

RESEARCH

Open Access



# Effects of covid-19 on the livelihoods of rural women in Ethiopia

Samuel Tadesse Adisalem<sup>1</sup> and Asrat Mulat Asegie<sup>1\*</sup> 

## Abstract

**Background** The COVID-19 pandemic has had an impact on people's lives and economic activities. Women are expected to bear the impact of the impact because they are over-represented in affected sectors on the front lines of the pandemic's response. However, no empirical evidence exists to support the effect of COVID-19 on women's economic activities in the Ethiopian context.

**Methods** This study investigated effects of COVID-19 on economic activities of rural women in Ethiopia. Thereby, a multistage sampling procedure was employed to randomly draw 263 rural women as study participants. Data were collected through interview schedules and key informant interviews. Finally, the data were analyzed qualitatively and quantitatively. A binary logistic regression model is used to examine factors determining the effect of COVID-19 on economic activities of women.

**Results** According to the findings, the most affected economic activities were remittances (94.28%), small business trade (94.06%), livestock and livestock product trading (91.30%), daily labor wages (84.82%), handcraft (72.73%), and crop production (61.32%). The logit regression result shows that irrigation use reduced the impact of the pandemic, whereas relying on remittances, market distance, and being a female-headed household exacerbated the impact of the pandemic on the economic activities of rural women.

**Conclusion** The pandemic had significant impact on rural women's economic activities. Therefore, governmental and nongovernmental organizations should support rural women's income-generating activities by providing revolving funds with training. Using remittances for income-generating activities would also improve the income of rural women.

**Keywords** Female-headed households, Income generation, Off-farm, Non-farm, Pandemic

## Introduction

COVID-19 pandemic significantly impact global lives and economy (Kassegn and Endris 2021; Rasul 2021). The COVID-19 pandemic has a negative impact on the livelihoods and economic activities of rural households (Mahmud and Riley 2021; Nechifor et al. 2021). A study

in China revealed that COVID-19 negatively impacted China's rural economy, affecting crop production, livestock, income, employment, economic development, and agricultural product sales (Pan et al. 2020). Ragasa et al. (2021) revealed that the pandemic has caused income loss for 51% of respondents in Myanmar, impacting agriculture and food supply chains in sub-Saharan Africa (Nchanji et al. 2021). The economic crisis of COVID-19 has affected all households, businesses and markets at the same time (Casarico and Lattanzio 2022; Fairlie 2020; Mottaleb et al. 2020). Financial sources such as remittances were held (Bisong et al. 2020; Sharma 2020). Informal and unskilled workers are vulnerable to losing their

\*Correspondence:

Asrat Mulat Asegie  
asrat19mlt@gmail.com

<sup>1</sup> Department of Rural Development and Agricultural Extension, College of Agriculture, Wollo University, P.O. Box: 1145, Dessie, Ethiopia



© The Author(s) 2023. **Open Access** This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>. The Creative Commons Public Domain Dedication waiver (<http://creativecommons.org/publicdomain/zero/1.0/>) applies to the data made available in this article, unless otherwise stated in a credit line to the data.

jobs because of COVID-19 (Casarico and Lattanzio 2022; Doss et al. 2020; Rasul et al. 2021).

The effects of a crisis are never gender-neutral, and women and men experience differ levels of stress as a result of COVID-19 (Ragasa and Lambrecht 2020; Ragasa et al. 2021). The studies show that women are expected to bear the heaviest impact (Parry and Gordon 2021). Farmers' access to agricultural inputs has been affected by the pandemic as a result of lockdowns and transportation restrictions (Anagah 2020). These impacts were severe for women who lacked reliable and timely agricultural information (Alvi et al. 2021). According to Harris et al. (2020), female farmers are more vulnerable to the pandemic in terms of both livelihoods and diet. In addition, COVID-19 has an impact on women in agriculture, including both production and sale (Fairlie 2020; Haqiqi and Bahalou 2021). Women contribute significantly to production activities, despite receiving less recognition (Doss et al. 2020). Lockdown negatively impacts women's livestock production, including feeding, management, disease control, and trade (Hashem et al. 2020; Nchanji et al. 2021; Rasul et al. 2021). Women bear a disproportionate share of the burden of economic decline, which results in male job loss, increased domestic work, hunger, and violence (Agarwal 2021). As a result, female workers face increased poverty due to lost income opportunities (Sarker 2021). Women as marginalized groups suffered more due to COVID-19 since they lost both external support and coping mechanisms (Adhikari et al. 2021). COVID-19 has an impact on job numbers, job quality, and vulnerable groups in addition to health concerns, affecting labor market outcomes (Béné 2020; Janssens et al. 2021; Kansime et al. 2021; Nechifor et al. 2021).

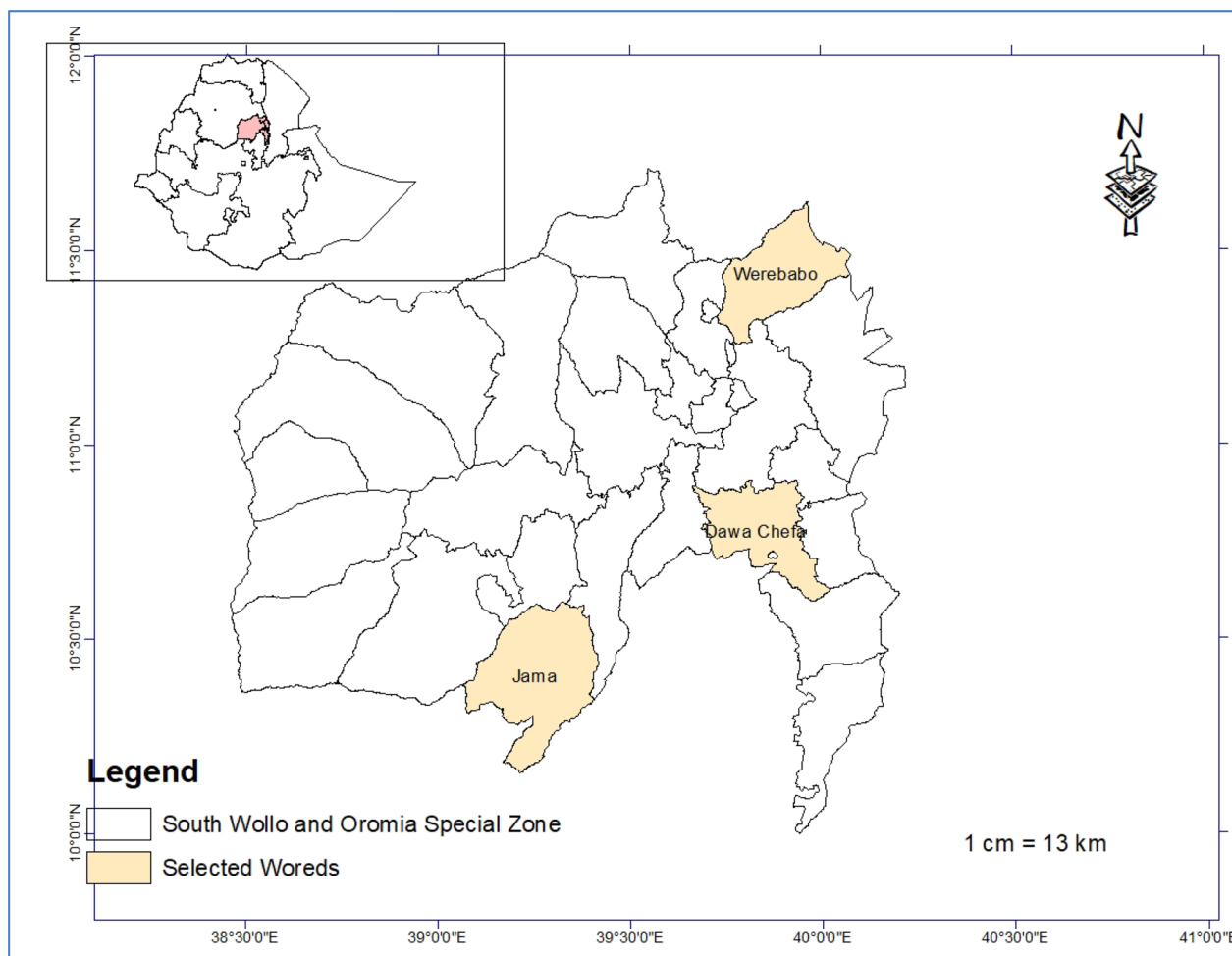
Ethiopia is not exceptional because the pandemic has adversely affected different groups of people (Hirvonen et al. 2021; Tamru et al. 2020; United Nations (UN) 2020; World Food Programme (WFP) et al. 2020). According to the Economic Commission for Africa (ECA), Ethiopian rural women in agriculture and informal sectors are vulnerable to COVID-19, spending 2.3 times more on unpaid work (ECA 2020). In Ethiopia, the business process has slowed down, production is cut, the unemployment rate has more than doubled, and the cost of living is mounting (Mohammed 2021; Yonnas and Dubale 2021). The pandemic has further exacerbated socioeconomic inequalities between men and women (Sarker 2021). Shocks can exacerbate or reduce gender gaps, so evidence-based policy responses are needed to mitigate the pandemic crises on rural women (Ragasa and Lambrecht 2020).

The evidence indicates that the effect of COVID-19 on women's economic activities is not well understood due to lack of detailed household survey data. We also

noticed that the previous studies lacked methodological rigor in gathering primary data from representative samples. For example, Harris et al. (2020) undertook a rapid telephone survey with 448 farmers. Telephone coverage in rural areas is extremely low in developing countries such as Ethiopia. Such designs exclude women who do not have access to telephones. Fairlie et al. (2022) and Haqiqi and Bahalou (2021) also conducted using secondary data from the California Department of Tax and Fee Administration and the United States Department of Agriculture's National Agricultural Statistical Service data, respectively to assess the impact of COVID 19 on U.S. countries. In addition, Adhikari et al. (2021) used series of panel discussion with policy makers and expert, key informant interviews, and extensive literature review to understand the impacts of COVID-19 crisis in agriculture and food systems in Nepal. Moreover, Hashem et al. (2020) conducted an overview on the animal welfare and livestock supply chain sustainability under the COVID-19 outbreak with no methodological design on how the study is undertaken. Doss et al. (2020) draw an evidence from past health crises, reports from the COVID-19 pandemic, and literature on gender and food security to analyze potential gendered effects across production, processing, trading, and consumption. Rasul (2021) analyzed the twin challenges of COVID-19 pandemic and climate change for agriculture and food security in South Asia using secondary data with no clear methodological design. Sarker (2021) analyzed labor market and unpaid works implications of COVID-19 for Bangladeshi women using secondary data and literature review. Agarwal (2021) analyzed the livelihoods during the time of COVID-19 in terms of gender perspective through literature survey.

As a result, the purpose of this study is to assess rural women's economic activities and to examine the impact of COVID-19 on those activities. The above empirical evidence serves as the reason for defining the scope, as rural women in developing countries such as Ethiopia have engaged in causal economic activities that are highly vulnerable to shocks and stresses. Consequently, the researchers are motivated to examine the impact of COVID-19 on the economic activities of rural women using firsthand information from a representative sample using a well-designed methodological approach. This study will allow the scientific community to triangulate primary data findings with secondary data findings. Following this, we are mainly interested in responding to the following research questions:

- Do rural women perceive that the COVID-19 affected their economic activities?



**Fig. 1** Map of the study area

- Which economic activities are severely affected by COVID-19?
- Which socioeconomic factors determine the effects of COVID-19 on economic activities of rural women?

**Methods**

**Description of study area and sample size**

The Oromia special administrative zone and South Wollo zone are located in the eastern Amhara Region of Ethiopia. The Oromia special administrative zone is 333 km from Addis Ababa in the north. It is located between latitude 10° 42′ 59.99" north and longitude 39° 51′ 59.99" east. The Zone is bordered on the southwest by North Shewa Zone, on the northwest by South Wollo and Argobba special woreda, and on the east by the Afar Region. The main agro-ecologies of the zone are low land and midland with an annual rainfall range of 600–900 mm. On the other hand, the South Wollo

Zone is 404 km from Addis Ababa, the capital of Ethiopia, in the north. It is located between the latitudes of 10.8997° north and 38.9877° east with three agro-ecologies: lowland, midland and highland. The annual rainfall ranges from 750 to 1400 mm with a long-term mean of 1109 mm. The location map of the study area is presented in Fig. 1.

Households were sampled using the following sampling procedures. First, South Wollo and Oromia Zones were selected purposively since it is the research mandate area of Wollo University, and one of severely affected areas by the COVID-19 in Ethiopia. Second, two districts from South Wollo and one district from the Oromia Zone were selected randomly. Third, a total of six kebeles (two kebeles from each district) were selected randomly. Fourth, a proportionate sampling technique was employed to draw 263 sample rural women from three sampled districts, regardless of household headship (both female and male-headed

**Table 1** Proportion of sample size across study districts (measured in numbers)

District	Number of household heads	Sample household heads
Jama	31397	93
Dawa chefa	32346	95
Worebabo	25246	75
Total	88989	263

Source: CSA (2020a)

households). The sample size was determined using the following formula as presented by Yehuala et al. (2021).

$$n = \frac{z^2 p \cdot q \cdot N}{e^2 (N - 1) + z^2 p \cdot q} \tag{1}$$

where, n is the desired sample size, N is the total number of population in selected districts, z is the value of the standard variant at 95% confidence level and to be worked out from a table showing the area under the normal curve (z=1.96), e is the level of precision = ± 5%, p is the proportion of sample size (p=22%), and q=(1-p). The number of households in selected district presented in Table 1 is obtained from Central Statistical Agency (CSA) population projection survey (CSA 2020b). By using the formula in Eq. 1, the sample size is calculated as:

$$n = \frac{(1.96)^2 (0.22)(0.78)(88989)}{(0.05)^2 (88988) + (1.96)^2 (0.22)(0.78)} = 263$$

Note: among the total respondents, the data from 254 households is used for analysis and the remaining nine questionnaire is discarded due to incomplete information.

**Data collection and analysis**

The data were collected between September and November 2020. The effect of the pandemic is continuing and will continue for an unknown period of time. The qualitative data were analyzed through narration, explanation, interpretation, and triangulation. The quantitative data were analyzed using simple descriptive statistical tools, and the factors that aggravated or reduced the effect were examined using a binary logistic regression model. The binary logistic regression model was used to estimate the relationship between socioeconomic variables peculiar to rural women and the effect of COVID-19 on their

economic activities. The dependent variable was the status of rural women’s economic activities as a result of the COVID-19 pandemic. The responses were 1 (if affected) and 0, otherwise; hence, it is a binary response variable. Therefore, the logit model is selected for this study and specified in Eq. 2 according to Gujarati (2004) as follows:

$$L_i = \ln \left( \frac{p_i}{1 - p_i} \right) = \beta_1 + \beta_2 x_{1i} + \beta_3 x_{2i} + \beta_4 x_{3i} + \dots + \beta_n x_{(n-1)i} \tag{2}$$

where  $L_i$ =natural logarithm,  $P_i$ =probability of being affected,  $1- p_i$ =probability of being not affected,  $\beta_1$ =constant term,  $\beta_2, \beta_3, \dots, \beta_n$ =coefficients of explanatory variables, and  $X_i$ =explanatory variables that are hypothesized to be included in the model (Table 2).

The study employed both qualitative and quantitative data obtained from primary sources. Data on the demographic and socioeconomic characteristics of the respondents, the economic activities, and the effect of COVID-19 on the economic activities of rural women were collected directly from 254 sample rural women using a pretested interview schedule keeping the recommended COVID-19 protective measures. Key informants from kebele development agents, kebele administrations, district office of agriculture, district gender office, local COVID-19 prevention task force, and other NGOs working on livelihood aspects of rural women were interviewed face to face.

**Definitions and measurements of variables**

The effect of COVID-19 on economic activities of rural women is estimated to be influenced by the independent variables presented in Table 2. These variables are selected based on extensive literature reviews.

**Results and discussion**

**Demographic and socioeconomic characteristics of respondents**

The primary goal of this research is to examine how rural households perceive the effects of COVID-19 on their economic activities. We accomplished this by identifying the major economic activities practiced in the study area. As a result, rural women work in on-farm, off-farm, and non-farm economic activities. Crop production and livestock keeping are the most common economic activities undertaken by rural women in the study area. They also engage in small business trade, daily labor wage, remittance, and livestock trading.

**Table 2** Definition and measurement of independent variables

No	Explanatory variables	Measurements	Type of data category	Expected sign
1.	Age of respondents	Number of years	Continuous	+
2.	Family size of respondents	Number of family members in the household	Continuous	+
3.	Educational status of respondent	1 = literate (read and write), otherwise = 0	Dummy	±
4.	Household headship	1 = male headed and 0 for female headed	Dummy	±
5.	Land holding size	The size of land a household owns in hectare	Continuous	-
6.	Use of irrigation	1 = user, otherwise = 0	Dummy	+
7.	Market distance	The distance from home to the nearest market in minutes	Continuous	+
8.	Use of credit	1 = used, otherwise = 0	Dummy	+
9.	Membership to farmers' cooperatives	Membership status to farmers' to cooperatives (1 = yes, 0 = otherwise)	Dummy	-
10.	Use of inputs	1 = used, otherwise = 0	Dummy	+
11.	Access to remittance	Access remittance (1 = if yes, otherwise = 0)	Dummy	+
12.	DA contact before COVID	No. of DA contacts per year before COVID-19	Continuous	+
13.	Number of oxen	Number of oxen owned for draft power	Continuous	±

Source: own hypothesis, 2020

Table 3 summarizes the demographic and socioeconomic information of respondents. The respondents' average age is 44, putting them in the active labor force category. This implies that respondents are likely to be involved in various farming practices and other income-generating activities in the rural economy. A possible explanation could be that rural women may

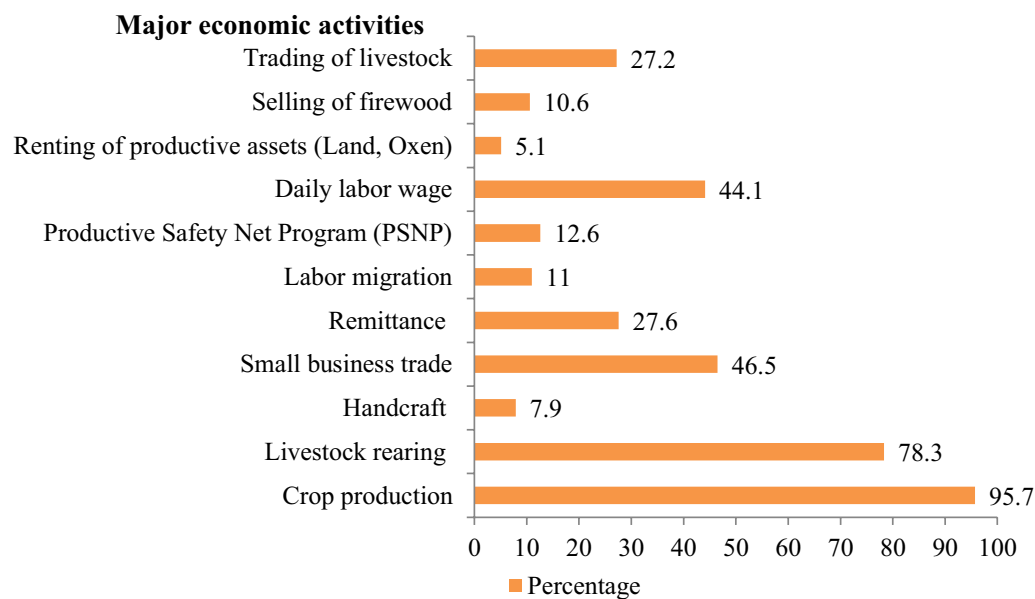
have better farming operations, wealth accumulation, and climate knowledge and use better planning and experiences in the past pandemics than younger women. Moreover, young women engaged in daily wages and small business activities where these activities were hard hit by the COVID-19 shutdown. The finding is in conformity with those of Abdullah et al.

**Table 3** Demographic and socioeconomic characteristics of respondents (N = 254)

Respondents characteristics		Mean	Standard deviation
Age		44	9.88
Family size		5.21	1.72
Land holding size in ha		0.86	0.42
Market distance in walking distance		91.11	44.10
Frequency of DA contact before COVID-19		2.31	3.50
Frequency of DA contact during COVID-19		1.00	1.19
Ox number		0.87	0.96

	Category	Frequency	Percentage
Literacy status	Literate	115	45.3
	Illiterate	139	54.7
Household headship	Female headed	116	45.7
	Male headed	138	54.3
Use of irrigation	User	129	50.8
	Non-user	125	49.2
Use of credit	Used	58	22.8
	Not-used	196	77.2
Membership to cooperatives	Member	173	68.1
	Not-member	81	31.9
Use of inputs	Used	171	67.3
	Not-used	83	32.7
Access to remittance	Yes	70	27.6
	No	184	72.4



**Fig. 2** Description of major economic activities in the study area (percentage of respondents from  $n = 254$ )

(2019), who found that older farmers have more experience with farming practices that can cope with the crisis. On the other hand, the young generation does not like the rural setting, and they want to find employment in the urban area.

The average family size in the study area is 5.21 members, which is higher than the national average of 4.6. The average land holding size of households in the study area is 0.86 ha which is more than the national average of 0.8 ha (Alemu et al. 2017). Households also go averagely 91.11 min to reach the nearest main market. The COVID-19 pandemic is expected to put pressure on DAs to visit smallholder farmers. The result shows that before COVID-19 Development Agents (DAs) were visited farmers more than three times (2.31) per month to provide agricultural production and marketing related activities. The frequency of DA during COVID-19 is averagely once a month which is reduced by half compared to their contact prior to COVID-19. Oxen ownership is important to practice agricultural activities. In the study area, the average ox ownership by respondents is 0.8. This implies that there are smallholders who have not own ox.

About 54.7% of respondents are illiterate, while the remaining 45.3% are literate. About 45.7% of respondents are female headed, implying that there is a significant proportion of female-headed households in the study area. Regarding irrigation use, 50.8% of respondents are the users. Using irrigation, smallholder farmers are practicing different vegetable and fruit production activities. In the study area, only 22.8% of respondents are credit users. The use of credit is expected to fulfill agricultural

inputs such as fertilizers, improved seeds and farm machineries. One possible explanation is that the use of credit services allows rural women to participate in various income-generating activities, and the previously derived revenue increases rural women's financial capacity and purchasing power, allowing them to avoid the effects of the pandemic. Other studies show that the use of credit has a positive influence on women's contributions to household welfare (Abdullah et al. 2019; Mandal et al. 2021).

About 68.1% of respondents are the members of farmers' cooperatives. They access fertilizer, improved seeds, and basic commodities through cooperatives. Accordingly, 67.3% of respondent used agricultural inputs such as fertilizer, improved seeds, and agro-chemicals for their agricultural practices. Moreover, only 27.6% of the respondents were accessed remittance, whereas the majority (72.4%) of the respondents are not accessing the remittance.

#### Major economic activity practiced by rural women in the study area

Crop production (95.7%) was the dominant economic activity practiced by rural women, followed by livestock keeping (78.3%), small business trade (46.5%) such as tea, coffee, small shops and street venders in the villages, daily labor wages (44.1%), remittances (27.6%) and trading of livestock (27.2%) (Fig. 2). According to CSA, (2020a), the major crops grown in the study area are Teff, barley, maize, sorghum, wheat, chickpea, horse bean, and other oilseeds, fruits, and vegetables. As the key informants

**Table 4** Major economic activities affected by COVID-19 (in percentage)

The major economic activities	Affected (%)	Forced to cease (%)
Crop production	61.32	19.00
Livestock rearing	58.29	18.10
Handcraft	72.73	59.09
Small business trade	94.06	83.91
Remittance	94.28	77.14
Labor migration	28.57	25.00
Productive safety net program (PSNP)	59.38	50.00
Daily labor wage	84.82	70.54
Renting of productive assets (Land, Oxen)	46.15	23.08
Selling of firewood	18.52	14.81
Trading of livestock	91.30	84.06

The percentage of affected for each economic activity is calculated from the number of respondents who engaged in the respective economic activities. The percentage of forced to cease is calculated from the respective affected economic activities

in Jamma and Dawachefa districts explained, the districts' small- and micro-scale enterprise office organized the rural women in the rural village to create employment opportunities in the five basic economic activities, namely, construction, small trade, peri-urban agriculture, service sectors and the manufacturing sector. This implies that rural women are practicing on farm, off farm and nonfarm income activities with the domination of on farm income activity.

#### Economic activities affected by the COVID -19 pandemic

First, the economic activities of rural women were identified and classified, as shown in Fig. 2. The COVID-19 pandemic effect on each economic activity was then independently examined to clearly demonstrate the pandemic's effect on economic activity. The survey results indicated that remittances (94.28%), small business trade (94.06%), trading of livestock (91.30%), daily labor wages (84.82%), handcraft (72.73%) and crop production (61.32%) were the most affected economic activities by the pandemic. Among the rural women whose remittance income was affected (94.28%), approximately 77.14% of them completely ceased receiving income from remittances due to the pandemic (Table 4). Out of the rural women whose small business trade is affected (94.06%), 83.91% were forced to cease this economic activity due to the pandemic. Similarly, among the rural women whose livestock trading activities are affected (91.30%), 84.06% totally banned the livestock trading activities. The respondents in Jamma and Dawachefa districts explained that they were doing beef and small ruminant fattening for holyday's market like Easter. However, they incurred

losses due to movement restrictions and were forced to cease the business. Among the rural women who engaged in daily labor wages, 70.54% were forced to cease this economic activity. Out of the rural women engaged in handcraft, 59.09% were also forced to cease handcraft making due to a lack of input and output markets. Approximately 61.32% of the crop production activity of rural women is affected by the pandemic. This is due to a lack of the necessary agricultural input distribution, a lack of a market for their products and the disruption of the planting season. Consistent result is reported by other authors (Pan et al. 2020; Ragasa and Lambrecht 2020; Yazdanpanah et al. 2021). The overall effect of COVID-19 on Economic activities of rural women was calculated by taking in to consideration on individual economic activities. For this study, economic activity of household is said to be affected if at least one income source is affected. Accordingly, 93.7% of rural women are affected by the COVID-19 pandemic (Additional file 1).

Our findings show that the majority of rural women perceived as the COVID-19 pandemic has a variety of effects on their economic activities. According to the study, the pandemic primarily impacted women's off-farm and non-farm economic activities such as small business trade, remittance, labor wage, and livestock trading. This is because certain business activities were banned by the government to avoid social gatherings; the others lacked the necessary inputs and customers due to movement restrictions. (Goswami et al. 2021) found that micro, small-, and medium-sized enterprises were the major victims of the pandemic as a result of financial shortages, supply chain disruptions, decreases in demand, and reductions in sales and profit.

#### Perception of rural women on the severity of challenges due to the COVID-19 pandemic

The severity of the COVID-19 pandemic effect was assessed across different themes in the study area. The severity of the problem varies according to the nature of the activity needed to support the economic activities (Table 5). The most severely affected activities were difficulty in getting good markets for the products (63.40%) and difficulty working in groups (44.5%), followed by difficulty preserving fruits and vegetables due to market shortages (35.80%) and problems securing rural labor (35.00%). The respondents explained the problem of market shortages for their handcraft and agricultural products, especially for perishable horticultural products. The main reasons are customers' fear of contamination from product transactions, especially in the early stage of COVID-19 case confirmation and lack of transport, lack of market due to movement restrictions and the perishable nature of agricultural products. A study in China

**Table 5** Severity of challenges during the COVID-19 pandemic

Major perceived challenges	The perceived severity of the challenges (%)				Mean	SD
	Not faced	Faced slightly	Faced modestly	Faced severely		
Accessing inputs	39.00	22.80	23.20	15.00	1.14	1.10
Increased input price	32.70	16.10	24.80	26.40	1.45	1.20
Getting markets	6.30	3.90	26.40	63.40	2.47	0.84
Getting animal feed	46.50	3.50	18.90	31.10	1.35	1.33
Accessing veterinary service	41.30	9.40	16.50	32.80	1.41	1.32
Delay agricultural activities	25.20	21.20	20.90	32.70	1.61	1.18
Securing rural labor	35.40	13.00	16.60	35.00	1.51	1.30
Spoilage of products	36.60	4.30	23.30	35.80	1.58	1.30
Contacting Development Agents	40.20	9.40	22.80	27.60	1.38	1.26
Difficulty of working in Jige	12.20	7.50	35.80	44.5	2.31	1.00
Difficulty of renting assets	52.00	3.90	18.10	26.00	1.19	1.32

explained that the COVID-19 movement restriction blocked the outflow channels of agricultural products, hindered necessary production inputs, destroyed production cycles, and finally undermined the production capacity of rural households (Pu and Zhong 2020). Working in Jige<sup>1</sup>/Working in group is a labor sharing practice for ploughing, weeding and harvesting among rural households in the study area. However, the pandemic hit this human labor gathering hard due to the social distancing rules (Table 5).

On the other hand, it was very difficult to obtain rural labor wages due to movement restrictions. It in turn affects input access, thereby affecting production and productivity in agricultural economic activity. An author in this regard confirmed that the COVID-19 pandemic reduced the availability of farm inputs in Nigeria (Aromolaran and Muyanga 2020). However, another study contradicts that finding that access to inputs was not significantly affected by the pandemic (Goswami et al. 2021). This difference may be the result of the level of infrastructure development and delivery mechanisms. The lockdown could also increase the cost of agricultural inputs. The study found that the price of inputs affected slightly, modestly, and severely by approximately 16.10%, 24.80%, and 26.40%, respectively. Contrary, the respondents explained that their income was dropped due to market inaccessibility for products. A study in India reported price reductions by over 80% of farmers, and farm income dropped by 90% during the pandemic (Harris et al. 2020).

<sup>1</sup> *Jige* is defined as working in groups through labor sharing practice for ploughing, weeding and harvesting among rural households in the study area.

The containment measures taken by the government also significantly affected the daily labor wage. This implies that daily labor wage workers in both off-farm and nonfarm economic activities have suffered from the pandemic since they are more resource poor in terms of land ownership and education, which leads to food and nutrition insecurity (Mottaleb et al. 2020). Studies have revealed that income from remittances was affected by the lockdown (Bisong et al. 2020). Moreover, some of the migrants deported and relied on local aid in the study area due to the pandemic.

### Results of econometric analysis

This study also looked at the relationship between various socioeconomic variables and the effects of COVID-19 on

**Table 6** Binary logistic regression results (econometric test)

Variables	B	S.E	Sig	Odds ratio
Age	-0.036	0.039	0.351	0.964
Family size	-0.233	0.178	0.190	0.792
Educational status of households	-0.898	0.689	0.193	0.408
Household headship	1.662	0.703	0.018	5.269
Land holding size in ha	-1.227	0.794	0.122	0.293
Use of irrigation	-1.910	0.751	0.011	0.148
Market distance in walking minute	-0.012	0.007	0.076	0.988
Use of credit	-0.924	0.920	0.315	0.397
Membership to cooperatives	-0.503	0.757	0.507	0.605
Use of inputs	-0.582	0.764	0.447	0.559
Access to remittance	-2.005	1.139	0.078	0.135
DA contact before COVID	0.265	0.246	0.282	1.303
Ox number	0.111	0.361	0.759	1.117
Constant	11.423	3.039	0.000	91368.548



rural women's economic activities. This finding aids in determining which socioeconomic variables significantly expose rural women to COVID-19 shocks. As a result, significant socioeconomic variables such as age, household headship, irrigation use, market distance, credit use, agricultural input use, and access to remittance determine the effect of COVID-19 on rural women's economic activities (Table 6).

#### **Household headship**

Household headship indicates whether the household is headed by a woman (1) or a man (0). The logit model results show that being a female-headed household is positively associated with the effect of the COVID-19 pandemic on rural women's economic activities. As the household becomes female headed, the odds ratio in favor of being affected by the pandemic increases by a factor of 5.269. One possible explanation is that rural women lack resources and fail to recognize the power logic of men in their households with limited income activities. Respondents also stated that as a result of the pandemic, female-headed households lost support from neighboring farmers because labor sharing practices were disrupted. A study revealed that female workers have rapidly lost their means to earn income and are confined to their homes due to the pandemic (Sarker 2021).

#### **Use of irrigation**

Irrigation use has a negative and significant relationship with the effect of COVID-19 on rural women's economic activities. When a rural woman uses an irrigation facility, the odds of being affected by the pandemic decrease by a factor of 0.148. This is explained by the fact that in moisture-stressed areas like the study area, getting moisture through irrigation facilities would improve agricultural and horticultural products, which is true for the majority of the surveyed women. This finding is in conformity with Abdullah et al. (2019), who found that the use of irrigation positively affects the welfare of smallholder farmers.

#### **Market distance in walking minute**

The model output revealed that the distance to the nearest market in walking minutes was negatively and significantly related to the effect of COVID-19 on rural women's economic activities. The odds ratio indicates that being affected by the pandemic increases by a factor of 0.988 as the market center gets closer to the woman's home. This is because rural women who live near a market center may be involved in nonfarm economic activities such as daily labor, small trade, and the sale of firewood, all of which are severely impacted by the

pandemic. The results of this study are consistent with the findings of Kumar et al. (2020).

#### **Access to remittance**

Relying on remittance income was found to exaggerate the effect of COVID-19 on rural women's income activities. As a rural woman relies on remittance income, the odds ratio in favor of economic activity being affected by the pandemic increases by a factor of 0.135. Most of the households in the study area sent their children (especially girls) to Arabian countries, and the households received gifts from abroad. Furthermore, as mentioned by respondents, sending family members to Arabian countries is a form of competition. Women who have access to this variable can use it to improve their income-generating activities, resulting in more income to improve their households, or they can spend it directly on the welfare of their households. Other studies shows that remittances have a positive influence on women's contributions to household welfare (Falola et al. 2020; Kumar 2019). However, the current finding reveals that the COVID-19 pandemic has harmed remittance income due to lockdown, and remittances create dependency syndrome. This finding is consistent with Chen et al. (2020), who reported that remittances are negatively impacted by the pandemic.

#### **Conclusion**

The study investigated the effect of COVID-19 on the economic activities of rural women in Ethiopia. Crop production, livestock rearing, small trade, daily labor wages, remittances, livestock and livestock product trading, productive safety net programs, labor migration, selling firewood, handcraft, and asset renting were all activities undertaken by rural women. The pandemic had a different impact on all dimensions of the majority of rural women's economic activities. As a result, significant numbers of rural women were forced to discontinue certain economic activities. The use of credit, inputs, and irrigation services significantly reduces the impact of the pandemic, whereas relying on remittances, being a female-headed household, and market distance exacerbate the impact of the pandemic on the economic activities of rural women. Therefore, the pandemic had a significant impact on rural women's on-farm, off-farm, and nonfarm economic activities. Thus, local and national governments and nongovernmental organizations must support rural women's income-generating activities. Revolving funds obtained from donor organizations and the national government could be used to provide assistance. Adequate training should be provided in addition to the funding. Furthermore,

using remittances for income-generating activities can help rural women improve their economic situation.

## Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s43170-023-00180-4>.

**Additional file 1.** Data set.

### Acknowledgements

We are thankful to data collectors participated during the survey. We also extend our sincere gratitude to respondents and local administrators for their consent and collaboration for providing the required information.

### Author contributions

STA and AMA conceived and designed the experiments; performed the experiments; analyzed and interpreted the data; wrote the paper.

### Funding

Wollo University funded financial support to data collection.

### Availability of data and materials

The data set used for this study is submitted as supplementary file in SPSS format.

### Declarations

#### Ethics approval and consent to participate

Ethical clearance letter was collected from Rural Development and agricultural Extension Department, College of agriculture, Wollo University, Ethiopia so as to safeguard both the study participants and the researchers. All participants of the research were fully informed about the objectives of the study. They all were approached friendly and in a fraternal way. Their informed consent was obtained before their involvement in the study.

#### Consent for publication

Not applicable.

#### Competing interests

The authors declare that they have no competing interests.

Received: 7 April 2023 Accepted: 20 September 2023

Published online: 02 October 2023

### References

- Abdullah Rabbi F, Ahamad R, Ali S, Ali A, Ahmad W, et al. Determinants of commercialization and its impact on the welfare of smallholder rice farmers by using Heckman's two-stage approach. *J Saudi Soc Agric Sci*. 2019;18(2):224–33. <https://doi.org/10.1016/j.jssas.2017.06.001>.
- Adhikari J, Timsina J, Khadka SR, Ghale Y, Ojha H. COVID-19 impacts on agriculture and food systems in Nepal: implications for SDGs. *Agric Syst*. 2021;186:102990. <https://doi.org/10.1016/j.agsy.2020.102990>.
- Agarwal B. Livelihoods in COVID times: gendered perils and new pathways in India. *World Dev*. 2021. <https://doi.org/10.1016/j.worlddev.2020.105312>.
- Alemu GT, Ayele ZB, Berhanu AA. Effects of land fragmentation on productivity in Northwestern Ethiopia. *Adv Agric*. 2017. <https://doi.org/10.1155/2017/4509605>.
- Alvi M, Barooah P, Gupta S, Saini S. Women's access to agriculture extension amidst COVID-19: insights from Gujarat, India and Dang, Nepal. *Agric Syst*. 2021. <https://doi.org/10.1016/j.agsy.2020.103035>.
- Anagah FI. Effect of Covid-19 lockdown on farmers in rivers State, Nigeria: positive effect of Covid-19 lockdown on farmers in rivers State, Nigeria: positive perspective. *Asian J Agric Extension Econ Sociol*. 2020;38(5):56–9.
- Aromolaran AB, Muyanga M. Impact of COVID-19 on agriculture, food systems and rural livelihoods in Eastern Africa. *Agric Policy Res Africa* Brighton; 2020. <https://doi.org/10.4060/cb0552en>.
- Béné C. Resilience of local food systems and links to food security—a review of some important concepts in the context of COVID-19 and other shocks. *Food Sec*. 2020;12(4):805–22.
- Bisong A, Ahairwe PE, Njoroge E. The impact of COVID-19 on remittances for development in Africa. 2020. The European Centre for Development Policy Management (ECDPM); Siege. Discussion Paper. [www.ecdpm.org/dp269](http://www.ecdpm.org/dp269)
- Casarico A, Lattanzio S. The heterogeneous effects of COVID-19 on labor market flows: evidence from administrative data. *J Econ Inequal*. 2022. <https://doi.org/10.1007/s10888-021-09522-6>.
- Chen H, Chand SS, Singh B. Impact of COVID-19 on remittance inflows to samoa. *Asian Econ Lett*. 2020. <https://doi.org/10.4655/001c.17894>.
- CSA. Population Size by Sex, Region, Zone and Wereda: Statistical Agency of Ethiopia. Addis Ababa; 2020a. <https://www.statsethiopia.gov.et/about-us/>
- CSA. Agricultural Sample Survey: Crop and Livestock Production and Utilization (Private Peasant Holdings, Meher Season). Statistical Agency of Ethiopia; Addis Ababa, Ethiopia; 2020b.
- Doss C, Njuki J, Mika H. The potential intersections of Covid-19, gender and food security in Africa. *AgriGender J Gender Agric Food Secur*. 2020;05(01):41–8.
- ECA. COVID-19 in Africa: Protecting Lives and Economies. Economic Commission of Africa; Addis Ababa, Ethiopia; 2020. [www.uneca.org](http://www.uneca.org)
- Fairlie R. The impact of COVID-19 on small business owners evidence from the first three months after widespread social-distancing restrictions. *Journal of Economics and Management Strategy*. 2020;29:724–40. <https://doi.org/10.1111/jems.12400>.
- Fairlie RW, Fossen FM, Johnsen RL, Droboniku G. Were small businesses more likely to permanently closed in the pandemic? Working Paper; Cambridge: Springer; 2022. Available at: <http://www.nber.org/papers/w30285>
- Falola A, Fakayode SB, Kayode AO, Amusa MA. Rural women in Kwara State (Nigeria) and their contributions to the welfare of their households. *J Int Womens Stud*. 2020;21(6):167–80.
- Goswami R, Roy K, Dutta S, Ray K, Sarkar S, Brahmachari K, et al. Multi-faceted impact and outcome of COVID-19 on smallholder agricultural systems: integrating qualitative research and fuzzy cognitive mapping to explore resilient strategies. *Agric Syst*. 2021;189:103051. <https://doi.org/10.1016/j.agsy.2021.103051>.
- Gujarati D. Basic econometrics. 4th ed. New York: The McGraw-Hill Companies; 2004.
- Haqiqi I, Bahalou MH. Assessment of COVID-19 impacts on U.S. counties using the immediate impact model of local agricultural production (IMLAP). *Agric Syst*. 2021. <https://doi.org/10.1016/j.agsy.2021.103132>.
- Harris J, Depenbusch L, Pal AA, Nair RM, Ramasamy S. Food system disruption: initial livelihood and dietary effects of COVID-19 on vegetable producers in India. *Food Secur*. 2020;12(4):841–51.
- Hashem NM, González-bulnes A, Rodríguez-Morales AJ. Animal welfare and livestock supply chain sustainability under the COVID-19 outbreak: an overview. *Front Veterinary Sci*. 2020;7:582528.
- Hirvonen K, De BA, Abate GT. Food consumption and food security during the COVID-19 pandemic in Addis Ababa. *Am J Agric Econ*. 2021;103(3):772–89.
- Janssens W, Pradhan M, de Groot R, Sidze E, Donfouet HPP, Abajobir A. The short-term economic effects of COVID-19 on low-income households in rural Kenya: an analysis using weekly financial household data. *World Dev*. 2021. <https://doi.org/10.1016/j.worlddev.2020.105280>.
- Kansiime MK, Tambo JA, Mugambi I, Bundi M, Kara A, Owuor C. COVID-19 implications on household income and food security in Kenya and Uganda: findings from a rapid assessment. *World Dev*. 2021. <https://doi.org/10.1016/j.worlddev.2020.105199>.
- Kassegn A, Endris E. Review on socio-economic impacts of 'Triple Threats' of COVID-19, desert locusts, and floods in East Africa: evidence from Ethiopia. *Cogent Soc Sci*. 2021;7(1):1–28.
- Kumar B. Remittances, poverty and welfare: evidence from Cumilla, Bangladesh remittances, poverty and welfare: evidence from Cumilla, Bangladesh. *Am J Data Min Knowl Discov*. 2019;4(1):46–52.
- Kumar A, Padhee AK, Kumar S. How Indian agriculture should change after COVID-19. *Food Sec*. 2020;12:837–40.

- Mahato P, Tamang P, Shahi P, Aryal N, Regmi P, Teijlingen VE, et al. Effects of COVID-19 during lockdown in Nepal. *Eur J Med Sci*. 2020;2(2):105–10. <https://doi.org/10.4640/ejms.v2i2.91>.
- Mahmud M, Riley E. Household response to an extreme shock: evidence on the immediate impact of the Covid-19 lockdown on economic outcomes and well-being in rural Uganda. *World Dev*. 2021. <https://doi.org/10.1016/j.worlddev.2020.105318>.
- Maina KW, Ritho CN, Lukuyu BA, Rao EJO. Socio-economic determinants and impact of adopting climate-smart *Brachiaria* grass among dairy farmers in Eastern and Western regions of Kenya. *Heliyon*. 2020;6:e04335. <https://doi.org/10.1016/j.heliyon.2020.e04335>.
- Mandal SC, Boidya P, Haque MIM, Hossain A, Shams Z, Mamun AAI. The impact of the COVID-19 pandemic on fish consumption and household food security in Dhaka city Bangladesh. *Glob Food Sec*. 2021. <https://doi.org/10.1016/j.gfs.2021.100526>.
- Mohammed AA. Preparedness and response to covid-19 in Woreta Town, North West Ethiopia. *Sci Afr*. 2021;14:e01037. <https://doi.org/10.1016/j.sciaf.2021.e01037>.
- Mottaleb AK, Mainuddin M, Sonobe T. COVID-19 induced economic loss and ensuring food security for vulnerable groups: policy implications from Bangladesh. *PLoS ONE*. 2020;15(10):e0240709. <https://doi.org/10.1371/journal.pone.0240709>.
- Nchanji EB, Lutomia CK, Chirwa R, Templer N, Rubyogo JC, Onyango P. Immediate impacts of COVID-19 pandemic on bean value chain in selected countries in sub-Saharan Africa. *Agric Syst*. 2021;188:103034. <https://doi.org/10.1016/j.agry.2020.103034>.
- Nechifor V, Ramos MP, Ferrari E, Laichena J, Kihiu E, Omany D, et al. Food security and welfare changes under COVID-19 in Sub-Saharan Africa: impacts and responses in Kenya. *Glob Food Sec*. 2021. <https://doi.org/10.1016/j.gfs.2021.100514>.
- Pan D, Yang J, Zhou G, Kong F. The influence of COVID-19 on agricultural economy and emergency mitigation measures in China: a text mining analysis. *PLoS ONE*. 2020;15(10):e0241167. <https://doi.org/10.1371/journal.pone.0241167>.
- Parry BR, Gordon E. The shadow pandemic inequitable gendered impacts of COVID-19 in South Africa. *Gend Work Organ*. 2021;28:795–806.
- Pu M, Zhong Y. Rising concerns over agricultural production as COVID-19 spreads: lessons from China. *Glob Food Sec*. 2020. <https://doi.org/10.1016/j.gfs.2020.100409>.
- Ragasa C, Lambrecht I. COVID-19 and the food system: setback or opportunity for gender equality? *Food Sec*. 2020;12:877–80. <https://doi.org/10.1007/s12571-020-01089-w>.
- Ragasa C, Lambrecht I, Mahrt K, Aung Z, Wang M. Immediate impacts of COVID-19 on female and male farmers in central Myanmar. *pdf. Agric Econ*. 2021;52:505–23.
- Rasul G. Twin challenges of COVID-19 pandemic and climate change for agriculture and food security in South Asia. *Environ Chall*. 2021. <https://doi.org/10.1016/j.envc.2021.100027>.
- Rasul G, Nepal AK, Hussain A, Maharjan A, Joshi S, Lama A, et al. Socio-economic implications of COVID-19 pandemic in South Asia: emerging risks and growing challenges. *Front Sociol*. 2021;6:629693.
- Sarker MR. Labor market and unpaid works implications of COVID-19 for Bangladeshi women. *Gend Work Organ*. 2021;28(5):597–604.
- Sharma M. Conceptualizing the nexus of migration and food security during COVID-19. *J Agric Food Syst Community Dev*. 2020;9(4):181–5.
- Tamru S, Harvone K, Minten B. Impact of the COVID-19 crisis on vegetable value chain in Ethiopia. *International Food Policy Research (IFPRI)*; Addis Ababa. 2020.
- United Nations (UN). Socio-economic impact of COVID-19 in Ethiopia. United Nations- Ethiopia, Addis Ababa. 2020
- Yalew AW, Hirte G, Lotze-campen H, et al. Agricultural transformation in Africa? Assessing the evidence in Ethiopia. *World Dev*. 2020;105(8):286–98. <https://doi.org/10.1080/23311932.2020.1722353>.
- Yazdanpanah M, Moghadam MT, Savari M, Zobeidi T, Sieber S, Lohr K. The impact of livelihood assets on the food security of farmers in Southern Iran during the COVID-19 Pandemic. *Int J Environ Res Public Health*. 2021;18:5310. <https://doi.org/10.3390/ijerph18105310>.
- Yehuala K, Almaz G, Dereje A. Determinants of adoption and intensity of improved faba bean cultivars in the central highlands of Ethiopia: a double-hurdle approach. *CABI Agric Biosci*. 2021;2(24):1–12. <https://doi.org/10.1186/s43170-021-00045-8>.

- Yonnas A, Dubale A. Social work responses and household-level determinants of coronavirus preparedness in Rural Ethiopia. *Soc Work Public Health*. 2021;36(2):1–19. <https://doi.org/10.1080/19371918.2021.1881014>.

## Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Ready to submit your research? Choose BMC and benefit from:

- fast, convenient online submission
- thorough peer review by experienced researchers in your field
- rapid publication on acceptance
- support for research data, including large and complex data types
- gold Open Access which fosters wider collaboration and increased citations
- maximum visibility for your research: over 100M website views per year

At BMC, research is always in progress.

Learn more [biomedcentral.com/submissions](https://biomedcentral.com/submissions)

