

Societal Responses and Household-Level Determinants of Coronavirus Preparedness in Rural Ethiopia

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Abstract

This study assesses the rural community engagement to respond to the novel coronavirus and challenges faced, and possible factors determining their preparedness and response to the pandemic in rural Ethiopia. A total of 190 sample respondents were interviewed, and then descriptive statistics and a probit model were employed for data analysis. The result revealed that various individual and community groups practiced social work response to coronavirus, but socioeconomic and other institutional factors constrained their effectiveness and performance. The probit model regression analysis indicated that the rural households preparedness to coronavirus has influenced by gender characteristics, age category, educational level (household head & family members), mobile ownership, extension service, participation in social groups, economic status, and income from off/non-farm activities. Thus, much more attention needs to be given by a government and other stakeholders to confront the virus and its possible effect.

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 surpass 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 approaches as a pressing problem of Ethiopia when 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 [4, 8, 12, 14–31]. 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.

Unless significant attention given to the rural area, the effect of the novel coronavirus (2019-Ncov) on the rural health and socioeconomic conditions for the majority of the agrarian-based economy dependent countries, including Ethiopia will risky after COVID-19. Thus, the health of rural peoples affects direct influence on agricultural labor sources, and also the existed agricultural value chain beside it will potentially cause the death of many peoples. Therefore, coronavirus would dangerous if not managed well. In response, this study aimed to assess the societal response of COVID 19 and factors affecting rural community preparedness and response to the novel coronavirus (2019-nCOV). 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

Sampling procedures and participants

The two-stage sampling procedure was applied to select sampled households. In the first stage, 51 peasant associations from the three largest administrative regions were selected by employing a purposive sampling technique. These peasant associations are chosen due to time and budget constraints, and also the availability of data collectors as well. The availability of full information for data collectors at wolkite university and the existed telegram page for each data collector ease the communication process. In the second stage, four rural households were chosen randomly from the list of household heads in their respective peasant associations. Accordingly, a total of 204 household heads (4 each from peasant associations) were used to collect the relevant information. The sample size was selected considering representativeness, budget, and the unnecessarily delay in data collection, analysis, and write up.

Data collection

Due to the case of coronavirus pandemic, the Ethiopian government in the middle of March 2020, recommended its people to avoid face-to-face dealings and movements within the domestic region. For this reason, social media (phone & telegram interview) were used to communicate with the data collectors. The study designed structured questionnaires, which was developed based on previous researchers' outlook of COVID 19 and also the authors' experience in different rural areas of Ethiopia and then applied through the interview schedule. The questionnaire was first sent to the data collectors through their telegram page. Then, the students have suggested to print it and then administered the data collection process by applying an interview schedule with selected respondents. A post-office box was used for collecting completed questionnaires from the data collectors. The study was conducted from April 20 to May 30, 2020, and the interview schedule was undertaken by using local language for respondents who declined to speak the national language fluently.

Data type and sources

The majority of the data nature used was a qualitative type, but quantitative data were also collected. Both primary and secondary data sources were also used. Data associated with societal works and responses, demographic, socioeconomic, and institutional factors affecting the preparedness and response to COVID 19 pandemic were collected from primary sources. Secondary data were taken from Journals, and statistical bulletin reports WHO, FMOH, WFP, and FAO.

Data analysis

The STATA software version 13 was used to analyze the collected data. The qualitative data were organized and coded into quantitative form through the following scientific methods applied for analysis purposes. Then, both descriptive and econometrics model methods of analysis were used. Societies' responses to the novel coronavirus, demographic, socioeconomic, and institutional related information were described by employing descriptive statistics, namely proportion, and percentage. Besides, the probit model was used to analyze factors affecting the preparedness and response of COVID 19 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 (ϵ). The link between the observed variable and the latent y^* is made with simple measurement equation:

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

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:

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

Following the analyses, the probit model is adopted as:

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

where Φ is the standard cumulative normal distribution function with variance one and numerically maximized concerning β . The predicted probability for any set of values of independent variables can be computed by using a variety 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
Sex	A dummy variable with value 1 for males and 0 for females
Age	A categorical variable indicating the age interval of households with value 1 for those aged 18–35, 2 for aged 35–55, 3 for those who are aged 55 or above
Marital status	A dummy variable for the marital status of respondents with value 0 for divorced/single/ widowed/widower, 1 for married
Educational level of a household head	A categorical variable for the educational level of a household head with value 0 for illiterate, 1 for primary educational level, 2 for secondary level
Family situation	A dummy variable for the household situation with value 1 for households with children for more than 10 years, 0 for households without children/those whose children less than 10 years
Educational level of children aged above 10 years	A maximum educational level of children in a household with value 0 illiterate, 1 for primary, 2 for primary level, 3 secondary levels, 4 for college/university level and others
Ownership of mobile	A dummy variable with value 1 if any of a households member have mobile, 0 otherwise
Ownership of radio	A dummy variable with value 1 if any of a households member have a radio, 0 otherwise
Engagement in community groups	A dummy variable with value 1 if a household has social community engagement; 0 otherwise
Extension information	A dummy variable with value 1 if a household received formal extension information about COVID 19; 0 otherwise
Off/non-farm income	A dummy variable with value 1 if a household received off/non-farm income; 0 otherwise
Households economic stats in the locality	A dummy variable with value 1 if relatively good economic status; 0 otherwise
Households support from others	A dummy variable with value 1 if they have options to receive support from their child/relatives/or other; 0 otherwise

Results

Characteristics of sampled respondents

Table 2 presents a description of the variables used in the analysis. The sample respondents were about 204 households from the three largest administrative regions of Ethiopia. However, about 14 sampled respondents excluded from analyses as we failed from collecting the data. 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 in the Youngers. In terms of education status, about 15.3%, 17.9%, and 8.4% attended primary, high school, and preparatory levels of education, respectively. The remaining 58.4% of the respondents were illiterate. Currently, about 85.6% were had family members (children) aged above 10 years while about 14.7% were had not children at all or aged 10 years.

Regarding mobile and radio ownership, about 54.2% of the households owned mobile phones, and about 31.1% of households owned and used radio for information. With respect to respondents' participation in social community groups participation either culturally or religiously and other communal labor share groups, about 58.4% participated in the time COVID 19. Also, more than 59% of the sample respondents reported the absence extension service related to COVID 19. Furthermore, about 37.4% of the respondents engaged in off-farming activities like a daily laborer, petty-trading, and craftsmanship to secure family needs; and close to 34.2% of the respondents received support from others to carry their normal lifestyles (Table 2).

The study result presented in Table 2 also depicted the demographic, socioeconomic, and institutional differences among respondents who actively engaged in preparedness to COVID 19, and respondents who rejected it. Among households participated in responding to COVID 19, about 25.3% were males, 35.3% were married, 29.5% were under the adult age category, 17.9% household heads were illiterate, and 38.4% had family members aged above 10 years. Regarding the educational level of other family members (aged above 10 years), about 6.8% of respondents were illiterate, 13.6% were at the primary school level, 13.6% were secondary school level, 2.6% were at a preparatory school level, and 9.5% were at college and university levels. Furthermore, about 36.3% of households had mobile, about 12.1% of had a radio, about 30.5% of the respondents were participated in the social community group activities, about 26.3% of the respondents received extension information from formal sources. Considering the economic status, the majority (32.6%) were at the medium economic level, 28.4% of them engaged in off and non-farm activities and closely 18.4% of those households were received support from others to carry on their usual lifestyle (Table 2).

Table 2
Demographic characteristics of sample respondents

Variable	N = 190	Proportion	Preparedness and response to COVID 19	
			Yes	No
Sex				
Male	130	0.694	0.253	0.432
Female	60	0.316	0.211	0.105
Marital status				
Married	138	0.726	0.353	0.374
Single/ widower/divorced/widowed/	52	0.274	0.111	0.163
Age groups				
18–35(young)	33	0.116	0.063	0.053
35–55(adult)	80	0.421	0.295	0.158
>55 (elder)	77	0.405	0.105	0.326
Education level household head				
illiterate	111	0.584	0.179	0.405
Primary level	29	0.153	0.111	0.042
High school	34	0.179	0.105	0.074
Preparatory	16	0.084	0.068	0.016
Family members aged above 10 years				
Yes	162	0.856	0.384	0.468
No	28	0.147	0.079	0.068
Educational level of family members				
Illiterate/children aged < 10	25	0.132	0.063	0.068
Primary school	111	0.584	0.21	0.374
High school	25	0.132	0.063	0.068
Preparatory school	6	0.032	0.026	0.005
University /college	23	0.121	0.095	0.026

Variable	N = 190	Proportion	Preparedness and response to COVID 19	
Ownership of active mobile phone				
Yes	103	0.542	0.363	0.179
No	87	0.458	0.10	0.358
Ownership of radio				
Yes	59	0.311	0.121	0.189
No	131	0.689	0.342	0.347
Social community groups participation				
Yes	111	0.584	0.305	0.279
No	79	0.416	0.158	0.258
Formal extension about COVID 19				
Yes	77	0.405	0.263	0.142
No	113	0.595	0.20	0.395
Off/non-farm income households				
Yes	71	0.374	0.284	0.089
No	119	0.625	0.179	0.447
Relative households economic stats				
Poor	80	0.421	0.10	0.321
Medium	89	0.468	0.326	0.142
Good/better	21	0.111	0.037	0.074
Households support from others				
Yes	65	0.342	0.185	0.158
No	125	0.658	0.279	0.379

Cognizant of coronavirus and related challenges

The survey of rural households' understanding of coronavirus pandemic showed that the majority of rural households' had not an understanding of the virus prevention, spread, and response mechanisms, despite the information of the outbreak. Based on the result, only about 25.5% of the surveyed respondents had information about the prevention methods, about 38.40% of the respondents had information on the

spreading ways, and also 18.58% of the respondents had understood on the alternative adaptation methods to reduce health and socio-economic effect of COVID 19. In this regard, currently close to 46.4% of the respondents practiced prevention methods by avoiding close contact, washing hands with water and soap, and avoid handshake to reduce the spread of the virus and its adverse effect. 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).

Despite recent progress, the result of the study showed a low level of awareness of COVID 19 by the majority in rural peoples of Ethiopia. In this respect, the study identified six challenges that caused the lower-level of understanding of coronavirus. Firstly, limited/absent of formal extension information about COVID 19 by the Ethiopian government, religious center, or other stakeholders. Accordingly, about 59.5% of the surveyed respondents revealed the absence of a formal extension source about COVID 19 in their respective localities. Secondly, limited social media accesses and alternatives in the rural areas caused less information access for the majority. Limited use and ownership of social media like mobile, smartphones, radio, and other social media enlarge the information gap in the rural peoples of Ethiopia. Thus, about 68.59% and 45.8% of the respondents have not owned phones and radio, respectively at household levels (Table 2). 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 challenge 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 challenge 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 3).

Table 3
Rural peoples cognizant of coronavirus and challenges in the time of COVID 19

Rural peoples in the time of COVID 19 and/or challenges	N	Proportion
Adequate information on prevention (yes)	48	0.255
Adequate information on spreading methods (yes)	73	0.384
Adequate information on response methods (yes)	35	0.186
Practiced prevention and response (yes)	88	0.464
Declined focusing from COVID 19 due to agricultural farming (yes)	142	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 to COVID 19

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 societal movement in their respective locality. The remaining 43.55% of the respondents showed the available few 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.

The societal religious-based monthly anniversary practiced by orthodox Christianity followers in the rural area are among the communal association that creates suitable conditions for the spread of the virus. To reduce the local religious leaders placed restriction and accordingly, about 21.57% of the respondents revealed the presence of restriction *mahiber*, 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 tezkar in their locality. *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 4).

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 4).

Table 4
Rural community engagement to prevent/reduce 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 Equib	77	0.406
Imposed restriction on Idirr and tezikar	48	0.25
Local community leaders and other stakeholders (yes)		
Debo and wonfel	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

COVID 19 and factors affecting preparedness and response

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 5).

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 5

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) ^a	-0.75**	0.311	-0.29***	0.115
Age category (young) ^a				
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) ^a	0.32	0.278	0.13	0.106
Household member above 10 years (not have) ^a	-0.18	0.779	-0.07	0.310
Educational level of HH(illiterate) ^a				
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
Mobile ownership in a household (not owned) ^a	1.52***	0.305	0.54***	0.086
Radio ownership in a household (not owned) ^a	-0.09	0.312	-0.03	0.122
Extension service about COVID 19 (not received) ^a	0.63**	0.298	0.25**	0.114
Education level of families (illiterate) ^a				
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) ^a	0.90***	0.294	0.34***	0.101
Relative economic status (poor) ^a				
Medium	0.83*	0.322	0.32***	0.117

Explanatory variable	Regression		Marginal effect	
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

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 indicates 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 create 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 the 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, university and also students can access social media. However, as is 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 and response to the novel pandemic are 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

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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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Competing interests

Authors declare no competing interest.

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