper information dissemination system and applicable support. Thus, much more attention needs to be given by a government and other stakeholders to reduce the vulnerability of the rural community in Ethiopia.

## Introduction

The novel coronavirus pandemic (COVID-19) outbreak emerged in Wuhan, which is the Hubei Province of China and then spread out quickly to developed and underdeveloped countries [1]. The virus resemblance to severe acute respiratory syndrome coronavirus (SARS-CoV) called "Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2)" [2]. Starting from the date of the announcement in China, coronavirus caused the death of many people, and globally COVID death surpasses 650 thousand with more than 16 million cases. The virus spreads from person to person through making physical contact with an

infected person (disrespecting social distance), air when an infected person sneezes, coughs, and exhales during a meeting, at a time of being together. Also, washing hands, using a mask, avoiding physical contact, and valuing social distance decreases the transmission rate [3].

Coronavirus has been a pressing problem of Ethiopia since the world health organization [4] reported 282 cases of coronavirus from four countries. The quick spread of the discovered virus and meaningful association of spreading methods with Ethiopian people's lifestyle fear the Ethiopian government. Before the virus reached Ethiopia, the Ethiopian airline had designed directions to undertake preventive measures to the passengers and service providers. However, Ethiopia officially reports the first coronavirus case on March 13, 2020, and had increased to 2019 cases with 27 deaths as of July 7, 2020 [5]. Following pandemic entrance, the Ethiopian government had taken numerous preventive measures including the state of emergency, partial to complete lockdown, quarantine, awareness creation, and social protection to minimize the danger of the pandemic [6, 7]. Additionally, the country has currently suspended movement both within its borders and at international boundaries to reduce the spreading of the pandemic.

Presently, the novel pandemic (COVID-19) is challenging the health, socioeconomic, and political condition of Ethiopia [8, 9]. The existed preventive measures like lockdown borders, state of emergency, movement restriction, school closure, isolation, and transport restrictions challenged the socioeconomic condition of majority peoples as it caused the loss of jobs, salaries, and daily income (daily laborers), and it exerts adverse effects on food and nutrition security [10]. Moreover, the Ethiopian election 2020, which was legitimately suspended by the Ethiopian government, is clearly showing the existed crisis due to COVID 19. In addition, the current pandemic (COVID 19) related restriction have been influenced the rural communities, farm households, rural youths, and their families from a different perspective. It could be due to the decreased market share and lockdown measure of the informal and private business center as it employed the majority of the rural labor source in different of the country. Thus, adults and youth who usually support their family in cash and kind to strengthen their family purchasing power of agricultural inputs were currently found at home due to COVID 19 related measures. Besides, the pandemic indirectly affecting the agricultural sectors that we all depend on.

Rural Ethiopia encompasses more than 80% of the overall Ethiopian population and also the mainstay of agriculture production in the country. Despite the role of frequent hand wash, waste management, and hygienic practices to reduce the human spread of the pandemic [4], the majority of the rural area in Ethiopia is living within areas of insufficient health care centers, absent of road infrastructure; and lived in deprivation of protected water, sanitation, and hygienic conditions [11]. Besides, less accessibility to media, their relatively low socioeconomic level, and the perceived difference in demographic characteristics to that of urban influence social work response, preparedness, and response mechanisms to coronavirus. These can put a lot of pressure on the health of rural people and worry about tomorrow-agricultural production and productivity that could mainly produce by smallholder farmers in the rural area. The information explained above indicates the particular importance of bringing behavioral change,

encourage societal involvement, and enhancement the preparedness and responses at an individual and collective level [12].

Regardless of the recent progress, given significant current gaps in the empowerment of rural peoples and farmers in Ethiopia, the issue of the rural peoples in terms of health, agricultural production, market participation, and the alternative adaptation mechanisms to overcome these problems need more great attention [13]. Thus, the existed coronavirus prevention and response practices in the rural area are not satisfactory. However, as recommended by (Food and agricultural organization [14] ensure timely and successful preventive measures in rural populations possibly avoids the further spread of poverty and hunger. It requires a much further pronounced social work in the rural area in collaboration with responsible stallholders to prevent and reduce vulnerability. In this regard, investigation of what is being known and unknown about the virus by the rural peoples helps to make immediate intervention, and also probably enhances people's understanding.

Many of the research work on COVID 19 have targeted the socioeconomic impact of coronavirus [14–22], the nature of the virus [8, 23–27], and prevention and treatment in health care [4, 12, 28–31]. The available works on COVID 19 in Ethiopia focused on the probable impact of COVID 19 by employing desk review and experts point of view, without empirical evidence. However, in countries having poor health care centers in terms of quality and quantity to challenge the pandemic, much great work on peoples' understanding, societies' involvement, and peoples' preparedness and response through investigating gaps and making appropriate intervention are acceptable.

The effect of the novel coronavirus (2019-Ncov) on socioeconomic conditions for the majority of the agrarian-based economy dependent countries, including Ethiopia will risky after COVID-19 unless significant attention given to the rural area. Therefore, coronavirus would dangerous if not managed well. In response, this study aimed to assess the attentiveness of the rural community to COVID 19, social work response, and major factors that affect rural community preparedness and response to COVID 19 in Ethiopia. The study aims to provide input for government intervention approaches to protect the current public health of rural peoples and future agricultural production as well. The study result may also provide information for future research related to this topic.

## **Methods**

### **Data collection and participants**

The study was designed to identify rural community understanding and preparedness to confront COVID-19 in Ethiopia, with the result that all participants were from 50 different peasant associations found in three largest administrative regions (Amhara, Oromia, and South Nation Nationalities Peoples Regional States (SNNPR)). Regarding the restriction of movement and other COVID 19 related protocol, including the need for social distance, the data collection process for this study had to be conducted without deviating these related COVID 19 protocols. The study used a total of 204 randomly chosen rural

households (four each from 50 peasant association) to acquire relevant information. However, we unable to acquired information from 14 sampled respondents due to different reasons and then 190 respondents were used to conclude the result of this study.

The study used structured questionnaires, which was developed using closed ended questionnaires by including the socio-demographic characteristics of the households and other institutional related factors in order to assess the determinants of preparedness and response of the respondents. Besides, questionnaires include questions related to knowledge, information sources, perception, social work activities to confront COVID 19 and, and preventive measures for the pandemic. The questionnaire was administered through an interview schedule with selected respondents. The study was conducted from April 20 to May 30, 2020 and the national language was used during data collection.

### **Data type and sources**

Both qualitative and quantitative data types were collected for the study. The majority of data used for the study are from primary sources, however secondary data sources are also used to strengthen the report. Information regarding the societal work engagement, demographic, socioeconomic, and institutional factors affecting expected to determine the rural community preparedness to confront COVID 19 were collected from primary sources. In addition, secondary data were taken from journals, and statistical bulletin reports WHO, FMOH, WFP, and FAO for strengthening the result.

### **Data analysis**

The STATA software version 13 was used to analyze the collected data. Descriptive statistics were employed for describing the demographic and institutional characteristics of the participants in this study. Econometric model, particularly probit model was used to analyze factors affecting the preparedness and response of coronavirus in rural Ethiopia.

### **Probit model analysis**

The study used a binary dependent variable that has two values, typically coded as 0 for households who didn't engage in any preparedness and response strategy to COVID-19. The dependent variable is linearly related to a set of independent variable  $x$  and a disturbance term ( $\epsilon$ ). The link between the observed variable and the latent  $y^*$  is made with simple measurement equation:

$$y_i = \begin{cases} 1 & \text{if } y_i^* > 0, \\ 0 & \text{if } y_i^* \leq 0 \end{cases} \quad 1$$

Cases with a positive value of  $y^*$  are observed as  $y=1$ , while cases with negative or zero value of  $y^*$  as  $y=0$ . Accordingly, the surveyed respondents were asked if they made a behavioral change for either the preparedness or response to COVID 19 or not. Respondents differ in their opinion on the issue, and some

respondents very adamantly agree with the adaption of behavioral change but, some very adamantly disagree, and others have only weak looks one way or on the others.

The probit model estimated by the maximum likelihood estimation techniques and the log-likelihood function for the probit model is specified as follows:

$$\ln Li(\beta) = y_i \log\{\phi(x_i\beta)\} + (1 - y_i)\log\{1 - \phi(y_i\beta)\} \quad 2$$

Following the analyses, the probit model is adopted as:

$$Pr(y_i^* > 0|x_i) = \phi(x_i\beta) \quad 3$$

where  $\Phi$  is the standard cumulative normal distribution function with variance one and numerically maximized concerning  $\beta$ . The predicted probability for any set of values of independent variables can be computed by using a verity of commands in STATA. Independent variables used for this study are presented in Table 1.

Table 1: Description of explanatory variables used in the probit model

Variable	Description and measurement
Gender of HHs	A dummy variable with value 0 for females and 1 for males
Age group of HHs (younger <sup>a</sup> )	A categorical variable representing with value 0 if young ( age b/n 18-35), 1 if adult (age b/n 35–55), 2 if elder (age >55)
Marital status of HHs	A dummy variable with value 1 for currently married, 0 otherwise
Educational level HHs (illiterate <sup>a</sup> )	A categorical variable with value 0 for illiterate, 1 for primary level, 2 for secondary level
Ownership of mobile with in HHs	A dummy variable with value 1 if owned mobile, 0 otherwise
Ownership of radio with in HHs	A dummy variable with value 1 if owned a radio, 0 otherwise
Participation in community groups	A dummy variable with value 1 if participated; 0 otherwise
Extension service in coronavirus	A dummy variable with value 1 if received; 0 otherwise
Off/non-farm income HHs	A dummy variable with value 1 if they acquired off/non-farm income; 0 otherwise
Economic stats of HHs (poor <sup>a</sup> )	A categorical variable with value 1 if poor, 2 if medium, 3 if good/better economic status

<sup>a</sup> taken as the base for analysis; HHs household heads

## Results

### Characteristics of sampled respondents

Table 2 presents a description of the variables used in the analysis. As shown in Table 2, the majority (69.4%) of the households were male-headed. Most of the household heads interviewed (72.6%) were married. Concerning the age category of the respondents, about 42.1% were adults, 40.5% were elder while the remaining about 17.4% were Youngers. In terms of education status, about 15.3%, 17.9%, and 8.4% of respondents attended primary, high school, and preparatory levels of education, respectively. The remaining 58.4% of the respondents were illiterate. Regarding mobile and radio ownership, about 54.2% of the households owned mobile phones, and about 31.1% of households used radio for information. With respect to respondents' participation in culturally, religiously and other labor share groups, about 58.4% participated in the time COVID 19. The majority (59%) of the sample respondents confirmed the absence organized and formal extension service related to COVID 19 in their locality. Concerning the relative economic status of the respondents, about 42.1% of the respondents were poor and about 46.2% were medium in their economic status. Only about 11.1% of the respondents were economically good with better living condition and capability to cover COVID 19 related protocol costs. Also, about 37.4% of the respondents engaged in off-farming activities like a daily laborer, petty-trading, and craftsmanship to secure family needs (Table 2).

Table 2  
Socio-economic and demographic characteristics of sample respondents (n = 190).

Variable		N	Proportion	Preparedness for coronavirus (yes)
Gender	Male	130	0.694	0.253
	Female	60	0.316	0.211
Marital status	Married	138	0.726	0.353
	Single/ divorced/widowed/	52	0.274	0.111
Age groups	18–35(young)	33	0.116	0.063
	35–55(adult)	80	0.421	0.295
	> 55 (elder)	77	0.405	0.105
Education level household head	illiterate	111	0.584	0.179
	Primary level	29	0.153	0.111
	High school	34	0.179	0.105
	Preparatory and above	16	0.084	0.084
Mobile ownership	Yes	103	0.542	0.363
	No	87	0.458	0.10
Radio ownership	Yes	59	0.311	0.121
	No	131	0.689	0.342
Current participation in community groups	Yes	111	0.584	0.305
	No	79	0.416	0.258
Extension service on COVID 19	Yes	77	0.405	0.263
	No	113	0.595	0.20
Off/non-farm activities	Yes	71	0.374	0.284
	No	119	0.625	0.179
Economic stats	Poor	80	0.421	0.10
	Medium	89	0.468	0.326
	Good/better	21	0.111	0.037

Considering the basic knowledge for responding to coronavirus the descriptive results of the study showed that close to 46% of the surveyed respondents were made preparedness to respond the pandemic. Of which: males (25.3%); married (35.3%); adult (29.5%); literate (30%); owned mobile (36.3%); participated in communal groups (30.5%); obtained extension information (26.3%); participated in off/non-farm activities (28.4%) and within the medium economic status (32.6%) (Table 2).

## Understanding of coronavirus pandemic

Regarding the basic knowledge of coronavirus, about 38.4% of respondents confirmed infectious nature of the pandemic while 60.5% of the respondents said that at the beginning of March 2020, COVID-19 virus reached Ethiopia. Regarding symptom manifest only about 13.2% of the respondents stated that symptoms occur within 0 to 14 days of suspicion to virus. Then, 46.3% of respondents said that they perceive on adequate knowledge of prevention, spreading and response to COVID-19. The majority of the respondents (55.8%) understood the existence of restriction of movement and state of emergency to reduce the vulnerability to coronavirus. About 34.2% of the respondents thought fever, sore throat, tiredness, and dry cough as symptoms happening in infected persons. Besides, about 35.3% of respondents consider other symptoms, include difficulty breathing, pain, diarrhea, nausea, and runny nose. However, surprisingly, the result revealed the existence of peoples who practiced prevention methods without adequate information about the potential benefit from it. Thus, about 20.9% of the respondents practiced the prevention methods temporarily when they observed others to do so (Table 3).

Table 3  
Respondents understanding of COVID-19.

Knowledge of COVID 19	N	Proportion
The disease is infectious	73	0.384
Symptom manifest within 14 days	25	0.132
Reached early march in Ethiopia	115	0.605
Symptom: fever, sore throat, tiredness, and dry cough.	65	0.342
Self-perceived knowledge of prevention, spreading and response	88	0.463
Originated from china, Whun	142	0.747
State of emergency due to coronavirus	106	0.558
Other symptoms include difficulty breathing, pain, diarrhea, nausea, and runny nose.	67	0.353

## Contributing factor for understanding of coronavirus

The study identified five main contributing factor affecting the knowledge and preparedness to coronavirus in different rural Ethiopia. Firstly, limited/absent of formal extension information about by the Ethiopian government, religious center, or other stakeholders. About 59.5% of the surveyed respondents revealed the absence of a formal extension source about coronavirus in their respective

localities. Secondly, limited social media accesses in the rural community. Limited use of social media like mobile, internet, radio, and others enlarge the information gap in the rural peoples of Ethiopia. Accordingly, about 68.59% and 45.8% of the respondents had not owned mobile phones and radio at household levels (Table 4).

Thirdly, the tough season for agricultural farming when the pandemic has reached Ethiopia decreased the possible information sharing opportunities among different stakeholders in their respective locality. In this regard, the majority (74.35%) of the respondents revealed that as they gave much more focus on agricultural production than COVID 19. The fourth determining factor is directly associated with public infrastructure (inadequacy and poor quality for roads), and also health care centers (clinics) for making close contact with the majority of rural peoples by other external stakeholders associated with COVID 19. The limited number of health extension services also challenges health accessibility. In this respect, about 37.6% of the respondents revealed the unavailability of public roads close to their villages.

The fifth determinant is related to the raining season (summer) caused by the breakdown of road, flooding, and crossing of larger rivers are impossible. It decreased the existed direct contact between the governments and its peoples, and also among the peoples themselves. It decreases the information dissemination process within and between different rural areas. Concerning this, about 48.9% of the respondents have challenged by this problem so far. Lastly, the dispersed nature of residents homes of in the rural area also constrained the information provision system for health extension service providers and in this regard almost close to 61.5% of the respondents revealed the unhappiness' of the health extension workers in the time other health services in their locality (Table 4).

Table 4  
Contributing factor for COVID 19 understanding in the rural communities

Major factors affecting knowledge of COVID 19	N	Proportion
Inadequate extension service from formal source (yes)	113	0.595
Limited use of mobile for communication (yes)	130	0.686
Limited use of radio for information (yes)	87	0.458
Weak attention to COVID 19 hence it reached Ethiopia in tough season for crop farming (yes)	141	0.744
Constrained by public infrastructure ( road, health) (yes)	75	0.376
Constrained by the breakdown of infrastructure due rainy season (yes)	93	0.489
Feedback from health and other extension related to residents house (not good)	117	0.615

## Social work responses in the time coronavirus

As stated by [32], successful control of the novel coronavirus (COVID 19) requires interactive social work response. In this respect, the study result on the existed societal works so far, and accordingly, about 66.45% of the respondents revealed the absence of influential social work response practices to enhance

knowledge of the rural communities in their respective locality. The remaining 43.55% of the respondents showed the availability of a few social work response practices by youths (university & preparatory students), religious leaders, community leaders, agricultural extension service providers, supervisor of road transport and traffic police, and also the input providers (farmers cooperatives and unions). Thus, about 35.8% of the respondents acknowledged the students' effort to enhance the community conciseness to COVID 19. Nevertheless, their engagement was limited to awareness creation only rather than mobilizing peoples by preparing hand wash programs, enhance peoples to use masks through incentives due to socio-economic, and institutional constraints.

Local religious leaders are engaged in designing either partial or complete restriction on different rural communal association and accordingly, about 21.57% of the respondents revealed the presence of restriction on *mahiber*, although about 47.06% of the respondents revealed partial restriction on *iquib*, and also about 25.49% of the respondents confirmed the availability of partial restriction on idirr and tezkara in their locality. Among the vulnerable cause for coronavirus in the rural community religious-based monthly anniversary practiced by Ethiopian orthodox Christianity followers creates suitable conditions for the spread of the virus. Besides, *Debo* and *wonfel*, which is labor-mobilizing techniques for those households who have cultivated land or small family size, are used for sharing labor for agricultural production. Local communities' leaders play a significant role in preventing coronavirus by imposing restrictions and therefore, about 58.86% of the respondents revealed the restriction on *debo* and *wonfel*, about 35.29% of the respondents confirmed partial restrictions on the wedding anniversary (Table 5).

Table 5  
Rural community engagement to prevent/reduce multiple effect of coronavirus

Degree of social work response	N	Proportion
University and preparatory level of students engagement (yes)	68	0.358
Religious leaders and elders engagement(yes)		
Imposed restriction on <i>Mihber</i>	49	0.256
Imposed restriction on <i>Equib</i>	77	0.406
Imposed restriction on <i>Idirr</i> and <i>tezikar</i>	48	0.25
Local community leaders and other stakeholders (yes)		
<i>Debo</i> and <i>wonfel</i>	106	0.558
Wedding anniversary	67	0.353
Multiple support agricultural extension service providers about COVID 19 and agricultural production as well (yes)	71	0.376
Agricultural input providers namely agricultural cooperatives and unions engagement (yes)	83	0.436
Public transport supervisors and traffic police engagement (yes)	68	0.359

Agricultural extension service providers are among the societal groups that are actively involved in advising rural households about the alternative means of agricultural production in the time of COVID 19 in rural Ethiopia. Consequently, about 33.5% of the respondents revealed the positive contribution of the rural *kebeles* development agents to facilitate agricultural farming, despite significant attention is also given to the pandemic. Agricultural cooperatives and its unions, who are a potential provider of agricultural inputs, are actively participated in preventing and reducing the spread out of the virus, and also to secure future agricultural production. Close to 43.65% of the respondents agreed with the positive contribution of agricultural input distributors by lecturing about social distancing in the time of input provision and also by reducing the unnecessarily delay of input provided to farmers in the time of COVID 19. In line with the partial restriction on public transport, supervisors, and traffic police also play a significant role in preventing the spread of the virus, and about 35.9% of the respondents confirmed the effective and responsible duty of public transport supervisors and traffic police in their respective locality (Table 5).

## Factors Affecting Preparedness Of Coronavirus

Tables 1 and 2 depict the descriptive and summary of explanatory variables used in the probit models, respectively. Based on the result that about 46.4% of the respondents have participated in preparedness and response to COVID 19. The model was checked for the suitability and explanatory power of independent variables over the dependent variables. The test results indicated the likelihood function of the probit model was significant (Wald  $\chi^2 = 84.36$  with  $P < 0.001$ ), showing its explanatory power. The results of the probit model are presented in Tables 5, and some of the explanatory variables and their respective marginal values are statistically significant in determining households' preparedness and response to COVID 19 as expected. The marginal effects of the result indicated the changes in the probability of rural society in preparedness and response to COVID 19 for a change in the explanatory variable.

The marginal effects of significant explanatory variables are used in estimating the likelihood of preparedness and response to COVID 19. The marginal effect for sex of household head showed that male household head decreases the probability of enhancing and engaging in preparedness and response to COVID 19 by 29% as compared to female household heads. Compared to younger household heads, adult household heads have a 33% higher probability of engaging in the preparedness and response to coronavirus but, the elder household heads have a 31% lesser probability of engagement. Households who attended the preparatory level of education have a 41% higher probability of engaging in preparedness and response to COVID 19 as compared to the illiterate one. Besides, households who have a mobile phone have a 52% higher probability of engaging COVID 19 preparedness and response compared with households survived without phones (Table 6).

Furthermore, compared to their counterparts, households received extension information about COVID 19 extension information, social community groups' participants, and income from off/non-farm activities

have 25%, 34%, and 26% higher probability of engagement in preparedness to the novel coronavirus. Also, compared to households without family who attended formal education, households with family members attended preparatory education levels have a 59% higher probability of engaging in preparedness and response to combat coronavirus. Besides, households who belong to middle economic status have a 32% higher probability of making preparedness and response compared to the lowest economic group households.

Table 6

The probit regression analysis of factors affecting the preparedness and response to COVID 19 in rural Ethiopia.

Explanatory variable	Regression		Marginal effect	
	Coefficient	Robust Std .Err	Coefficient	Std. Err
Constant	-2.272	0.552	-	-
Sex of HH (female) <sup>a</sup>	-0.75**	0.311	-0.29***	0.115
Age category (young) <sup>a</sup>				
Adult age group	0.85**	0.433	0.33**	0.158
Elder age group	-0.81*	0.472	-0.31*	0.166
Marital status of HH (single, divorced, widowed) <sup>a</sup>	0.32	0.278	0.13	0.106
Household member above 10 years (not have) <sup>a</sup>	-0.18	0.779	-0.07	0.310
Educational level of HH(illiterate) <sup>a</sup>				
Education level of HH (primary)	0.42	0.408	0.16	0.159
Education level of HH (high school)	0.16	0.418	0.06	0.166
Education level of HH (preparatory)	1.15**	0.553	0.41***	0.154
Ownership mobile (not owned) <sup>a</sup>	1.52***	0.305	0.54***	0.086
Ownership radio (not owned) <sup>a</sup>	-0.09	0.312	-0.03	0.122
Formal extension service (not received) <sup>a</sup>	0.63**	0.298	0.25**	0.114
Maximum level education within a family (illiterate) <sup>a</sup>				
Education level of families (primary)	-0.07	0.683	0.03	0.269
Education level of families (high school)	0.38	0.785	0.15	0.308
Education level of families (preparatory)	2.87***	1.108	0.59***	0.063
Education level of families (university/college)	0.96	0.817	0.36	0.264
Social group participation(not participated) <sup>a</sup>	0.90***	0.294	0.34***	0.101
Relative economic status (poor) <sup>a</sup>				

\*, \*\*, \*\*\* are significant at  $p < 0.1$ ,  $p < 0.05$ , and  $p < 0.001$  respectively.

Explanatory variable	Regression		Marginal effect	
Medium	0.83*	0.322	0.32***	0.117
Good/better	-0.41	0.51	-0.15	0.181
Off/non-farm income (did not have)	0.69**	0.309	0.26**	0.117
Households economic support from others (No)	0.03	0.322	0.12	0.127

\*, \*\*, \*\*\* are significant at  $p < 0.1$ ,  $p < 0.05$ , and  $p < 0.001$  respectively.

## Discussion

Improving the rural societies understanding of COVID 19 is vital for safeguarding the health and livelihoods of the most vulnerable people, including Ethiopia. Hence, the majority of rural households are from low socioeconomic groups that probably exposed to adverse conditions, such as financial, food, and medicine safety problems [25]. In line with this, this study surveyed the rural peoples' consciousness of coronavirus and possible factors hindering their preparedness and response. The result revealed the low-level cognizant and insufficient attention to coronavirus. The level of community engagement to reduce the vulnerability is still at the infant stage, and the majority of the rural peoples behave in a usual manner before the outbreak of novel coronavirus (2019-nCoV).

The result of the study presented in Table 3 indicated that only a few of the respondents understand the transmission, prevention, and way of confronting its effect, and then engage in changing their social behavior to minimize the possible consequences. Thus, the pandemic requires organized community-based prevention and response rather than a few engagements. Rural household health, agricultural production, and food security condition would expand and hinders the country's strategic objective of reducing food security problems and increasing agricultural production levels. The world health organization recommends individuals to quarantine or to trips to areas where a large number of peoples probably exist. In this respect, social and communal association groups of either religiously or culturally practiced in Ethiopia creates suitable conditions for COVID 19. The result presented in Table 3 shows the availability partial and complete restriction on communal association steted by religious leaders, elders, and local administer but, the absence of any formal measures majority of the peoples have practiced it. It could be due to the unavailability of legitimacy coverage in the restriction by the religious center. However, different socio-economic and institutional factors affect rural peoples' preparedness and the response of COVID 19. Besides, respondents also revealed the existence of peoples' criticized the restriction by believing GOD will save me narratives.

The probit model regression analysis was employed to identify factors affecting the preparedness and response to COVID 19 in rural Ethiopia. The marginal effects of the probit regression analysis presented in Table 2 showed that the age of household head, educational level of a household head, ownership mobile phone within a household, access to formal extension information, educational level of household

members, social group participation, households economic situation, and income from off/non-farm activities have a positive and significant effect on the rural households preparedness and response to novel coronavirus (2019-nCoV) while the sex of a household head affects negatively. This difference among rural communities calls further intervention to facilitate the prospect of enhanced rural households preparedness and response to COVID 19.

Based on the results, male-headed households' are less likely to engage in preparedness and response to novel coronavirus compared to female household heads. It could be due to the more attentiveness of females to practices actions by others or could link to perspicacious characteristics compared to males. On the other hand, males might not fear and not provide much emphasis on the information due to the natural character compared to females. As expected, the age category of a household head is significantly associated with households' preparedness and response to confront coronavirus pandemic. Compared to young household heads, household heads within the adult age category are more likely to engage in preparedness and response to confront coronavirus but, the elder household heads are less likely to engage in preparedness and response activities. It could be associated with the adult age category is the stage where the majority of peoples coming relatively wise for the sake of others, including families. This suggesting that adult headed households better recognizing the risks associated with the novel coronavirus (2019-nCoV). On the other hand, elder households' heads are not disturbed by the outbreak of the new pandemic as they experienced many indigenous and global diseases so far. Besides, elders believed that GOD saves our lives rather than engaging in preparedness and response COVID 19.

Ownership of mobile phones within a household level is positively and significantly related to household preparedness and response to coronavirus. The result showed that households who own mobile phones in their families are more likely prepared to prevent and respond to the pandemic. This can be associated with the fact that the Ethiopian telecommunication office provides extension information about COVID 19 instead of a ring voice of the caller before it reached the receiver. Households who did not own mobile phones have relatively less access to real information, and this decreases the probability of engagement in preparedness and response to coronavirus.

The extension service provided to COVID 19 by the Ethiopian government or religious centers is the only trusted and accepted information sources in almost all parents rural Ethiopia. Those respondents who received extension information about COVID from above-listed sources could have a better understanding of prevention, transmission, and response mechanisms, and therefore, more likely to engage in preparedness and response to the virus. The result also suggests households who received extension information tend to use their family labor and other technology packages instead of shared labor to practices agricultural production.

The education level of the families/children identified as a significant factor for preparedness and response to COVID 19, and households with family members attended preparatory or university level education are more likely to engage in preparedness and response to novel coronavirus. It could be due to

the students who have actively attended preparatory and university level education are matured and acceptable in their family, and this could help the family to have a full understanding of the pandemic. Besides, the majority of them owned mobile phones smart either phone or others for information, and this helps them to get updated information from either internet or phone call for sharing with their family. Moreover, households who currently participated in social community groups are more likely to prepare and respond to coronavirus as they received information about these community group members.

Compared to the poor (lower economic level), households with a medium economic level are more likely to engage in coronavirus preparedness and response. The preparedness and response mechanisms of COVID 19 require additional costs, and those who afford such costs for hygienic, sanitary, and others could engage in the adaptive response of COVID 19. Moreover, compared to their counterpart, households who had off/non-farm income are more likely to engage in preparedness and response to COVID 19. It could be the nature of off /non-farm activities, the potential information accesses about the pandemic, and the income from non-farm sources may probably determine their engagement.

## **Conclusion**

This study investigated factors affecting rural people's preparedness and response to the novel coronavirus (2019-nCoV). The study employed the probit model to explore the determinants of rural households' preparedness and response to coronavirus. The rural parts of Ethiopia were wrongly expected to be advantageous and easily accessed information about COVID 19 due to the homecoming of the educated youths from cities, small towns, and university students can access social media. However, as it evidenced by the results of this study, the majority of the study site has challenged by the availability full and real information gap, inadequate, and ineffective, infant, and not well-organized social response mechanisms due to socioeconomic and institutional constraints.

The result of the study showed that the rural households' preparedness to the novel pandemic is affected by demographic, institutional, and socioeconomic factors. The majority of the significant variables (ownership of mobile phones, access to formal extension information, educational level of household members, social group participation) determining rural peoples' preparedness and response in this study came from the information gap on the novel coronavirus (2019-nCoV). On the other hand, the majority of rural households are existed in the low economic groups and challenged by cash income sources, and cannot afford to buy the prevention equipment of COVID 19. Thus, more attention needs to give for the rural community in term of awareness by using technical language and local language; temporary support (sanitary equipment and cash) to these more vulnerable groups as an incentive enhance peoples to apply prevention and response methods of coronavirus in rural Ethiopia.

For future research, it is recommended to check the government's actions and their impacts to face COVID 19, especially public policies aimed at the rural population of Ethiopia.

## **Declarations**

# Availability of data and materials

The data used in this study are available from the corresponding author upon reasonable request.

## Ethics approval and consent to participate

Not applicable to this study.

## Consent for publication

Not applicable.

## Competing interests

Authors declare no competing interest.

# Funding

No funding was available/used for this study.

# Authors' contributions

Yonnas Addis conceived the idea. Dubale Abate contributed in collecting and analyzing the data. Both Yonnas Addis and Dubale Abate performed the interpretation of the data and wrote the manuscript. João Batista Ferreira carried out the language editing of the manuscript. The author(s) read and approved the final manuscript.

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