

Research Application Summary

Preliminary assessment of the impact of COVID-19 on crop production in the Central District of Botswana

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Abstract

The COVID-19 pandemic has had an impact on crop production in Africa. However, literature reports mainly the adverse effects brought about by the pandemic. Little is known about the positive impact that the pandemic may have had on the arable crop subsistence farmers in Botswana. In this study, we conducted a scheduled interview survey to assess the impact of the COVID-19 mitigation strategies on arable crop production in the Central District of Botswana. Twenty-nine per cent of those interviewed reported that the COVID-19 pandemic did not affect their arable production. Of the majority reported to have been affected, 21% said they benefited from the COVID-19 lockdown. The results confirm that the pandemic may have not only brought adverse impacts but a benefit to some farming households. The preliminary findings show that the lockdown due to COVID-19 was a barrier and a facilitator to crop management activities in Central District in Botswana. It facilitated increasing the availability of household labour and time for farmers to allocate to crop production, but it was a barrier in reducing the market's access for farmers to sell their produce. It contributed positively towards the availability of household labour resulting in improved management of farm activities such as weeding, scaring away the birds and harvesting.

Keywords: Arable crop production, Botswana, COVID-19 pandemic, household labour, subsistence farmers

Résumé

La pandémie de COVID-19 a eu un impact sur la production agricole en Afrique. Cependant, la littérature rapporte principalement les effets néfastes induits par la pandémie. On sait peu de choses sur l'impact positif que la pandémie a pu avoir sur les agriculteurs de subsistance des cultures arables au Botswana. Dans cette étude, nous avons mené une enquête par entretiens programmés pour évaluer l'impact des stratégies d'atténuation de COVID-19 sur la production de cultures arables dans le district central du Botswana. 29% des personnes interrogées ont déclaré que la pandémie de COVID-19 n'avait pas affecté leur production arable. Parmi la majorité des personnes signalées comme ayant été touchées, 21 % ont déclaré avoir bénéficié du confinement lié au COVID-19. Les résultats confirment que la pandémie a peut-être non seulement eu des effets négatifs, mais aussi un avantage pour certains ménages agricoles. Les résultats préliminaires montrent que le confinement dû au COVID-19 a été un obstacle et un facilitateur pour les activités de gestion des cultures dans le district central du Botswana. Cela a facilité l'augmentation de la disponibilité de la main-d'œuvre domestique et du temps que les agriculteurs pouvaient allouer

à la production agricole, mais c'était un obstacle à la réduction de l'accès au marché pour les agriculteurs pour vendre leurs produits. Il a contribué positivement à la disponibilité de la main-d'œuvre domestique, ce qui a permis d'améliorer la gestion des activités agricoles telles que le désherbage, l'effarouchement des oiseaux et la récolte.

Mots-clés : Production de cultures arables, Botswana, pandémie de COVID-19, travail domestique, agriculteurs de subsistance

Introduction

The world activities came to a halt in the year 2020 following the outbreak of the novel Corona Virus Disease (COVID-19). On 11th March 2020, the World Health Organization (WHO) declared the COVID-19 a pandemic (Cevher *et al.*, 2021). Countries adopted mitigation strategies to minimise the spread of the disease. The most common was the declaration of national lockdowns which resulted in movement restrictions. As in several other countries, Botswana imposed a nationwide lockdown on 2nd April 2020. Like most African countries, Botswana has over 70 per cent of its population living in rural areas and depend on agriculture for their livelihoods (Statistics Botswana, 2019). Agriculture is the primary source of food security and livelihoods through household farming carried out mainly by subsistence farmers. In Botswana, subsistence arable crop farmers are traditional farmers who produce in individually owned holding of less than 16 hectares and typically use small equipment suitable for their production area (MoA, 2013). These farmers produce primarily for family consumption and sell the surpluses to the market (Mothlalamme, 2019), which collectively contribute most of the aggregate food produced in the country (Statistics Botswana, 2019).

When Botswana imposed the COVID-19 lockdown, the only season for arable crop production in Botswana was just halfway through. Most farmers were either weeding their fields, guarding the crops that were just about to mature to scare away the birds and animals and subsequently preparing for harvesting. Before the lockdown, most farmers, especially the women, stayed in the homesteads in the villages away from the ploughed fields. The distance between the crop fields and the homestead ranges between 10 to 35 kilometres. Therefore, the COVID-19 mitigation strategies was expected to affect the agricultural production and food supply.

The International Food Policy and Research Institute reported disruption of the food supply chain in Ethiopia, Rwanda, Burkina Faso and Nigeria (IFPRI, 2020). The IFPRI report noted that the COVID-19 control measures hindered the informal agricultural sector workers from going to work, creating a strain in the food supply chains process. Workie *et al.* (2020) also added that many developing countries have labour-intensive farming systems, and a global outbreak such as COVID-19 exposed farming to shortage in labourers thus disrupting the food supply. This was the case in almost all countries. The lockdown led to the closure of businesses and schools, forcing people to stay in one place. In Botswana, during the lockdown, people were required to produce essential movement travel permits to move from their homesteads. During this time, due to the lockdown, some farmers temporarily relocated to the ploughed fields taking along school-going children and the other household members who were now not going to their workplaces, while others moved to the villages in fear of the unknown.

Although studies on the impacts of COVID-19 continue, little is known about how the pandemic affected the crop production of the subsistence farmers. This paper assesses the effects of COVID-19 on crop production in the Central District of Botswana. The critical question is, how did COVID-19 affect arable crop production of the subsistence farmers in Botswana? The study thus contributes to the literature on the effects of COVID-19 on crop production in Africa.

Methodology

To understand the impact of COVID-19 on crop production, we conducted a scheduled interview survey with the arable crop farmers in the Central District of Botswana. The Central District comprises nine sub-districts. We randomly selected four subdistricts for the study. The number of subsistence arable farmers in the district was approximately 30, 000 (Statistics Botswana, 2019). The study used the Raosoft (2004) sample size calculator to determine the statistically acceptable sample size for the population using a 95 per cent confidence level and a margin of error of 5 per cent. The determined sample size was 380 subsistence farmers. However, data were collected from 470 randomly selected farmers in the Central District of Botswana.

The survey instrument was used to gather information about the farmers' demographics and how the COVID-19 impacted their crop management and production activities. Production activities included selling produce, transporting the harvest from the farm to a household storage facility, harvesting and collecting produce in the fields, scaring away birds and animals, and weeding.

Data were processed and analysed using SPSS, where crosstabs and frequencies were used, and comparative statistics were used for some comparative analysis. Comparative statistics refer to a conventional statistical method that preliminarily critic differences between samples during the study period (Gu and Wang, 2020). Given that demographic data indicate that a single-gender dominates arable crop production in Botswana, the impact of the COVID-19 pandemic on arable crop production can be further investigated by comparing how COVID-19 affected female and male farmers' production. For the empirical results, the following hypothesis was tested;

H_0 : There is no significant difference between the impacts of COVID-19 on farmers' arable production based on gender.

H_a : There is a significant difference between the impacts of COVID-19 on farmers' arable production based on gender.

Therefore, based on the survey data, a chi-square test statistic was used to determine whether there was a significant difference between the impacts of Covid-19 on arable crop production based on gender. For this analysis, the decision criteria using the Pearson Chi-Square statistic was; if the test statistic was ($p < 0.05$), the null hypothesis was rejected in favour of the alternative hypothesis.

Results and discussions

A selection of socioeconomic characteristics of the arable crop farmers was examined and the results were as follows;

Sex of farmer: The majority of the subsistence arable crop farmers were women, as shown in Table 1. Clearly female farmers dominated the subsistence arable crop production in Botswana while their male counterparts concentrated more on livestock production. Over two-thirds of

the subsistence farmers practiced mixed farming, with crop production carried out individually managed smallholdings and livestock grazing carried out communally. This is consistent with the findings of Motsatsi, (2015).

Age (years), farming experience, and household size: The study results show that most farmers were above sixty-two years of age. From Table 2, the modal age from the study is sixty-five years. However, there were several modal age values, with sixty-five being the smallest. The results suggest that aged people do the arable crop production in Botswana. The average household size was five people. These are people who reside at the same place with the farmer.

Impacts of COVID-19 on the farmer's arable production: Farmers were asked whether COVID-19 affected their arable production. The study results indicate that not everyone was adversely affected by the COVID-19 pandemic (Table 3). Almost a third of the respondents (29%) reported that COVID-19 did not affect their arable crop production. Instead of commuting from their villages to the fields every day, they were ploughing; this group of farmers chose to live in the areas they were cultivating. Therefore there was no change realised from their farming livelihood due to COVID-19.

Table 1. Sex of farmers

	Frequency	Percent
Male	84	17.9
Female	386	82.1
Total	470	100.0

Source: computed from survey data (2021)

Table 2. Farmers' age, farming experience and household size

	Frequency	Farming experience	Household size
Mean	62.10	27.76	5.00
Mode	65 ^a	20	2

Source: survey data (2021)

^a Multiple modes exist. The smallest value is shown

Table 3. Did COVID-19 affect your arable production?

	Absolute Frequency	Percent
NO	137	29.1
YES	333	70.9
Total	470	100.0

Source: survey data (2021)

The researcher then asked farmers who answered yes to the above question to choose the applicable answer from the list of how the COVID-19 during to the lockdown affected farm management practices in the arable production in their farms. The frequencies of the responses were then computed and categorised into two groups, namely barriers and facilitators (as latent variables presented as percentages), depending on whether the effects were negative or positive, respectively. Table 4 below shows the results.

It is interesting to note that due to COVID-19, the lockdown facilitated harvesting (21.3%), scaring away the birds and animals (18.9%). During the lockdown, there was an increase in household labour and available time for crop management activities. Household labour increased, including school-going children, since some families relocated to the fields during the lockdown, allowing more family members to participate in farm activities.

The lockdown prompted farming households to relocate to the ploughing fields, increasing the amount of time they spent there. As a result, farmers completed several farm tasks that they had previously been unable to do due to inadequate labour resources. As shown in Table 2 above, the majority of the subsistence arable crop farmers were women aged above sixty. The women work in the fields alone or with limited hired labour to assist with some management practices in the ploughing fields such as weeding, scaring away the birds and harvesting their produce. In Botswana, crop fields are 10km or more from the homesteads. During the lockdown, farmers relocated to their crop fields, minimising the time it took to go to and from the farms. In Table 4, 3.3 per cent of farmers who reported that the lockdown facilitated harvesting eventually sold their surplus to others who were negatively affected. However, 35.9% of the farmers reported failure to sell their produce due to the lockdown despite excess. This failure to sell is attributable to the movement restriction as farmers harvested but had no way of getting their produce to the market, some highly perishable, such as watermelons.

Test of the hypotheses. Although the study investigated the impact of COVID-19 on subsistence arable crop farmers irrespective of gender, COVID-19 could have exacerbated the gender disparities. In this case, the failure to weed could have been caused by a lack of hired labour due to the lockdown, since most hired labour are young males. It was then imperative to investigate whether the impacts of the COVID-19 pandemic were consistent among the male and female farmers. The results show that failure to scare away birds and animals was attributed to the effect of the COVID-19 pandemic due to scarcity of hired labour, mainly males.

Table 4. Effect of COVID-19 on crop management activities

	Barrier %	Facilitator %
Selling produce	35.9	3.3
Transporting the harvest from the farm to the household storage facility	23.1	3.0
Harvest	44.7	21.3
Scare away the birds and animals	45.6	18.9
Weeding	39.6	15.6

Source: survey data (2021) (N=470)¹

From the comparative analysis, the results in Table 5 show that the p-value for the Chi-statistic test is 0.09 ($p < 0.05$) for failure to scare away the birds and animals and 0.051 for failure to weed. These test statistics fall within the alpha level of the $p < 0.05$ threshold. This shows that there was a significant difference in the impact of COVID-19 between female farmers and male farmers' arable production. Therefore, the null hypothesis is rejected in favour of the alternative hypothesis and concludes that female farmers were affected differently by the COVID-19 effects as opposed to their male counterparts in production when it comes to the two activities. It is worth noting that positive outcomes of COVID-19 included increased opportunities to harvest, weed (not statistically significant) due to increased access to household labour resulting from the lockdown, mainly the closure of schools. This allowed school-aged children and other household members who were not at work to participate in farm activities, which would not have been possible without the lockdown.

Table 5. Crosstabs and Chi-square tests results

Variables	Response Category	Sex of farmer		Chi-square	P-Value
		Male	Females		
Failure to sell the produce	No	44	170	1.123	0.289
	Yes	19	100		
Failure to transport the harvest from the farm to the household storage facility	No	44	150	2.164	0.141
	Yes	19	58		
Failure to harvest	No	34	150	0.052	0.82
	Yes	29	120		
Failure to scare away the birds and animals	No	25	156	6.741	0.09*
	Yes	38	114		
Failure to weed	No	31	169	3.816	0.051*
	Yes	32	101		
Increased opportunity to sell produce	No	62	260	0.716	0.397
	Yes	1	10		
Increased opportunity to transport the harvest from the farm to the household storage facility	No	60	263	0.825	0.364
	Yes	3	7		
Increased opportunity to harvest	No	53	209	1.375	0.241
	Yes	10	61		
Increased opportunity to scare away the birds and animals	No	53	217	0.47	0.493
	Yes	10	53		
Increased opportunity to weed	No	54	227	0.104	0.747
	Yes	9	43		

Source: Computed from survey data (2021)
N=333, *Significant. Significance level = 0.05

Conclusion

Preliminary findings show mixed results about the impact of COVID-19 on crop production of subsistence farmers. On the one hand, the study results show that not all farmers were adversely affected by the impacts of COVID-19. For some farmers, the COVID-19 mitigation strategies, particularly the lockdown, may have positive effects by availing the much-needed household labour and increasing more time for arable production. The results also showed that there was consistency in the impacts among farmers. When it came to weeding and scaring away birds and animals, however, the female farmers were affected slightly differently. This is because female farmers are more responsible for the crop management activities in the farms.

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