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Research Article

Effects of Covid-19 on Major Crops Production; The Case of Ethiopia

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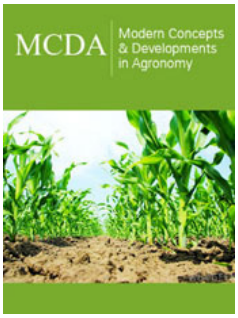

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Abstract

This research was conducted to study the impacts of covid-19 on major crops production to achieve the objectives; determining impacts of covid-19 on crops yield, evaluating its impacts on Agricultural inputs access, determining its impacts on labor and crop product transport costs and assessing covid-19 impacts on expert advice, training and demonstration. Community-based cross-sectional study design was implemented. Four districts were purposively selected in consultation with Awi zone department of Agriculture based on Covid-19 prevalence and crop production potentials. Similarly, four peasant associations from each of the four districts were selected purposively. Then interviewee household selection was carried out randomly in each peasant association. A structured questionnaire was developed and used to collect primary data from sample respondents. The generated data entered into database and analyzed using SPSS (Version 26) and interpreted by descriptive statistics. The result showed that 63.87% of the respondents had a clear understanding about the pandemic and believed farming is open for covid-19 impacts. Similarly, 77.23% of the respondents had knowledge about the impacts of covid-19 pandemic. The majority (80.1%) of the respondents verified there was a 26-50% reduction in access to improved seeds and fertilizer. Consequently, there was 26-50% annual crops yield reduction as confirmed by 76.44% of the respondents. In addition, 52.09% of the participants validated 51-75% increment on labor cost for agronomic activities. Similarly, all of the respondents confirmed that there was a 26-50% crops product transport cost increment and there was no access to expert advice, training and demonstration in 2020 cropping season fearing the pandemic

Keywords: Pandemic; Crop production; Effects of covid-19; Awi zone

Introduction

Background and justification

COVID-19 is an infectious disease caused by the novel corona virus that is now renamed as severe acute respiratory syndrome corona virus 2 (SASR-COV-2). The virus was known as the novel corona virus as it was an incomplete match between the genomes of previously known corona virus. This outbreak was first reported on December 2019 in Wuhan city in Hubei province of China. The disease was declared as a global health emergency on January 30, 2020, and a global pandemic on March 11, 2020. It is believed to be transmitted by droplets that are produced when an infected person coughs, sneezes or talks. These droplets because of their size do not stay suspended in the air beyond 2-meter distance. COVID-19 continues to spread across the world. Meanwhile, daily COVID-19 admissions increased at an alarming rate more than expected. The numbers of patients admitted to intensive care units with COVID-19 are also very high. Correspondingly, the costs in terms of loss of life in such a scenario are considered intolerable for society [1].

In a strongly connected and integrated world, the impacts of the disease beyond mortality (those who die) and morbidity (those who are incapacitated or caring for the incapacitated and unable to work for a period) have become apparent since the outbreak. Transport, being limited and even restricted among countries, has further slowed down global economic activities. Most importantly, some panic among consumers and firms has distorted usual

consumption patterns and created market anomalies. Global financial markets have also been responsive to the changes and global stock indices have plunged [2].

There are many channels through which an infectious disease outbreak influences the economy. Direct and indirect economic costs of illness are often the subject of the health economics studies on the burden of disease. The conventional approach uses information on deaths (mortality) and illness that prevents work (morbidity) to estimate the loss of future income due to death and disability. Losses of time and income by careers and direct expenditure on medical care and supporting services are added to obtain the estimate of the economic costs associated with the disease [1].

In East Africa, including Ethiopia, transports along commodity routes have been disrupted by restrictions. These countries also reported COVID-19-related disruptions to access to agricultural inputs (seed, fertilizer, veterinary inputs, pesticides and feed), which will likely drive a reduction in crop yields. Labor shortages, due to the stay-at-home policies, are expected to impact Agricultural production and processing plants. Agricultural extension and advisory services have also faced severe disruptions since lockdown measures have been imposed, reducing farmers' access during this critical growing period. While all governments of East Africa have declared agricultural products as essential to ensure movements in view of the COVID-19 containment measures, the stay-at-home advice and travel restrictions mean that traders have logistic difficulties, leading to supply delays and post-harvest losses due to lack of access to formal markets. The closure of many informal markets in the urban and peri-urban areas to avoid crowding has disrupted food supply systems, especially for fresh produce. In view of this, shifts in consumer demand have been reported. The impact is felt mostly in low-income urban households who rely on these informal food markets. Middle- and higher-income families can buy fresh produce from supermarkets and grocery shops [3].

Statement of the problem

The World Health Organization (WHO), On 12 January 2020, confirmed that a novel corona virus was the cause of a respiratory illness in a cluster of people in Wuhan City, Hubei Province, China, which was reported to the organization on 31 December 2019. The COVID-19 pandemic in Ethiopia is part of the ongoing worldwide pandemic of corona virus disease (COVID-19) caused by severe acute respiratory syndrome corona virus 2 (SARS-CoV-2). The virus was confirmed to have reached Ethiopia on 13 March 2020 [1]. The national government, led by Prime Minister Abiy Ahmed, declared a five-month state of emergency in April 2020 but has allowed economic activities to continue during the public health crisis [4].

In addition to its impact on public health, COVID-19 has caused a major economic shock in Ethiopia. Even with the implementation of preventive measures such as testing, mask wearing, hand washing, social distancing and others the pandemic on all economic sectors of the country. The agriculture sector is also vulnerable to this impact due to the pandemic. COVID-19 and the restrictions needed to contain it have had a significant impact on the country's economy. Even as restrictions were lifted, there was not a full recovery in the economy as a whole or in the Agricultural sector. There have also been significant impacts on the labor market in all crop production activities. The economic impact of the pandemic on the poor and most vulnerable is devastating during the lockdown period.

Significance of the study

The research will provide insights about the potential impacts of Covid-19 for the development of mitigation measures in Awi zone. Also, the study will provide scientific information for farmers, experts and other concerned stakeholders working in the area and agricultural offices.

Research questions

i. Are you informed about the Covid-19 pandemic?

ii. What general problems have you faced due to Covid19?

iii. Does Covid-19 have impact on your crop production and its market?

Objectives of the study

General Objective

i. To examine the possible effects of Covid-19 on major crops productivity.

Specific Objectives

i. To determine the impact of Covid-19 on major crops yield.

ii. To evaluate impacts of Covid-19 pandemic on Agricultural inputs access and their cost.

iii. To evaluate the impacts of Covid-19 on Vegetable crops production and utilization.

iv. To evaluate the impact of Covid-19 on labor cost for farm activities.

v. To evaluate the impact of Covid-19 on crop product transport.

vi. To assess the impacts of Covid-19 on access of expert advice, training and demonstration.

Materials and Methods

Description of the study area

The research was conducted in four purposively selected districts (Ayehu Guagusa, Jawi, Dangla and Guagusa Shikudad) of the Awi zone. Awi Zone is situated between 11° 00' 0.00" N and 36° 39' 59.99" E and found in Amhara National regional state of Ethiopia. Topographically Awi zone has 9,148.43 km^2 total areas with relatively flat land and fertile soil, whose elevations vary from 1,800 to 3,100m, with an average altitude of about 2,300 meters above sea level [5].

Research design

A community-based cross-sectional study design was implemented to study the effects of Covid-19 pandemic on major crop production in Awi zone from June to December 2020.

Population and Sample size determination

All residents in the Awi administrative zone were the source population of this research while all selected participants during the study period were considered as the study population. Four districts were selected in consultation with Awi zone department of Agriculture based on the potential prevalence of Covid-19 and crop production potential to study the impact of Covid-19 on crop production. Then due to their production potential of field crops, four Peasant associations (kebelies) from each of the four districts were selected. The interviewee household selection was carried out randomly in each PAs or kebelies. To determine the required sample size from households Yamane formula (n=N/ (1+Ne 2)) was applied and 399 respondents were identified. Where n = the sample size, N = the size of population and e = the error of 5 percentage point [6].

Data collection tools and techniques

A structured interviewer-administered questionnaire, that is first developed in English and then translated into local language, was used to collect primary data. The survey tool and interview guides were developed by reviewing different literatures, current national and international guidelines on COVID-19 prevention. The tool contains socio-demographic characteristics, knowledge of respondents, the community perception, attitude of the individuals, and impacts of COVID-19 on crop production related questions. Twenty-four data collectors and four supervisors were involved in the data collection process through house-to-house interviews and visual observations of the crop production.

Prior to data collection data collectors were trained about Covid-19 and how to collect data by considering the pandemic. Sanitizers and other materials were given to data collectors to create awareness for farmers, related personnel and themselves about the pandemic. Then a pre-test and recognizance survey were also conducted among 5% of the study sample to see the effectiveness of the questionnaire for the study. Meanwhile, both primary and secondary data were collected from respected sources. The qualitative information collected in key informant interviews was used to supplement and crosscheck the data obtained through the household survey [7].

Data collected

The following primary data related to crop production were collected: -

i. Covid-19 impacts on access and cost of fertilizer, seeds and pesticides.

ii. Covid-19 impact on vegetables production and utilization.

iii. Covid-19 impact on personal cost of agronomic activities.

iv. Impact of Covid-19 on Crops yield.

v. Impact of Covid-19 on crop products transport.

vi. Impact of Covid-19 on farmer's expert advice, training and demonstration.

Data analysis

The generated information entered into the database and analyzed using SPSS (Version 26) and interpreted by descriptive statistics [8].

Result and Discussion

A total of 399 questionnaires were distributed to sample respondents and 382 (95.7%) questionnaire was obtained valid and used for analysis. First the socio-demographic characteristics of respondents and the prevalence of job stress in the institution were tested using descriptive statistics. The results of the findings have been explained and discussed based on the analysis done on the data collected. The results of the study are discussed by triangulating the different sources: questionnaire results and interview results. The data collected using questionnaires were analyzed through descriptive statistics, while the data collected through key informant interviews analyzed qualitatively. The discussion attempted to accomplish the objectives of the study and answer the research questions.

Socio-demographic Characteristics

Sex and age of the respondents

The results indicated that almost 94.5% (361) of the study participants were rural area farmers and the rest 5.5% (21) were individuals engaged in urban agriculture. The distributions of sample household heads by sex constitute 52.1% and 47.9% for male and female, respectively from a total of 382 respondents (Table 1). The age categories of interviewed participants in this study were different age ranges comprising 0-20 years (0.26%), followed by 21 - 40 years (51.3%), 41- 60 years (44.24%) and ≥61 years (4.2%) of age (Table 1). In general, 51.56% of the population involved in this study was the age in between 0-40years old, while the rest of 48.44% were the ages greater than 40 years old. In addition, the maximum age observed was 68 and the minimum age was 20 years.

Table 1: Socio-demographic Characteristics of Participants on impacts of Covid-19 Pandemic in Awi Zone, Ethiopia, 2020 (n=382).

Variables	Category	Frequency	Percent
Sex	Male	199	52.1
	Female	183	47.9
Age	0 – 20 years	1	0.26
	21 – 40 years	196	51.3
	41 – 60 years	169	44.24
	≥61 years	16	4.2

Marital Status	Single	50	13.09
	Married	307	80.37
	Divorced	19	4.97
	Widow	6	1.57
Position in household	Husband	181	47.38
	Wife	131	34.29
	Single	51	13.35
	Other	19	4.98
Educational level	Illiterate	26	6.81
	Reading & writing	216	56.54
	Elementary school	62	16.23
	Secondary school	67	17.54
	Diploma holder	11	2.88
Family Size	0 - 3	162	42.41
	4-6	220	57.59

Marital status and household position of respondents

Out of the total farmers interviewed, 307 household heads were married, 50 of them were single, while 19 household heads and 6 of the respondents were found to be divorced and widow respectively. From all study participants' majority of the interviewed were married (80.37%), compared to the single (13.09%), divorced (4.97%) and widow (1.57%) categories. Of those surveyed respondents, 181 (47.38%) were acting as husband, 131 (34.29%) as wife, 51 (13.35%) single and 19 (4.98%) divorced and widow were acting as household owner in family position.

Educational level and family size of respondents

As educational status of a household head increases, it is assumed to increase the transfer of relevant information and as a result increase farmers' knowledge about the transmission and impacts of Covid-19 pandemic as well. So with regards to educational backgrounds majority of the respondents have a status of reading and writing, where as 17.54% of the respondents were completed secondary school, 16.23% of the respondents were completed elementary/primary school and 6.81% of the respondents were illiterate. In relation to family size 42.41% of the respondents have 0-3 family numbers, 57.59% of the respondents have 4 to 6 family numbers.

Perception and attitudes towards Covid-19

The respondents' perception and attitude about COVID-19 was assessed by 5 points Likert scale, and the highest score above the mean was indicated as increased and low as poor perception and attitude towards COVID-19 pandemic. As shown on table 2 below, the majority (63.87%) of the respondents had a clear understanding about covid-19 and 33 (8.87%) have only little information while 4 (1.05%) of them have no any pre hand information about COVID-19 pandemic but the rest 101 (26.44%) respond as neutral. Similarly, 295 (77.23%) of the respondents had knowledge about the impacts of covid-19 and about 34 (8.9%) of them never knew the impacts of the pandemic, while 53 (13.87%) responded as neutral. In addition, the majority (59.17%) of the respondents believed that farming is open for covid-19 impacts and 4 (1.05%) of them disagree with this observation while 49 (39.79%) respond as neutral. These results imply that most of the farmers had enough understanding about the impacts of Covid-19 pandemic.

Table 2: Frequency and percentage distribution of personal perception on Covid-19 in Awi zone, Northwest Ethiopia, 2020 (n=382).

S. No.	Personal Perception on Covid-19	Response									
		SD		D		N		A		SA	
		F	%	F	%	F	%	F	%	F	%
1	clear understanding about covid-19	34	8.9	3	0.79	101	26.44	163	42.67	81	21.2
2	Knowing the impacts of covid-19	33	8.64	1	0.26	53	13.87	213	55.76	82	21.47
3	Believing that farming is open for covid-19 impacts	4	1.05	-	-	49	39.79	177	46.34	152	12.83
4	Experiencing a fear about covid-19	4	1.05	-	-	203	53.14	98	25.65	77	20.16
5	Having relations with other groups at work which may exposed to covid-19	317	82.99	7	1.83	58	15.18	-	-	-	-
6	Knowing symptoms of covid-19	34	8.9	3	0.79	101	26.44	163	42.67	81	21.2
7	Observing symptoms of covid-19 on other individuals	382	100	-	-	-	-	-	-	-	-
8	Never heard before about covid-19	378	98.95	-	-	-	-	-	-	4	1.05

Note: SD= Strongly Disagree, D= Disagree, N= Neutral, A= Agree and SA= Strongly Agree.

From the entire population 98 (25.65%) agreed and 77 (20.16%) strongly agreed about experiencing a fear about covid-19 and reported that they were exposed to repetitive stressful situations, whereas half of them (53.14%) remains neutral and only 4 (18.18%) disagrees on the issue and considered as if they did not experience a fear about covid-19 in their day-to-day working activity. Almost all of the participants (84.82%) have no relations with other groups at work or other places which may exposed to covid-19 pandemic while the rest 15.18% respond as neutral. In addition, 163 respondents or 42.67% agreed and 81 respondents or 21.20% strongly agreed that they had an understanding about symptoms of Covid-19, while 101 (17.05%) of the respondents were neutral but the remaining 37 (12.5%) of the sample respondents did not agree and reported that they had no understanding about symptoms of Covid-19 (Table 2).

The collected data revealed that all of the participants didn't observe symptoms of covid-19 on other individuals or colleagues in their day-to-day activity. Accordingly, except 4 respondents almost all (378) of the respondents confirmed that they were well informed about the pandemic through different communication ways. Generally, the information about the introduction of covid-19 pandemic into Ethiopia including the survey area was disseminated through Radio, Television and interpersonal communications.

Economic impacts of Covid-19 on crop production

The assessment result shows that farming sector is among the highly affected business sectors by Covid-19 impacts in Awi zone. Accordingly, all (100%) research participants reported a shortage of improved seed that has always been a challenge was worsened this season due to Covid-19 pandemic. Majority (80.1%) of the respondent's observation exhibits there was 26-50% reduction in access to improve seeds, the rest 72 (18.85%) and 4 (1.05%) assessed participants confirmed as there was 1-25 % and 51-75% reduction in access to improve seeds of major annual crops respectively. The research participants assure the same results of access to improved seeds regarding access to fertilizer for annual crops production. Only 172 (45.03%) of the respondents verify that there was an impact of Covid-19 pandemic on access to pesticides required for crop pest protection. According to research participants 114 (66.28%) of them validated there was 26-50% reduction in access to pesticides, whereas 58 (32.72%) of them approve there was 51-75% reduction on access to this agricultural input. Consequently, all of the respondents confirmed that their annual crops production was impacted by the Covid-19 pandemic in 2020 cropping season. Meanwhile, 292 (76.44%) of the respondents confirmed that there was up to 25-50% yield reduction on annual crops production, while 77 (%) and 13 (%) of the participants were revealed as there was 25% and 51-75% annual crops yield reduction respectively.

All of the research participants confirmed that there were no impacts of Covid-19 pandemic on irrigation systems and perennial crops management and yield. Similarly, according to the assessment results the pandemic have no any impacts on the production and utilization of major vegetable crops grown in the research areas. But the pandemic highly influenced the cost of production by affecting the labor cost and crops product transport. From total respondents 199 (52.09%) of them support that there was 51-75% increment and the rest 183 (47.91%) approve 26-50% increment on labor cost for agronomic activities. Therefore, as schools are closed and movement restrictions limit more adults, children were engaged in supporting their families in farm-related works to compensate for adult workforce shortage and labor cost on their family farm. Similarly, all of the respondents confirmed that there was 26-50% crops product transport cost increment from threshing area to storage and from storage to marketplace. Finally, all the research participants confirmed that there was no access to expert advice, training and demonstration in 2020 cropping season both from kebelie and districts, because there was a fear of personal communication due to the pandemic. Generally, Covid-19 was impacting farming operations of Awi zone households in terms of access to inputs (fertilizer, improved seed and pesticides), access to alternative labor, getting timely extension service, access to transport and consequently annual crops yield reduction (Table 3).

Table 3: Frequency and percentage distribution of the impacts of Covid-19 on crop production in Awi zone, Northwest Ethiopia, 2020 (n=382).

S. No.	Variables	Response							
		Yes		No			Reduction or increment		
		Frequency	%	Frequency	%		Quantity in %		
						0–25 %	26–50%	51-75%	≥76%
1	Does covid-19 have impacts on major annual crops production and yield	382	100	-	-	77	292	13	-
2	Is there any impact of covid-19 on fertilizer access	382	100	-	-	72	306	4	-
3	Is there any impact of covid-19 on improved seed access	382	100	-	-	72	306	4	-
4	Is there any impact of covid-19 on pesticides access	172	45.03	210	54.97	58	114	-	-
5	Does covid-19 have impacts on perennial crops management and yield	-	-	382	100	-	-	-	-

6	Does covid-19 has an impact on major Vegetables production and utilization	-	-	382	100	-	-	-	-
7	Does covid-19 has an impact on agronomic activities labor cost	382	100	-	-	-	183	199	-
8	Does covid-19 has an impact on crop product transport	382	100	-	-	-	382	-	-
9	Does covid-19 has an impact on access of expert advice, training and demonstration	382	100	-	-	-	-	-	382

Note: SD= Strongly Disagree, D= Disagree, N= Neutral, A= Agree and SA= Strongly Agree.

Response of key informants to the impacts of the pandemic

The key informant interview results authenticated that there was a 40% average reduction in access to improve seeds, fertilizers and pesticides for annual crops production. Conversely there was a double increment on labor cost for agronomic activities. In addition, there was no access to expert advice, training and demonstration in 2020 cropping season both from kebelie and districts, because of the fear of personal communication due to the pandemic. Hence there was 38% average yield reduction on annual crops production which is verified by the respondents. Likewise, there was a 26-50% crops product transport cost increment from threshing area to storage and from storage to marketplace due to the consequences of the pandemic. Similar to the sample respondent's key informants confirmed that there were no impacts of Covid-19 pandemic on perennial crops management and yield. The key informant interview results also validated the pandemic have no impact on the production and utilization of major vegetable crops grown in the research areas. But the pandemic highly influenced the cost of production by affecting the labor cost and crops product transport. Consequently, access to fertilizer, improved seeds, labor and transport were highly interrupted and the total production of major annual crops was reduced by 38% on average.

Generally, this work shows that the pandemic has made a challenging situation even in rural areas of the country where majority of the population is found. Labor shortages, due to the stay-at-home policies, are expected to impact on the annual crop production. The closure of many informal markets in the urban and peri-urban areas to avoid crowding has disrupted the rural community livelihood. The pandemic has resulted in job losses and has negatively affected the poor's income-earning opportunities, reduced their purchasing power and widened the poverty gap. Therefore, further arrangements should be designed to make agricultural inputs accessible to farmers and get agricultural extension services to keep the farming sector productivity.

Summary and Conclusion

The outbreak of corona virus named Covid-19 has disrupting Ethiopia's economy. This study also highlights the negative impacts of the Covid-19 pandemic on household heads of the randomly selected samples. The results of the study are discussed by triangulating the different sources: questionnaire results and interview results. The unanticipated shock of Covid-19 underscores the need for a shift from "farming as usual" and there are no specific new arrangements designed to make agricultural inputs accessible to farmers during the pandemic. In addition, the agricultural experts depart from their workplace fearing interpersonal communication with farmers and other individuals based on the lockdown. This is assumed to decrease the transfer of relevant information among farmers about new crop productivity improvement technologies.

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