

# Socioeconomic impact of COVID19 in Burundi

**DRAFT 082222**

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## **Executive summary**

## **1. Introduction**

### **1.1. The country and the political context**

A landlocked country in East Africa, Burundi is a low-income economy where 80% of the population are employed in the agricultural sector. Surrounded by Rwanda to the North, Tanzania to the East, the Democratic Republic of the Congo to the West, it is bordered by Lake Tanganyika to the Southwest. With a population of 11.8 million, of which 50.4% (2019) are women, it is one of the most densely populated countries in the Great Lakes region. Since independence (1962), the socio-political instability of the country has had a lasting impact on macroeconomic performance and has led to a gradual dislocation of ties between communities and a significant deterioration of living conditions. In 2015, a socio-economic crisis resulted in donors suspending direct budget support, leading to a 50 percent decrease in the national budget. The peaceful general elections in May 2020 and the subsequent political developments fostered improved cooperation with the international community, recognizing Burundi as a country with a huge potential for development. Consequently, competition over scarce resources such as grazing land, water, agricultural farms and mining fields is further compounded by the return of Burundian refugees from neighboring countries following the 2020 elections. Adding to the pressure on Burundi's stretched resources, over 50,000 refugees, mainly from the Democratic Republic of the Congo, are hosted in already food-insecure areas and rely on assistance for basic food and nutrition.

### **1.2. Socio-economic context**

Burundi has experienced a difficult economic situation over the past seven years, which has led to fiscal and balance of payments difficulties. To compensate for the loss of external resources, the Government mobilized internal resources, but this has not been sufficient for an ever-increasing social demand, driven by sustained population growth. The COVID-19 pandemic interrupted a still fragile economic recovery and intensified macroeconomic imbalances. According to the African Development Bank Group<sup>1</sup>, Burundi fell into recession in 2020, largely due to the effects of the COVID-19 pandemic. Real GDP contracted by 3.3%, after growing by 4.1% in 2019. The

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<sup>1</sup> <https://www.afdb.org/fr/countries/east-africa/burundi/burundi-economic-outlook>

pandemic hit industry particularly hard, with output falling by 4.5% and services falling by 1.8%, compared to 2019. On the demand side, investment fell by around 3%.

The decline in agricultural production, combined with higher prices for imported products, led to a sharp increase in prices. Inflation rose by 8.5 percentage points in 2020 to 7.6 % compared to -0.7% in 2019. The fiscal deficit doubled to 8.7% of GDP in 2020, compared to 4.2% in 2019, as current expenditure increased by about 4%. As weak global demand led to a 4.4 % drop in export prices for coffee and 10.4% for tea, trade and current account deficits widened. The current account deficit stood at 19.1% of GDP, compared to a deficit of 17.8% in 2019. This led to a reduction in foreign exchange reserves, which could cover less than 30 days of imports by the end of 2020. The exchange rate between the Burundian franc and the US dollar fell by 3.8% between May 2019 and May 2020.

Economic growth is projected at 2.5% in 2022, supported by gains across all sectors. Inflation remained high at around 8.3% in 2021 against 7.5% in 2020, driven by rising food prices and monetization of the fiscal deficit. Inflation will remain high at around 9% in 2022, particularly following the impact of the Russia/Ukraine conflict on food and oil prices worldwide.

The Burundian economy is poorly diversified and is therefore particularly exposed to certain economic and environmental shocks, and highly prone to macroeconomic instability. It is heavily based on the primary sector, which has contributed an average of 33.7% of GDP in recent years. This situation is explained by the important weight of agriculture in the sector which accounts for almost 90% of export earnings and employs more than 90% of the working population. Agriculture is mainly rural, carried out on small family farms. Although women play a central role in agriculture, gender equality is among the lowest in the world. The majority of the country’s poor are in rural areas, where 90% of people rely heavily on subsistence agriculture and informal employment. A hilly landscape makes the country vulnerable to climate-related shocks such as flooding. Tables 1 & 2 present the country’s priority livelihood zones and climate and non-climate shocks, respectively.

**Table 1. Priority livelihood zones of Burundi, climate and non-climate related threats**

Zone	Zone 1	Zone 2	Zone 3	Zone 4
Region	Imbo Plain	Eastern Depression	Northern Depression	Eastern Dry Plateau
Altitude	<800 m	1200 m	1400 m	1500-2000 m

Temperature	21-25°C	21-23°C	18-20°C	18-20°C
Precipitation	<900 mm	1000 mm	1100 mm	1200 mm
Crops	Rice	Beans	Beans	Cassava
	Corn	Cassava	Sorghum	Beans
	Cassava	Corn	Cassava	Corn
Livestock	Cattle	Goat	Goat	Goat
	Goat	Small ruminant	Small ruminant	Small ruminant
	Small ruminants	Cattle	Cattle	Swine

Altitudes greatly influence temperatures and precipitation, with higher temperatures and less rainfall in lowland areas and an inverse in the higher mountain ranges<sup>2</sup>. Focus crops include cassava, beans, corn, rice and sorghum; priority livestock include small ruminants (sheep and goat), cattle and swine<sup>3</sup>.

**Table 2. Climate and non-climate related threats to the livelihood zones**

Threats	Affected livelihood zones	Impacts	Contributing factors
Climate-related threats			
Droughts	2,3	Reduced yields	Lack of irrigation infrastructure
Water deficits	1,4	Reduced yields	Water management, sediment management, overexploitation
Landslides	1,4	Road closures/transport impediment	Deforestation, land degradation, heavier rains
Flooding	1,2,4	Reduced yield; increased landslides	Poor infrastructure
Non-climate related threats			

<sup>2</sup>Response Analysis for Climate Adaptation: Burundi

Fall armyworm	1,2,3,4	Crop destruction (esp. corn and 4sorghum), loss of income	Warmer weather (advances pupal stage)
Stinking (or Harlequin) locusts	2,3	Crop destruction (esp. corn and sorghum), loss of income	Deforestation, heavier and more frequent rains (better condition for hatching and breeding)
Malaria	1,2,3,4		Water management; health care and access

Some of the drivers of food insecurity in Burundi include poverty, rapid population growth, vulnerability to climate-related shocks, poor access to clean water, and deteriorating access to basic services such as health and education. A high prevalence of infectious diseases, lack of diversity in diets and poor hygiene further aggravate the health and nutrition status of the population.

In terms of diet and nutrition, a WFP study (2020b)<sup>3</sup> had already shown that the situation was alarming:

- 45.5% of households are food insecure, of which 8.5% (982,414 people) are severely food insecure;
- 13.8% of households have poor food consumption, and are therefore unable to cover their daily energy needs;
- 46.2% of households have a poor food diversity score; which makes them rely on maize flour and cassava.
- 61.0% of households allocate more than 65% of their expenditure to food;
- 46.9% of households engage in severe (crisis and emergency) coping strategies;
- 66.7% of households depend on food crop farming as their main livelihood activity.

In the education sector, Burundi has made significant progress in terms of quality and access since the introduction of free primary education in 2005. The Gross Enrollment Rate (GER) in primary education reached 115% during the 2020/2021 school year without significant variation between

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<sup>3</sup> Impact of Covid-19 outbreak on livelihoods, food security and nutrition in East Africa

<sup>4</sup> <https://scalingupnutrition.org>

provinces, gender or wealth levels. However, only 32 percent of Burundi's children complete their lower secondary education.

While health targets are commendable, the level of health provision remains relatively low. More specifically, the National Health Policy 2016-2025<sup>4</sup>, has as its main objectives:

(i) Universal health coverage; (ii) Provision of quality health services; (iii) The implementation of public policies aimed at the promotion and protection of the health of individuals and in particular of vulnerable groups; (iv) Improving the competence and accountability of health authorities and actors.

### **1.3 Brief on covid-19 in Burundi**

Strengthening food production and distribution systems is key to fighting hunger; this includes helping tackle diseases wherever they emerge in humans, animals, plants or the environment. The Coronavirus Disease 2019 (COVID-19) is a global health crisis, and FAO is playing a role in assessing and responding to its potential impacts on people's life and livelihoods, global food trade, markets, food supply chains and livestock. FAO<sup>5</sup> believes this will allow countries to anticipate and mitigate possible disruptions the pandemic may trigger for people's food security and livelihoods, avoiding panic-driven reactions that can aggravate disruptions and deteriorate the food and nutrition security of the most vulnerable. FAO is working closely with WHO, WFP, IFAD and OIE and other partners, harnessing broad networks to drive further research, support ongoing investigations and share critical knowledge.

The Government's priorities are: to tackle the coronavirus (COVID19); strengthen health services; fight corruption; revitalize the agricultural sector; youth employability and support for state pensioners. In addition, cash transfers are used to empower local citizens to improve their resilience to potential local weather shocks.

Burundi is a country vulnerable to climatic shocks, particularly flooding due to its hilly landscapes and proximity to Lake Tanganyika. In August 2021, WFP<sup>6</sup> distributed a total of 135,000 Euros to 13,000 people in areas at risk of flooding in south western Burundi. The EU-funded cash assistance allows vulnerable communities to take anticipatory measures such as protecting and/or strengthening their homes, securing their household assets, or purchasing the necessary equipment to reduce the effects of flooding.

The preparedness of local communities to anticipate and respond to natural disasters was also improved by setting up 20 Community Disaster Risk Reduction Committees (CDRRCs) in exposed areas, whose 160 members, together with 50 Burundi Red Cross (BRC) staff, were trained in: (i) the functioning of the forecasting-based funding (FbF) approach, (ii) the early warning system, and (iii) the programming of cash transfers in emergency situations. These committees developed anticipatory action plans (e.g., drainage channels, house reinforcement, evacuation plans).

In addition, two VHF radio communication facilities were installed covering nearly ten provinces, and 160 BRC volunteers were trained in the use and transmission of warning messages for anticipatory action. The total number of beneficiaries reached over the course of the year by this weather forecasting-based funding (FbF) project is estimated to be around 70,000 people, including those who regularly receive alert messages from the communication facilities installed in the project area.

"The FbF approach was first introduced in Burundi in 2020. It is an innovative mechanism by which anticipatory actions are pre-planned and implemented before climate shocks take place. The objectives are to better prepare communities to natural disasters, reduce the need for assistance during extreme weather and bridge the gap between emergency preparedness and response," explains Housainou Taal, the WFP Representative and Country Director in Burundi. WFP<sup>7</sup> aims to establish a comprehensive forecasting-based system and hand over its entire design and management to the BRC within approximately two to three years. The overall objective of this EU-funded project is to build community resilience and position the BRC as the first local early warning and early action responder. COVID-19 infection and transmission rates remain relatively low but communities living in areas bordering neighboring countries have lost livelihoods due to the disruption of informal cross-border trade following restrictions on movement to contain the pandemic.

The government has taken steps to mitigate the risks associated with the movement of goods and people. These are (i) the quarantine of all passengers from the countries concerned since March 6, 2020; (ii) the suspension of all international flights from March 21, 2020, with the exception of flights related to the transport of goods, medical evacuation, humanitarian and diplomatic actions;

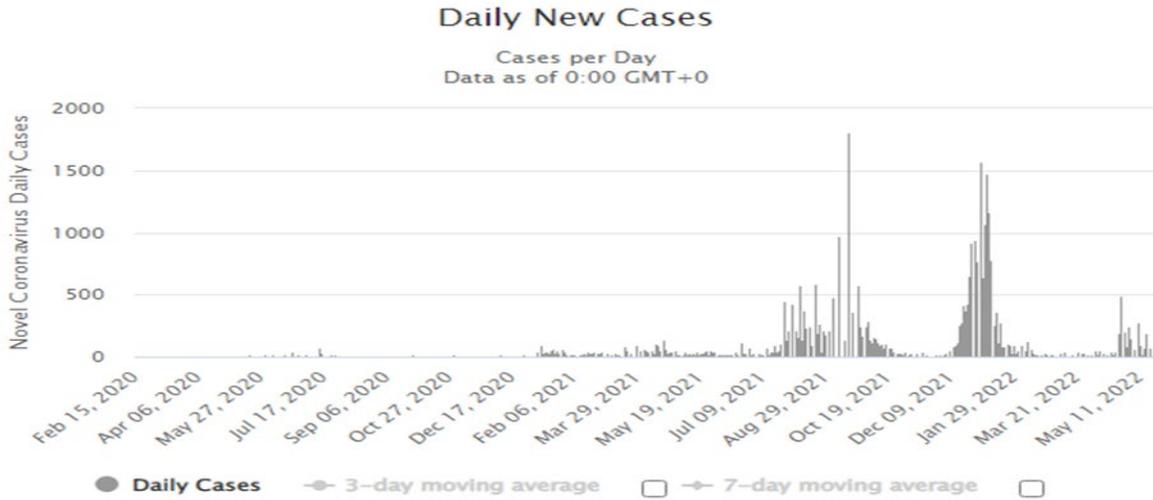
(iii) the suspension of all official international missions, and (iv) the suspension, since March 19, 2020, of the granting of entry visas to Burundi. The Government has also developed a National COVID-19 Preparedness and Response Plan for a 6-month response. The emergency plan follows WHO guidelines and is technically supported by most international institutions based in Burundi active in the field of health. It is based on a series of scenarios and assumptions and includes a set of priority actions such as (i) coordination, (ii) rapid response, (iii) epidemiological surveillance, (iv) laboratory, (v) case management, infection prevention and control, (vi) communication, (vii) operations support, (viii) vaccination and (viii) resource mobilization.

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7Situation Report No 1, 17 April: Burundi

Figure 1 Total Corona virus cases in Burundi

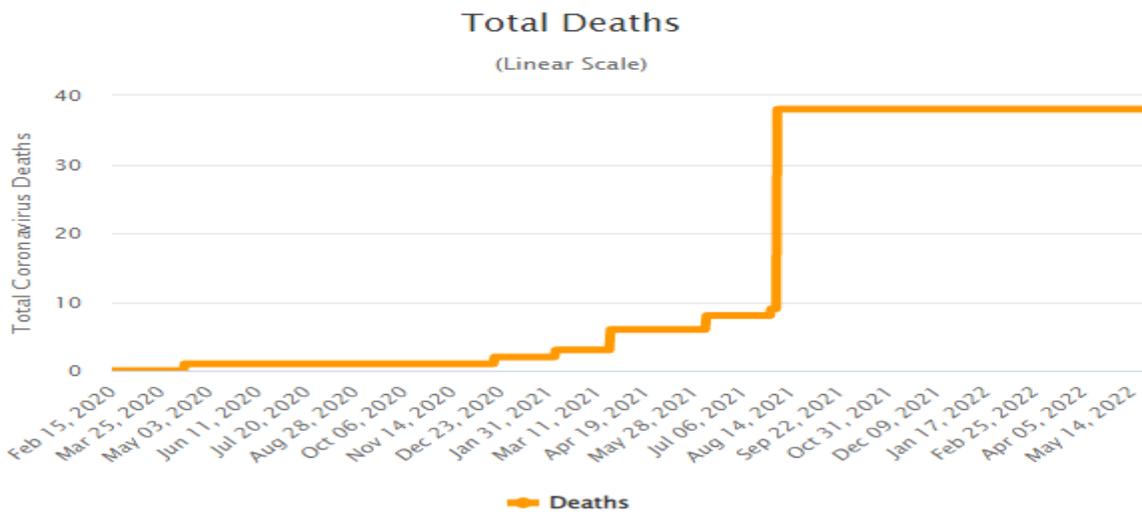
Source : <https://www.worldometers.info/coronavirus/country/burundi/>



**Figure 2 Daily new cases in Burundi**

Source : <https://www.worldometers.info/coronavirus/country/burundi/>

**Figure 3 Total Corona Virus cases in Burundi**



Source : <https://www.worldometers.info/coronavirus/country/burundi/>

The COVID-19 pandemic is devastating economies, and populations particularly living in existing food crisis areas. Africa faces dual public health and economic crises that risk overwhelming healthcare systems, destroying livelihoods, and reversing the region's growth prospects for years to come (OECD, 2020). Many Africans risk becoming food insecure as a consequence of this crisis (United Nations, 2020a). Countries such as Burundi, with existing humanitarian crises, are particularly exposed to the effects of the pandemic, both in terms of direct impacts on people's health, as well as indirect effects, such as disruption of livelihoods, food supply chains and access to food, basic services and humanitarian assistance (FAO, 2020d).

Even though some African countries have learned relevant lessons from dealing with previous health crises, like HIV/AIDS and Ebola epidemics, they are not spared from the disruption of the COVID-19 pandemic (UN, 2020a). COVID-19 is exerting additional pressure to an already fragile situation in East Africa following various other shocks that include climate-related shocks (droughts and floods), conflicts, politically instigated insecurity, refugees and human displacements, and an invasion by desert locusts beginning at the end of 2019 (WFP, 2020a). These shocks have negatively impacted the livelihoods of affected populations and continue to increase vulnerability and reduced resilience. This is particularly true in Burundi, a country with widespread poverty, eroded livelihoods, and serious hunger and malnutrition rates due to multiple shocks (Kansiime et al., 2020).

The implementation of lockdown and physical distancing policies in several countries caused a serious slowdown in regional economic activity disrupting supply chains, unleashing new dynamics with cascading effects on food systems and people's food security and nutrition (HLPE, 2020a). Lockdowns and business closures have exacerbated the precarious nature of their livelihoods (Robin et al., 2020). The most vulnerable are those who are already facing acute hunger and malnutrition, internally displaced persons and refugees, low-income urban households, market-dependent rural households, elderly and people already suffering from medical conditions, as well as children unable to access schools and school meals (WFP, 2020a). According to the ILO (2020b), more than 400 million full-time jobs have been lost globally in the second quarter of 2020 within countries enforcing lockdown measures.

In Burundi, the negative impact on livelihoods is estimated to bring the direct consequence of household income losses to an average of 7% of household income, and in the event of a lengthy crisis, this could increase to 10% due to loss of employment and decreasing terms of trade. If borders are closed, this could reduce income an average of 14% (WFP, 2020a). According to the UN (2020a), the COVID-19 pandemic began to impact African economies heavily well before it reached the shores of the continent due to falling demand for Africa’s commodities, capital flight from Africa, a virtual collapse of tourism and reduced air transport associated with lockdowns and border closures. Movement restrictions have also had the effect of decreasing economic opportunities for both urban and rural populations, driving unemployment. Given the existing vulnerabilities in the sub-region, the impact of the crisis on lives, food security, livelihoods, social services, and other economic activities are expected to be particularly severe. Table 3 below displays the simplified consequences of COVID-19 in Burundi in terms of first-order effects, second-order effects, and third-order effects under the economic and social categories.

**Table 3. Consequences of COVID-19 in Burundi**

	<b>First order effect</b>	<b>Second order effect</b>	<b>Third order effect</b>
<b>Economic</b>	<ul style="list-style-type: none"> <li>• Increasing health and health-related spending</li> <li>• GDP declines</li> <li>• Trade balance worsens</li> <li>• Job and livelihood opportunities worsen</li> <li>• Wealth depletion</li> </ul>	<ul style="list-style-type: none"> <li>• Domestic supply chain disruptions</li> <li>• Increased non-formal economic activity</li> <li>• Economic activities stalls</li> <li>• Loss of livelihoods</li> </ul>	<ul style="list-style-type: none"> <li>• Government debt crisis</li> <li>• Financial panics</li> <li>• Economic recession</li> <li>• Increased food insecurity</li> <li>• Increased poverty</li> </ul>
<b>Social</b>	<ul style="list-style-type: none"> <li>• Reduced social spending</li> <li>• The disproportionate impact on vulnerable groups</li> <li>• Social services disrupted</li> <li>• Loss of lives</li> </ul>	<ul style="list-style-type: none"> <li>• Widespread deprivation</li> <li>• Social disaffection</li> <li>• Breakdown in social services</li> </ul>	<ul style="list-style-type: none"> <li>• Social unrest</li> <li>• Reduction in human development</li> <li>• Increased inequalities</li> </ul>

Source: Authors

Burundi is currently battling three shocks to the country including: the COVID-19 pandemic, the worst desert locust outbreak in decades, and heavy flooding. The former two large-scale crises (COVID and locusts) have many parallels: their effects are transnational and do not adhere to national borders and if left uncontained each has the capacity to spread both exponentially and internationally. While it is difficult to estimate the extent of each crisis, both have the potential to cause devastating impacts for the socioeconomic situations of the people. Together, the two crises are posing potentially significant synergistic risks to the public health and wellbeing of the population in Burundi, by impacting the economy, affecting livelihoods, and further worsening the food security situation. Simultaneously, current seasonal rains in Burundi are likely to bring moderate to heavy rainfall to the region, triggering floods that may deepen existing needs and complicate ongoing responses to both crises. The combination of the COVID-19 pandemic and the locust outbreak is challenging the capacity of countries to respond to these emergencies and address pre-existing crises and vulnerabilities.

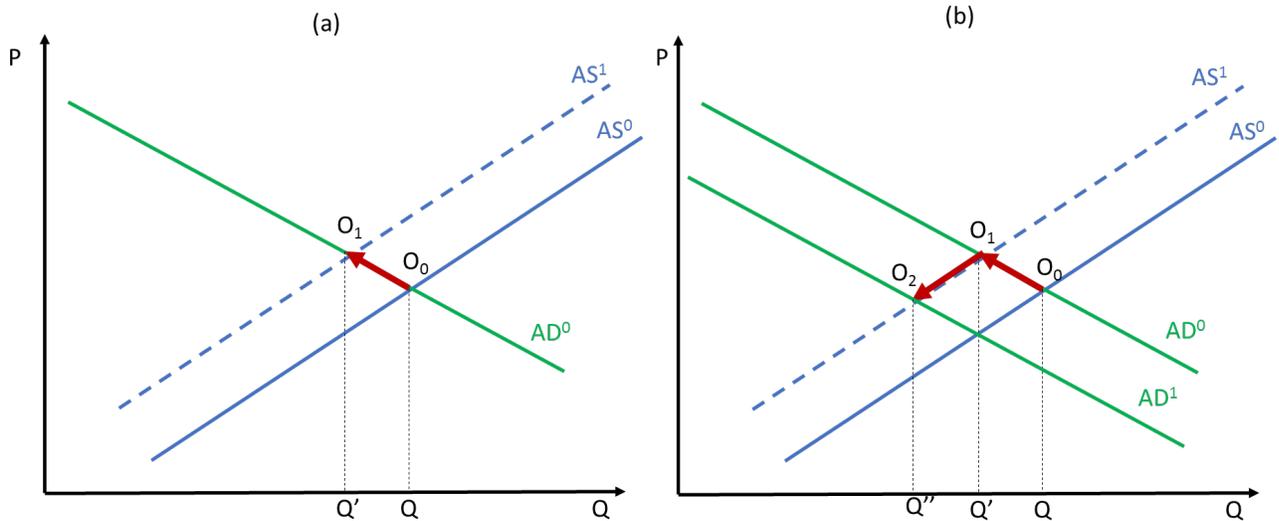
In Burundi, the impact of COVID-19 would change the precarious socio-economic condition for the worse. This implies that the severity of the global recession, driven in-part by the COVID-19 pandemic, is likely to trigger a significant slowdown of the Burundian economy in upcoming years. It is almost certain that GDP growth will be below 3% between 2019 and 2022, and the probability of growth close to zero or even turning negative in 2023 is possible. Humanitarian assistance needs in Burundi are notably higher than in recent years, driven largely by compounding effects of COVID-19 related restrictions (measures) and the continued devastating effects of unusual floods occurring frequently in most parts of the country.

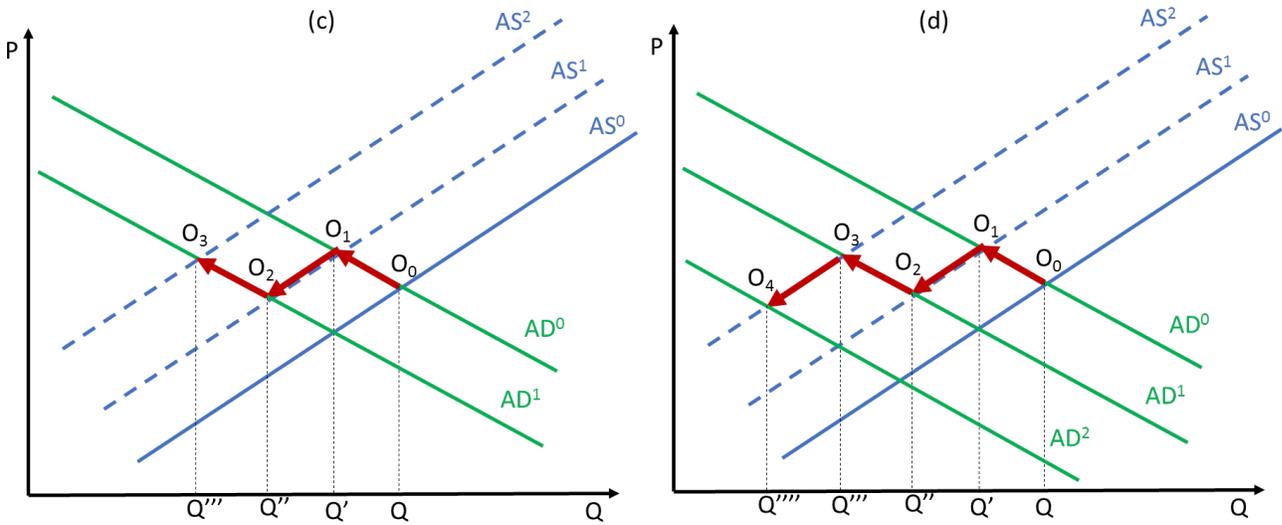
The purpose of this study is to assess the impact of the COVID-19 pandemic on household living conditions and business activities in Burundi. Indeed, using data collected at household level, we present a thorough assessment of socioeconomic impact of COVID-19 on Burundians. The assessment includes different players along food value chains (producers, processors and distributors). We also include a special section on women empowerment. Household assessment of government's actions in dealing with the pandemic is also included.

## **2. Analytical framework**

The containment measures implemented to combat the COVID-19 pandemic have reduced the effective supply of person-hours to the economy, resulting in a negative supply shock. Indeed, increasing borders shutting, quarantine and social distancing across the world has decreased labor supply; theoretically, the aggregate supply (AS) will move from  $AS^0$  to  $AS^1$  as shown in the Figure 4 (a). Resulting uncertainty about the progress of the disease, lack of credibility about economic policies to address the pandemic will trigger a downward slide of the demand curve from  $AD^0$  to  $AD^1$  (Figure 4 (b)). Social distancing implies a decrease in the demand for most goods (entertainment, apparel and services, vehicles, fuels, services, etc.), except for necessity goods following the start of the virus spread. Incomes lost from workers in affected industries, increase in precautionary savings from wary households and firms will further accentuate the decline in the demand.

**Figure 4: COVID-19 supply and demand dynamics**





None of the equilibria described above is stable as long as the pandemic spread continues. Indeed, as shown in Figure 4 (c) and (d), shrinking demand may dry out firms' liquidity forcing them to shut down or file for bankruptcies. This will likely lead to more workers losing their income and therefore lower their consumption. It is worth mentioning the boom in few sectors (delivery businesses, online communication tools, etc.) as people are socially distancing, but this is not enough to offset the downward move of the aggregate supply. The risk of economic contraction and depression increases as the feedback between aggregate supply and aggregate demand continues as a result of failure to stop the pandemic or at least devise a credible plan against it. This implies that the anti-COVID-19 strategy should contain both perceived credible economic and health components. Regardless of the strength of economic fundamentals, unless the strategy to combat the pandemic is perceived as credible by investors, traditional economic instruments will not be enough to calm short term fear.

The COVID-19 pandemic is a global crisis which, among others, has significantly affected the food and agriculture sector. Prompt measures to ensure that food supply chains are kept well-functioning, both domestically and internationally, are needed to mitigate the risk of large shocks that would have a considerable impact on everybody, especially on the poor and the most vulnerable. Although disruptions in the food supply chain are relatively small so far, challenges have already been experienced in terms of logistics. Food needs to move across borders with no restrictions and in compliance with existing food safety standards.

To mitigate the pandemic's impacts on food and agriculture, FAO urges countries to meet the immediate food needs of their vulnerable populations, boost their social protection programs, maintain both domestic supply chains as well as global food trade, , and support smallholder farmers' ability to increase food production.

Countries with existing humanitarian crises are particularly exposed to the effects of the COVID-19 pandemic. Even as their own domestic needs may be rising because of the pandemic, it is critical that donor countries ensure continued delivery of humanitarian assistance where food insecurity is already high and potentially increasing.

### **3. Survey design and implementation**

#### **3.1. Sampling frame**

The Survey on Household Living Conditions (ECMVB 2013/2014), conducted from mid-November 2013 to mid-April 2014 throughout the country served as a sampling frame for drawing the sampling units. The sampling frame contains 7092 households drawn from 415 CDs. A two-stage sampling with first-stage stratification was implemented for the survey. The first-stage statistical units or primary units were the census districts (CDs) defined in the 2008 General Census of Population and Housing. A sample of CDs was therefore be drawn at the first level. The second stage statistical units or secondary units was formed by the households of the CDs drawn in the first stage. Thus, the CDs sampled in the first stage formed the sampling frame for the second stage. The provinces (18) were divided into urban and rural areas.

#### **3.2. Sampling strategy**

For this survey, we targeted a sample of 3,000 households. Using as sampling frame the sample from the ECVMB (2013/2014) enables us to use a probabilistic approach. However, that sample was drawn to target households, so it wouldn't guarantee us representativeness for producers, processors, or distributors. Our interest is in not only assessing the impact of covid-19 in households living conditions but also on their business activities (production, processing, and distribution). To overcome that issue, we decided to do a small census of processors and distributors while the enumerators were on the field. We shared our sample in two groups. We

drew 2,090 households (S1) from the sampling frame and about 1,000 households (S2) were selected while on the field whenever they were involved in processing or distribution activities. To draw S1, a two-stage sampling with first-stage stratification was implemented. For the first-stage, 191 CDs distributed over the 36 strata, were selected. In the second stage, a constant number of 12 households were drawn in each. A special attention has been given to secondary urban centers (Cibitoke, Kayanza, Makamba, Rumonge, Rutana) bordering with neighboring countries, because of the cross-border activities, that's why we tried to draw two more CDs for those centers (See appendix for the partition of Sample 1). The table below shows the final partition of the sample.

***Table 4 : Final partition of the sample***

<b>Province</b>	<b>Rural</b>	<b>Urban</b>	<b>Total</b>
BUBANZA	84	34	118
BUJA MAIRIE	12	666	678
BUJA RURAL	81	23	104
BURURI	101	28	129
CANKUZO	81	52	133
CIBITOKÉ	47	60	107
GITEGA	90	32	122
KARUSI	88	35	123
KAYANZA	94	76	170
KIRUNDO	84	43	127
MAKAMBA	44	48	92
MURAMVYA	108	50	158
MUYINGA	98	64	162
MWARO	79	33	112
NGOZI	87	81	168
RUMONGE	129	98	227
RUTANA	91	85	176
RUYIGI	83	88	171
<b>Total</b>	<b>1,481</b>	<b>1,596</b>	<b>3,077</b>

Source: Burundi Covid Impact Survey (BCIS), 2022

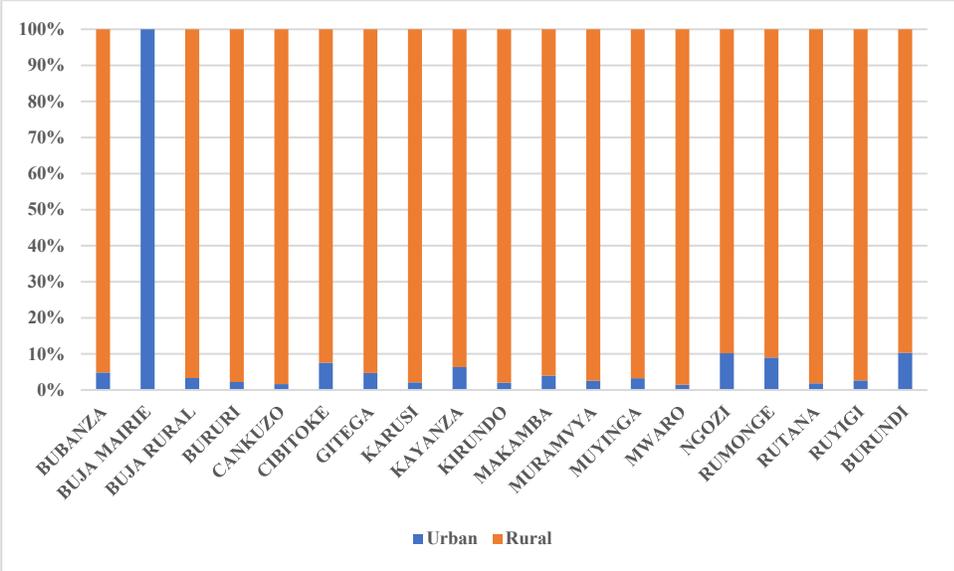
The second part of the sample is not random, so when running extrapolation, only the random sample is used. Overall, we have 3,077 households distributed over 18 provinces. Bujumbura is the economic capital of Burundi. Located in the far west of the country, on the shore of Lake Tanganyika, it is the largest city in Burundi. The province concentrates much of the processing and distribution activities in the country, which justifies the large number of households selected in the province for our sample.

**4. Non parametric analysis**

**4.1. Socioeconomic and demographic characteristics**

At the national level, Burundi's population is predominantly rural (89.65%), Gitega (9%) and Ndozi (8%) are the most populated provinces while Mwaro (2,8%) and Cankuzo (3,4%) are the least populated. Those results are in line with the national statistics. The partition by residential area remains the same across the provinces as it shows on the following graphs.

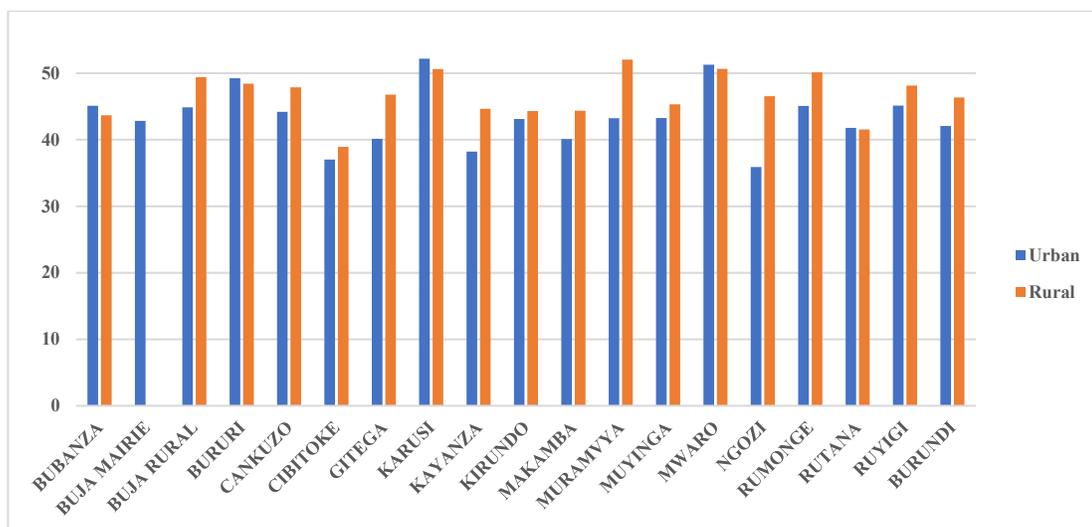
*Figure 5: Population share by residence*



Source: Burundi Covid Impact Survey (BCIS), 2022

Overall, the average size of households in the country is 5,5 in the urban area and 5,8 in rural area, and more than 58% Burundians households’ heads are over 40 years old. The average age of heads of households revolves around 40 years, goes roughly over 50 years for the provinces Karusi, Muyinga and Mwaro.

**Figure 6 : Average age of head of household by province and area of residence**



Source: Burundi Covid Impact Survey (BCIS), 2022

Burundi's Health Minister confirmed the country's first two cases of covid-19 on 31 March. Despite the perceived optimism, the Government of Burundi had nevertheless gradually put in place measures to contain the spread of the pandemic, including included the closure of the Bujumbura International Airport and a ban on flights except for cargo, sanitary and diplomatic flights, the closure of border crossings, except for land transportation of food products and other cargo. An awareness campaign on the measures to be taken to contain the spread of the virus was initiated. These are minimal measures that reflected the political will to fight the pandemic by not slowing down normal life. However, these restrictions could potentially have an impact of the households' living conditions. The average household budget in April 2020, was 9066 FB in the urban area and 5935 FB in the rural area (Table 5). Later in in the spam, January-February, the budget has slightly increase in the rural area while at the same time, a reduction was registered in the urban zone. The daily budget of household is much more significant in May 2022, it has been two years since, restrictions and limitations have been removed.

**Table 5 : Average household budget by province and residence**

	Daily budget April 2020		Daily budget January - February		Daily budget May 2022	
	Rural	Urban	Rural	Urban	Rural	Urban
BUBANZA	7110	6000	6780	5614	9752	9599

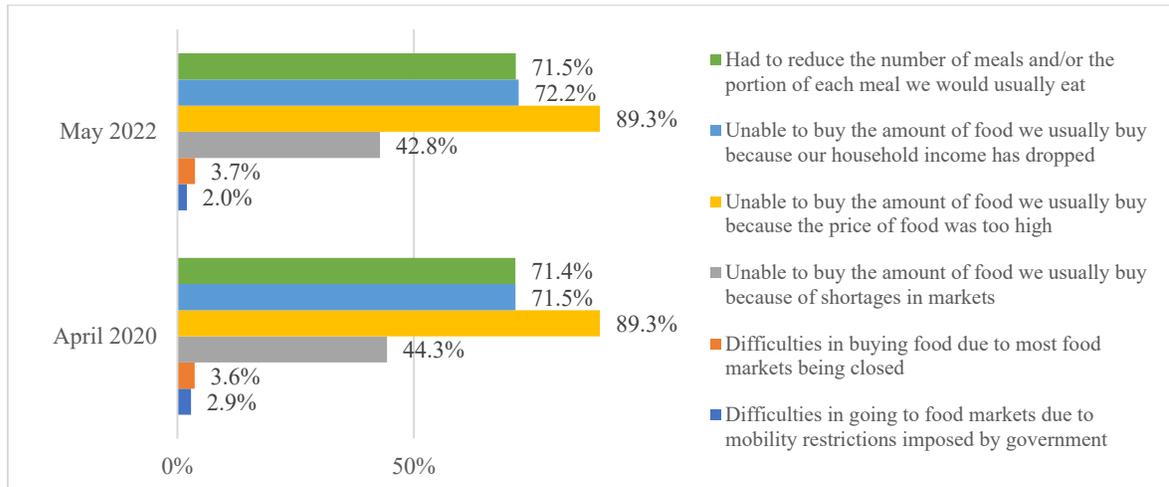
BUJA MAIRIE	-	10105	-	9533	-	12916
BUJA RURAL	5737	6814	5383	5973	6912	9269
BURURI	8348	6625	8335	6521	10588	9196
CANKUZO	7557	4859	7106	4884	10745	9254
CIBITOKI	5626	10767	5506	8938	6778	9695
GITEGA	5693	6911	5311	6373	6673	7584
KARUSI	4399	8517	3851	7258	5726	10867
KAYANZA	5542	7414	5299	7414	7537	10077
KIRUNDO	5058	5125	7540	4111	6234	6417
MAKAMBA	7265	7652	6477	6873	8221	9453
MURAMVYA	5351	8668	5429	7455	7262	12064
MUYINGA	5914	6952	5033	6383	7906	10291
MWARO	6242	7347	6457	7171	7348	9051
NGOZI	4428	6639	6649	8000	5633	8722
RUMONGE	8361	8906	7973	8909	10211	12026
RUTANA	5847	8332	5477	7426	7140	9014
RUYIGI	5958	7611	5960	7111	9029	11389
Total	5935	9066	6041	8628	7558	11547

Source: Burundi Covid Impact Survey (BCIS), 2022

- **Food security**

As reported in Figure 7, the share of households who reduce the number of meals and/or portion of each meal usually eaten is slightly the same, going from April 2020 to May 2022. Same trends were observed for the inability to buy the usual amount of food because of the income or high prices. However, the difficulties related to mobility restrictions were more usual during the pandemic.

**Figure 7 : Share of households with food security issues**

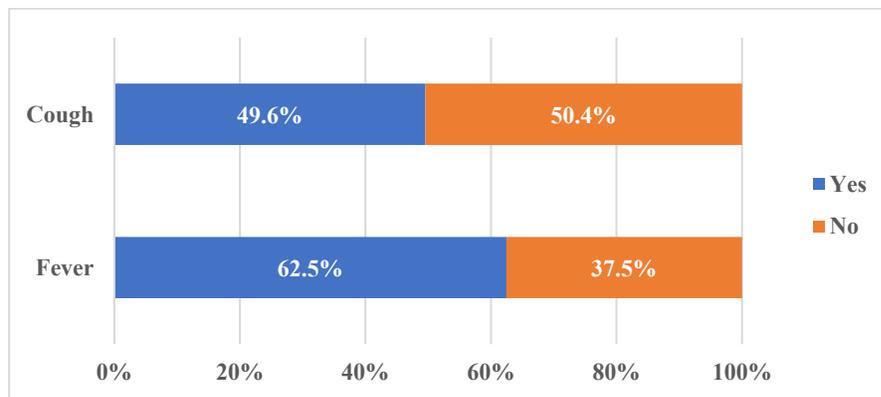


**Source:** Burundi Covid Impact Survey (BCIS), 2022

- Health**

About 50% of the population have recognized that they had a household member experienced an unusual dry cough and/or difficulty breathing/shortness of breath against 62,5%, with a household member who had fever (Figure 8).

**Figure 8 : Share of households with Health issues**

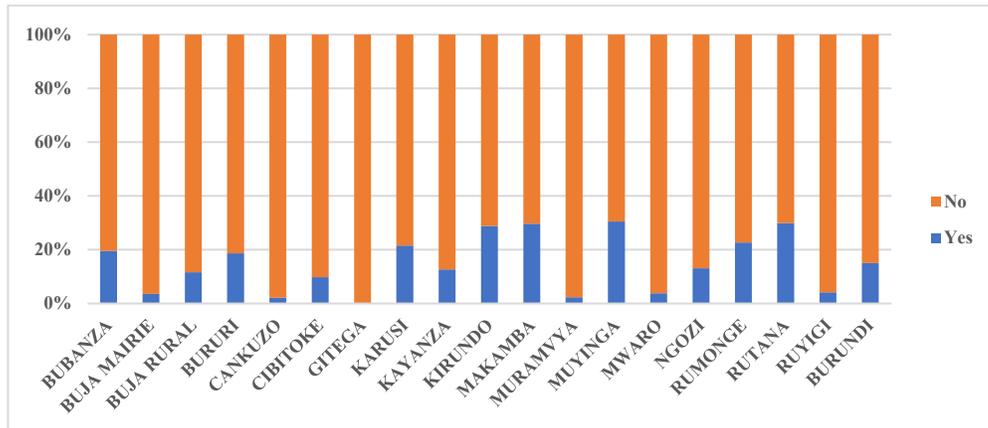


**Source:** Burundi Covid Impact Survey (BCIS), 2022

- Movement restrictions**

Across provinces, less than 40 % of households reported having experienced movement restrictions because of COVID-19 (Figure 9). The highest (above 20 %) shares are recorded in Karusi, Kirundo, Makamba, Muyinga, Rumonge and Rutana.

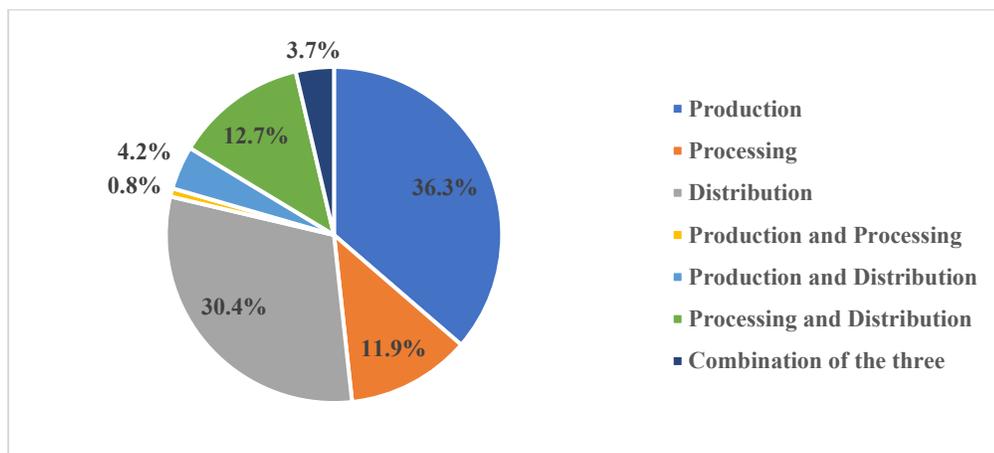
**Figure 9 : Share of households that experienced movement restrictions**



Source: Burundi Covid Impact Survey (BCIS), 2022

About 57% of the household's sample are involved in production, processing, and distribution activities<sup>5</sup>. Among these 57%, 36,4% focus exclusively on primary production, 12% on processing, 30,4% on distribution and there are those who are involved multiple activities (Figure 10).

**Figure 10 : Share of households by activity sector**



Source: Burundi Covid Impact Survey (BCIS), 2022

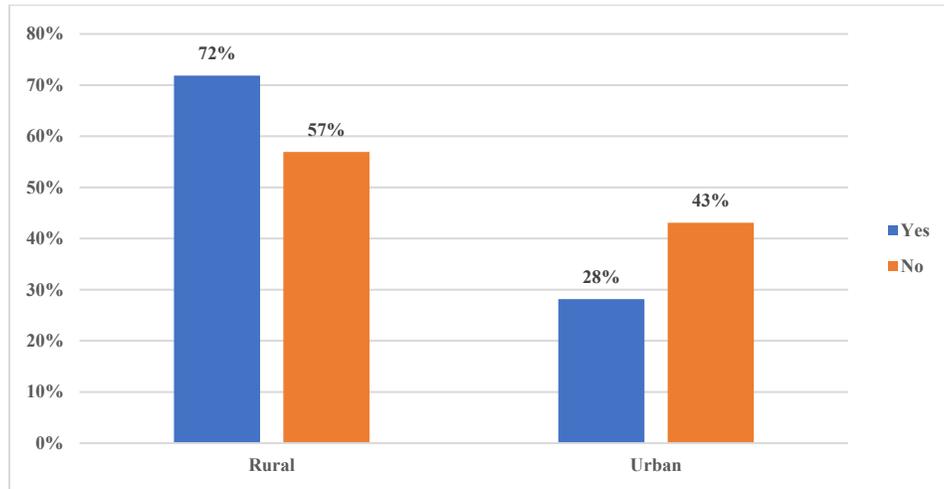
<sup>5</sup> In this section unlike the previous one, the statistics are given within the sample, our sample is only representative by province and residence.

This section briefly presents the structure of the population as well as the main demographic and socioeconomic indicators.

#### **4.2. Production**

Almost 72% of the respondents in rural own land for commercial purpose where they plant variety of crops while 57% of the respondents perform small scale farming (Figure 11). The study also found out that 43% of respondents residing in urban areas do not have land for planting commercial crops against 28% with land where they plant crops for both domestic and commercial use.

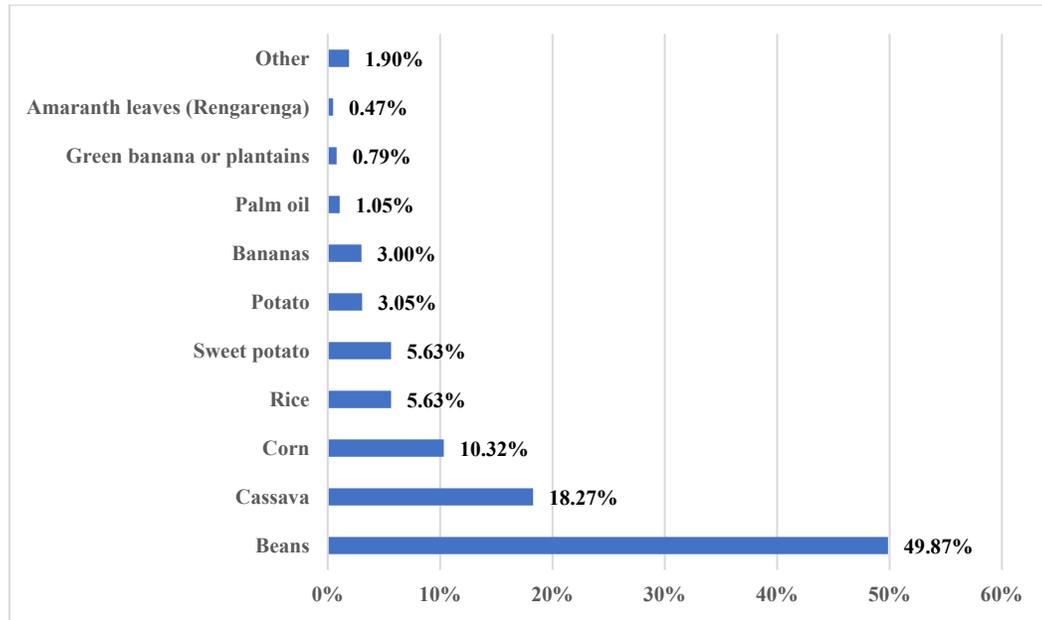
**Figure 11 : Share of producers owning a land**



Source: Burundi Covid Impact Survey (BCIS), 2022

Overall, the minimum acreage of land own by most farmers in Burundi is 0.81 hectares where majority of farmers practice mostly beans (49.87%) and cassava farming (18.27%), corn (10.32%), Rice and sweet potatoes (5.63% each) respectively and palm oil (1.05%), amaranth (0.47%) and green bananas or plantains (0.79%) is the least grown crops (Figure 12). However due to the weather changing patterns and impact of Covid-19 most farmers prefer planting drought resistant and high yielding crops for their survival.

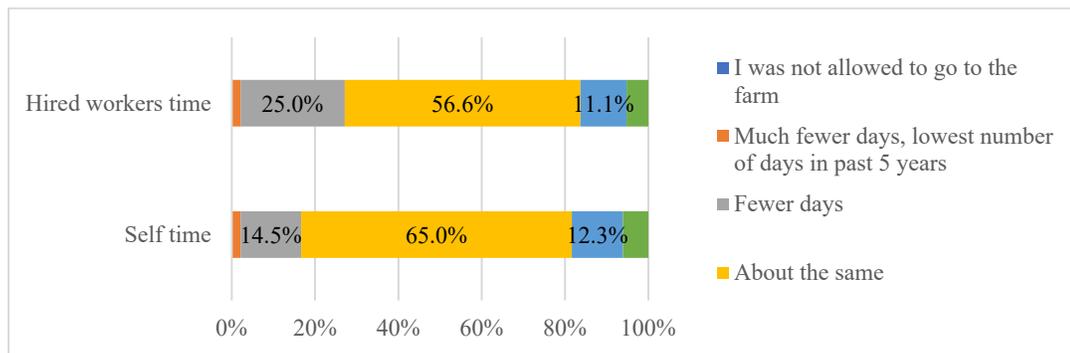
**Figure 12 : Share of producers by crop**



**Source:** Burundi Covid Impact Survey (BCIS), 2022

The majority of the farmers (65.0%) stated that they spent most of their time farming in their own land without any assistance as compared to the previous years (Figure 13). Moreover, 56.6% of the farmers reported that they hired workers so that they can assist in planting, cultivating and harvesting of the crops. About 12.3% of farmers spent more number of days taking care of their farms compared to those who hired workers. This could be attributed to the number of facts such as lack of money preventing some farmers not to seek help in hiring labor in their farms while others felt it was not easy to handle the farms on their own so they hired workers to complete the tasks.

**Figure 13 : Share of producers by time spend farming compared to the year before**



**Source:** Burundi Covid Impact Survey (BCIS), 2022

Findings in Table 7 suggest that the majority of the respondents 62.51% spent the same amount of seeds and other inputs compared to the previous years. Only 24.96% of the respondents reported that they spent less seeds and inputs as compared to the previous years, while 0.33% of the respondents stated that they could not buy any inputs because they were not available.

***Table 6 Seeds and other inputs use***

Compared to the same time last year, how much seed and input did you use for this crop	Percent
Not allowed to go buy inputs, inputs are not available	0.33
Much less, lowest amount in last 5 years	1.91
Less	24.96
About the same	62.51
More	0.65
Much more, highest amount in last 5 years	9.65
Total	100.00

Source: Burundi Covid Impact Survey (BCIS), 2022

The results shown in table 8 , indicate that 61.79% of the farmers have been harvesting almost the same amount of crop for the last 5 years while 25.11% declared that they have harvested less crops this year as compared to the amount of inputs. About 10% of farmers reported that they have harvested more crops for the last 5 years with much lower amount of inputs. Overall, farmers tend to spend more on inputs while harvesting the same amount of harvest.

***Table 8 Crop harvest***

Compared to the same time last year, how much did you hope to harvest for this crop	Percent
Much less, lowest amount in last 5 years	2.07
Less	25.11
About the same	61.79
More	1.04
Much more, highest amount in last 5 years	9.99

Total	100.00
-------	--------

Source: Burundi Covid Impact Survey (BCIS), 2022

With respect to the crop prices, the results show that 47.62% of the respondents expect the prices to increase while 28.55% believe the price will remain the same (Table 9). Overall, despite the government's effort to contain food prices (corn, beans, etc.), expectations are such that prices will keep increasing because of the disparity between the supply and demand on one side but also due to increasing cost of inputs and other factors of production.

***Table 9 Crop prices***

Compared to the same period last year, how do you expect prices to change for your crops	Percent
Much lower, lowest price in last 5 years.	1.21
Inferior	5.59
About the same	28.55
Upper	47.62
Much higher and highest price in the last 5 years	17.04
Total	100.00

Source: Burundi Covid Impact Survey (BCIS), 2022

Whether the farmers will sell their crops to the same intermediaries or not, about 61% of the respondents stated that they are likely not to sell their crops to the same intermediaries, markets or places against 35.77% who are willing to sell their crops to the same intermediaries, markets or places (Table 10). Willingness of the majority of farmers to change intermediaries maybe an indication that farmers prefer to sell directly to the market to maximize their earnings.

**Table 10 Expected market outlets**

Do you think you can sell your harvest to the same intermediaries or the same places/markets	Percent
Yes	35.77
No, but I hope to find other channels to sell all my harvest	3.16
No, I probably won't be able to sell to the same market	19.86
No, I probably won't be able to sell to same intermediaries	41.21
Total	100.00

Source: Burundi Covid Impact Survey (BCIS), 2022

With respect to interventions needed to support their businesses during and after the Covid-19 pandemic, 35.60% of the respondents called for food price stabilization measures while 34.39% are asking for input subsidies (Table 11). The rest is spread between inputs price stabilization measures, cash transfers or unemployment benefits, business credit, discounted tax, improvement of digital connectivity infrastructure, training and extension for digital marketing and sales and postponement of payment of taxes.

**Table 11 Needed interventions**

What would be the most needed intervention to support your business during and after the pandemic	Percent
Business credit	4.63
Input subsidies	34.39
Input price stabilization measures	15.75
Price stabilization measures for products	35.60
Cash transfers or unemployment benefits	5.95
Improve digital connectivity infrastructure	0.26
Training and extension for digital marketing and sales	0.16
Discounts tax	3.21
Postponement of payments tax	0.05

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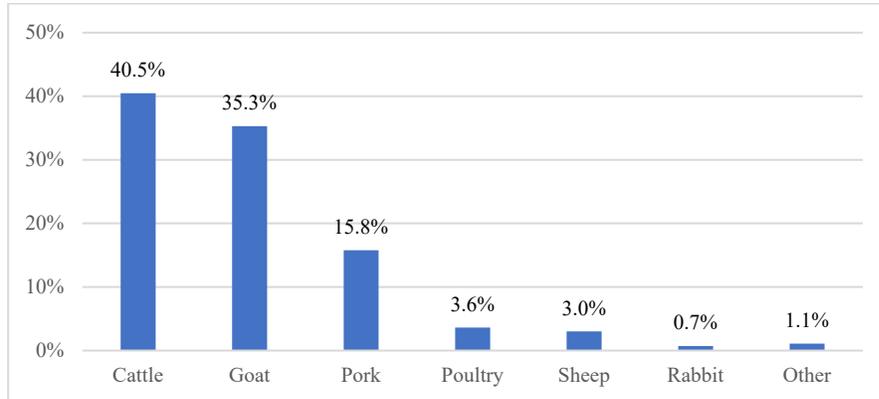
Total

100.00

Source: Burundi Covid Impact Survey (BCIS), 2022

As reported in Figure 14, 40.5% of the respondents are involved in cattle farming, 35.3% in goat, 15.8% in pork, 3.6% and the rest in sheep, rabbits and others. Majority of them prefer cattle because of additional value from milk, meat, hides, horns and hooves.

***Figure 14 : Share of producers based on the most important livestock***



Source: Burundi Covid Impact Survey (BCIS), 2022

As shown in table 12, 68.41% of the respondents reported that they have been spending the same number of days in raising their livestock for the past five years. Only 13.61% reported working fewer days. In a sense, the pandemic might have altered the number of days allocated to livestock.

***Table 12 Working days for livestock***

Compared to the same period last year, how many days did you and your household members spend raising livestock?	percent
I was not allowed to go to the farm	0.24
Significantly fewer days, lowest number of days in past 5 years	2.07
Fewer days	13.61
About the same	68.41
More days	12.76
Many more days, most days in past 5 years	2.92
Total	100.00

Source: Burundi Covid Impact Survey (BCIS), 2022

In terms of the number of working days for the hired workers to look after cattle, 66.33% of the respondents stated that the number of days has not changed for the past five years. Only 18.26% of the respondents stated that the number of days for raising livestock has been decreasing for the past five years. In general, the trend is similar to the number of days by livestock farmers themselves as discussed above. It also appears as if the decreasing trend in hired workers for cattle, which is the main livestock, may not necessarily be due to the pandemic.

***Table 13 Working days of hired workers for livestock***

Compared to the same period last year, how many days did you hire laborers to help with cattle raising?	Percent
I was not allowed to hire other people on my farm	1.42

Significantly fewer days, lowest number of days in past 5 years	2.43
Fewer days	18.26
About the same	66.33
More days	8.52
Many more days, most days in past 5 years	3.04
<hr/> Total	<hr/> 100.00

Table 14 presents responses on inputs used for livestock. About 65% of the respondents stated that the inputs put in livestock such as fodder, vaccination, fattening feed was almost the same as in previous years. However, 23.75% of the respondents stated that they spent less on the inputs for raising their livestock which might seem contradictory given the rising cost of inputs discussed above unless farmers benefits from external interventions such as inputs subsidies.

***Table 14 Inputs used for livestock***

<hr/> Compared to the same period last year, how much inputs (eg fodder, vaccination, fattening feed) did you use (plan to use) for raising livestock? <hr/>	Percent
Not allowed to go buy inputs; entries are not available	0.63
Much less, lowest amount in last 5 years	1.75
Less	23.75
About the same	65.38
After	0.38
Much more, highest amount in last 5 years	8.13
<hr/> Total	<hr/> 100.00

Source: Burundi Covid Impact Survey (BCIS), 2022

As report in in Table 15, 62.44% livestock farmers claimed to have sold the same amount they sold the previous year. However, it is worth noting that about 27% of them reported that they will sell less livestock products this year compared to last year. This is a significant number and

needs more attention on whether the perception is related to COVID-19 or not.

***Table 15 Livestock sold***

Compared to the same period last year, how many livestock products (i.e. animals, meat, milk, dairy products, eggs, skins, etc.) do you have (or plan to you) intend to sell?	Percent
Not allowed to sell livestock products	3.92
Much less, lowest amount in last 5 years	2.11
Less	24.89
About the same	62.44
More	1.06
Much more, highest amount in last 5 years	5.58
Total	100.00

As discussed before, prices increase has been a constant trend since the pandemic. Results in Table 16 suggest that about 56% of livestock farmers have experienced price increase. Only, 37.71% of the respondents stated that the prices of livestock have been approximately the same for the past five years.

***Table 16 Trend in the prices of livestock***

Compared to the same period last year, how are (do you expect) the prices for livestock products?	Percent
Much lower, lowest price in last 5 years	0.36
Less	5.54
About the same	37.71
Higher	47.11
Much higher and highest price in the last 5 years	9.28
Total	100.00

Source: Burundi Covid Impact Survey (BCIS), 2022

The findings of the study shows that majority of the respondents (46.51%) stated that they hope to

sell their livestock products to the same intermediaries, places or markets while 19.64% of the respondents stated they will not be able sell all their breeding products to the same intermediaries, places or markets (Table 17).

***Table 17 Expected markets and intermediaries***

Are you/hope you can sell livestock products to the same intermediaries or same places/markets?	Percent
Yes	46.51
No, but I expect to find other channels to sell all my products.	3.25
No, I probably won't be able to sell to the same intermediaries	12.05
No, I probably won't be able to sell to the same markets	19.64
Not applicable	18.55
Total	100.00

Our findings (Table 18) suggest that 31.57% of the respondents would prefer food price stabilization measures, 29.64% asked for input subsidies, and 15.54% for input of price stabilization measures. Other supports include credit for cooperatives, cash transfers or unemployment benefits and tax breaks.

***Table 18 Support requested during and after covid 19***

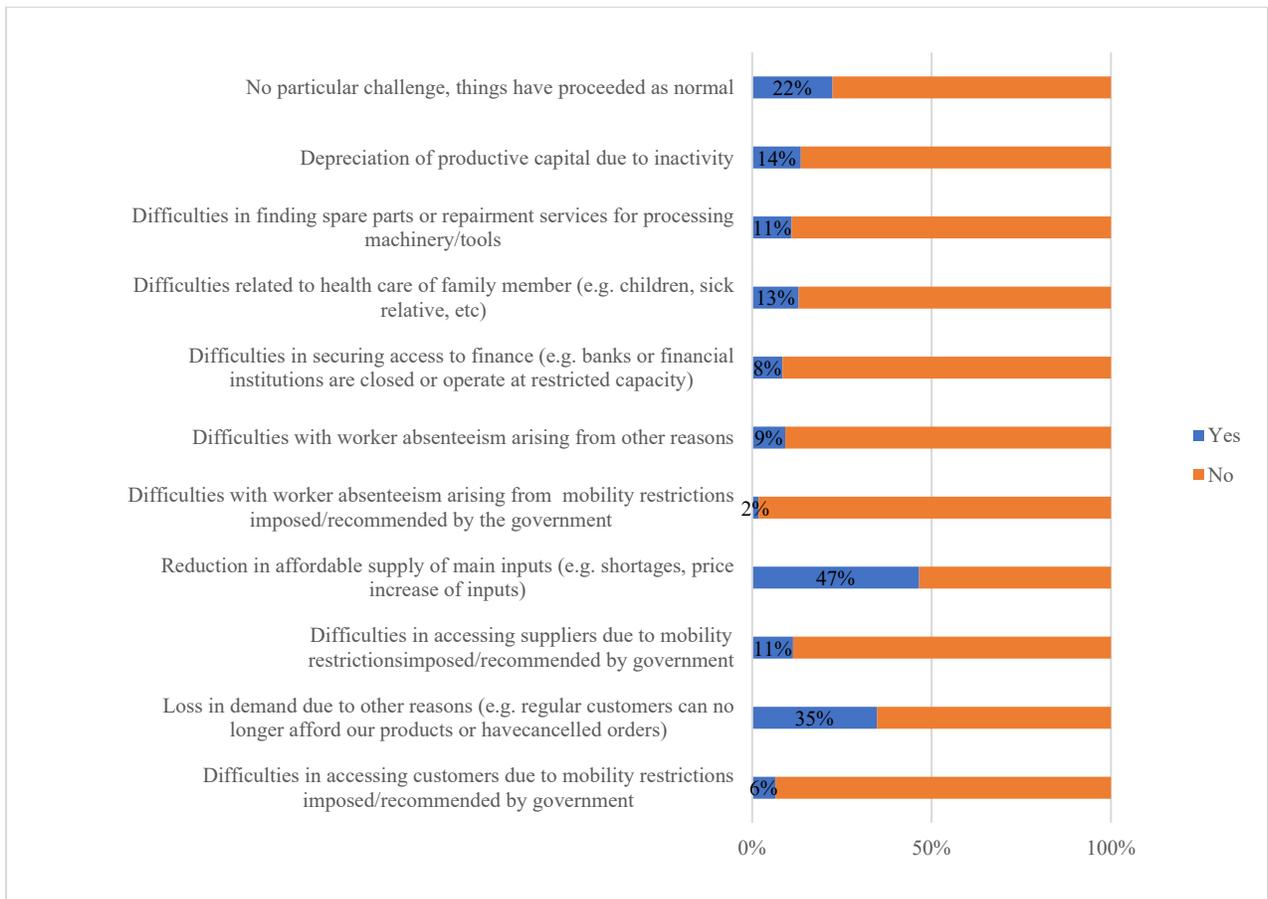
What would be the most necessary policy to support your business during and after the pandemic?	Percent
Business credit	2.17
credit to cooperatives	12.65
Input subsidies	29.64
Input price stabilization measures	15.54
Price stabilization measures for products	31.57
Cash transfers or unemployment benefits	5.78
Improve digital connectivity infrastructure	0.12
Training and extension for digital marketing and sales	0.24
Tax cuts	2.29
<b>Total</b>	<b>100.00</b>

When asked what would be the most important intervention to support their business once the border points open, 31.33% mentioned food price stabilization, 27.11% input subsidies, and 11.69% stated credit to cooperatives.

### **4.3. Processing**

The study shows that majority of the respondents (89.4%) process crop-based products. For 47% of respondents (Figure 15), the reduction of inputs supply is the main challenge while 35% pointed to loss in demand due customers no longer able to afford their products. Only 2% mentioned absenteeism of the workers due to the mobility restrictions imposed by the government to curb the spread of Covid-19.

**Figure 15 : Challenges face by processors**



Source: Burundi Covid Impact Survey (BCIS), 2022

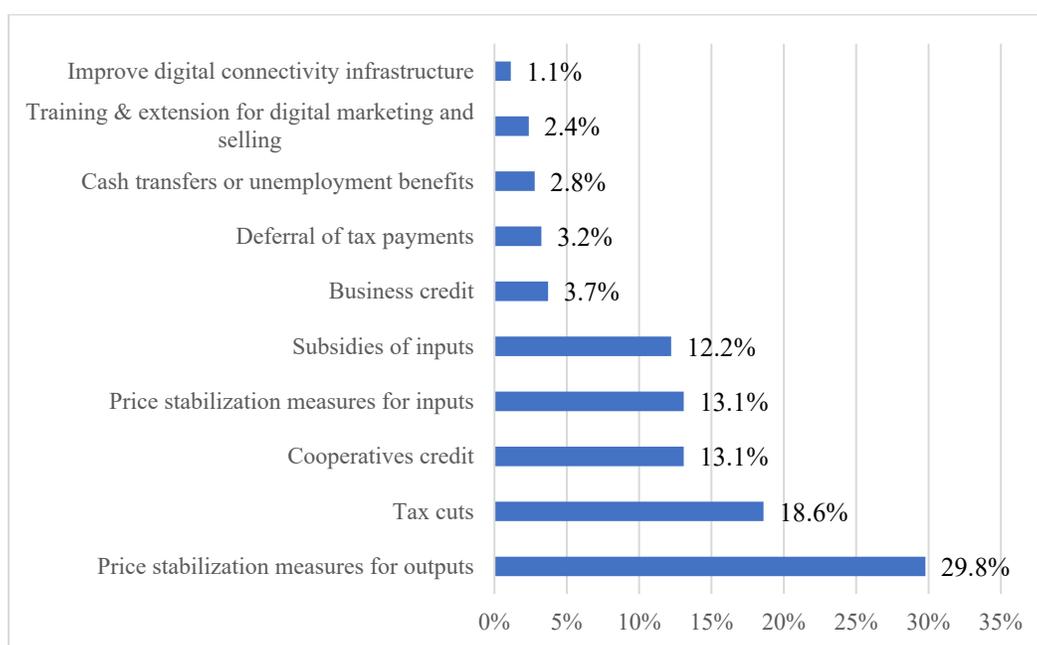
More than 50% of processors asked for inputs and outputs price stabilization interventions. While credit support (business and cooperatives) is needed for 20% of respondents against 11% for inputs subsidies.

#### 4.4. Distribution

The majority of households (86%) are involved in the distribution of crop-based products. This mirrors the processor sector. Challenges facing distributors include workers absenteeism was due to Covid-19 pandemic and travel restrictions, difficulties in finding spare parts or repairment for their machines, and difficulties in accessing suppliers and financial services.

Like other value chains participants, distributors requests for support evolve around prices stabilization, inputs subsidies and tax breaks (see Figure16).

**Figure 16: Interventions needed by distributors to survive covid crisis**



Source: Burundi Covid Impact Survey (BCIS), 2022

#### 5. Special case of women empowerment

This section presents a gender empowerment profile for Burundi using the indicators of the Abbreviated Women’s Empowerment in Agriculture Index (A-WEAI). This shorter version of WEAI relies on the same five domains of empowerment but uses only six instead of 10 indicators. Table 19 describes the domains, indicators and inadequacy cut-offs of each indicator together with

their assigned weight to derive the individual empowerment score. Whereas the indicators can only take the value of zero (inadequate) or one (adequate), the empowerment score can range between zero and one with higher values indicating more empowerment. For the purpose of this report, we make use of the six individual (in) adequacies as well as the weighted (dis)empowerment score.

**Table 19 . Domains, indicators, inadequacy cut-offs and weights used in A-WEAI**

<b>Domains (5)</b>	<b>Indicator (6)</b>	<b>Inadequacy cut-off</b>	<b>Weight</b>
Production	Input in productive decisions	Inadequate if respondent does not have at least some input in decisions, or does not make the decisions nor feels he/she could	20%
Resources	Ownership of assets	Inadequate if household does not own any asset, or if respondent does not own at least one bigger asset	13%
	Access to/decisions on credit	Inadequate if household has no credit, or used a source of credit but respondent did not participate in any decisions about it	7%
Income	Control over use of income	Inadequate if respondent has no or little input in decisions about income generated, or feels he/she cannot make decisions regarding wage, employment and major household expenditures	20%
Leadership	Group membership	Inadequate if respondent is not part of at least one group, or if no groups are reported in the community	20%
Time	Workload	Inadequate if respondent works more than 10.5 hours a day	20%
<b>Individual empowerment score</b>			<b>100%</b>

Source: Based on Malapit et al. (2020).

Table 19 summarizes the percentages of men and women who are empowered in each of the six A-WEAI indicators as well as their overall empowerment score, covering a period just before (recall data) and after (current data) the COVID-19 pandemic. Comparing the adequacy rates before and after COVID-19, the global pandemic clearly had little or no impact on the empowerment profile of men and women. While men experienced a small decrease in asset ownership (-1.51 %-points) combined with a similarly sized increase in group participation (+1.58%-points), there are no statistically significant changes among women. Despite the reassuring observation that COVID-19 did not worsen people's empowerment in Burundi, as can also be inferred from the mean empowerment scores, it certainly did not challenge or change the structural inequalities that exist between men and women. For both times, male respondents have far more control over income sources while they also face less workload compared to their female counterparts. With a difference of almost 15%-points, the disempowerment of women regarding the income domain is particularly revealing. As a result, the mean empowerment score of women is 3.9% lower than that of men, an observation that applies to both periods.

*Table 20 . Gender differences in empowerment before and after COVID-19, Burundi (2022)*

<b>BEFORE COVID-19</b>		<b>% Adequacy</b>		<b>Difference</b>
Indicators	N	men	women	(men/women)
1. Input in productive decisions	1,660	58.2%	60.2%	-1.93%
2. Ownership of assets	2,090	86.3%	82.7%	3.56%
3. Access to/decisions on credit	2,050	48.9%	48.1%	0.84%
4. Control over use of income	2,028	41.6%	27.1%	14.47%***
5. Group membership	2,090	74.5%	74.6%	-0.08%
6. Workload	2,090	92.0%	87.2%	4.74%**
<b>Mean empowerment score</b>	<b>1,627</b>	<b>0.680</b>	<b>0.641</b>	<b>0.039**</b>
<b>AFTER COVID-19</b>		<b>% Adequacy</b>		<b>Difference</b>
Indicators	N	men	women	(men/women)
1. Input in productive decisions	1,660	58.5%	60.1%	-1.67%
2. Ownership of assets	2,090	84.7%	82.1%	2.60%
3. Access to/decisions on credit	2,066	48.4%	48.3%	0.04%
4. Control over use of income	2,029	42.0%	27.1%	14.90%***
5. Group membership	2,090	76.1%	75.6%	0.48%
6. Workload	2,090	92.1%	87.8%	4.33%**
<b>Mean empowerment score</b>	<b>1,642</b>	<b>0.684</b>	<b>0.645</b>	<b>0.039**</b>
<b>IMPACT COVID-19</b>		<b>Difference (after/before covid)</b>		

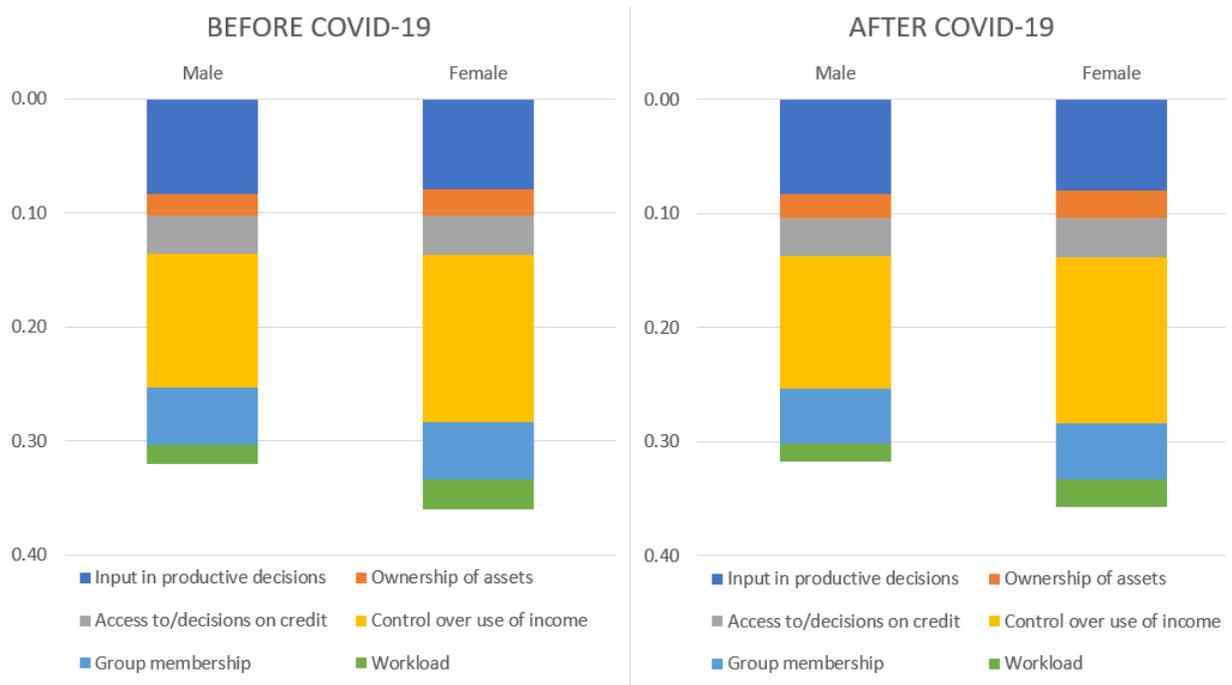
Indicators		men	women	
1. Input in productive decisions	na	0.24%	-0.02%	na
2. Ownership of assets	na	-1.51%**	-0.56%	na
3. Access to/decisions on credit	na	-0.54%	0.26%	na
4. Control over use of income	na	0.44%	0.01%	na
5. Group membership	na	1.58%*	1.02%	na
6. Workload	na	0.12%	0.53%	na
<b>Mean empowerment score</b>	na	<b>0.004</b>	<b>0.004</b>	na

Note: The significantly smaller number of observations for the indicator “input in productive decisions” as well as the overall empowerment score relates to A-WEAI’s focus on agricultural activities, thus excluding urban households involved in non-farm activities. Significance levels for paired and unpaired t-tests: \* = 0.05, \*\* = 0.01, \*\*\* = 0.001.

Source: Impact COVID-19 Survey Burundi (2022).

Figure 17 presents the decomposition of the gender disaggregated mean *disempowerment* scores (that is one minus the mean empowerment scores) using the *inadequacy* shares and weights associated to each individual indicator. Again, in line with Table 20, we observe the minor impact of COVID-19 combined with structural gender inequalities reflected in the disadvantaged position of women regarding control over income sources and workload. Remarkably, the charts also show that disempowerment is largely composed the same way for men and women, with inadequate control over income sources accounting for the biggest part, followed by inadequacy in terms of productive decisions and then group membership, while access to and decisions on credit, asset ownership and workload appear to be less problematic.

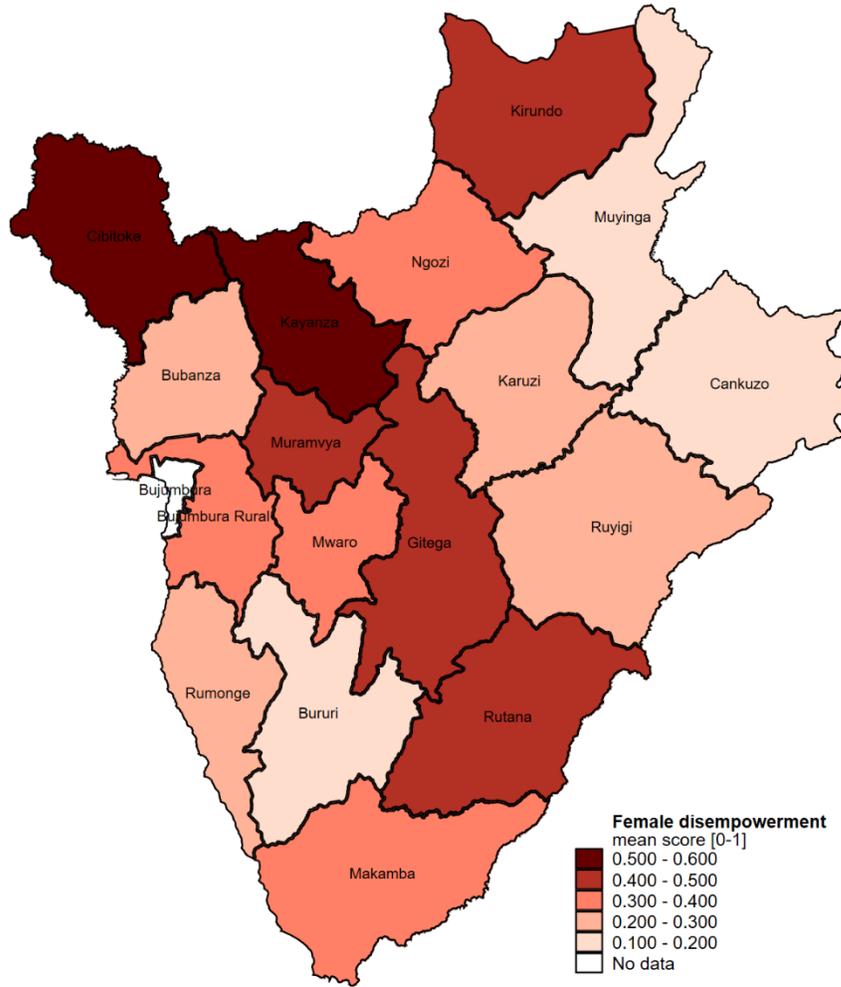
**Figure 17: Decomposition of mean disempowerment score, Burundi (2022)**



Source: Impact COVID-19 Survey Burundi (2022).

Contrary to the homogenous profile of disempowerment sources at aggregate level, Figure 18 illustrates that there is substantial variation in post-COVID female disempowerment across provinces. Whereas mean disempowerment rates are below 0.200 in Muyinga, Cankuzo and Bururi, women in various provinces throughout the country are suffering from high levels of disempowerment. This is particularly the case for women living in Kayanza and Cibitoke, where rates exceed 0.500, while those in Rutana, Kirundo, Gitega and Muramvya are also substantially more constrained than what is on average observed by women in Burundi (0.355).

**Figure 18: Women’s mean disempowerment by province after COVID-19, Burundi (2022)**



Source: Impact COVID-19 Survey Burundi (2022).

## 6. Parametric analysis

In this section, we turn to parametric analysis of the impact of COVID-19 on households using their budgets as proxy for food security as well as for poverty status. Indeed, between April 2020 (before the pandemic) and January-February 2022 (after the pandemic peak), 48.2% of households have experienced a reduction in their budget. Given the number of variables involved and the lack of consensus on an exhaustive list of COVID-19 determinants as related to food security and poverty, we use the Lasso (Least Absolute Shrinkage and Selection Operator) algorithm. To illustrate the impact of COVID-19 on food security and poverty, we implement a double selection model at household level using the Lasso machine learning algorithm.

Initially introduced by Tibshirani (1996), Lasso estimates the parameters by finding the minimum of a cost function of the following form:

$$Q_L = \frac{1}{N} \sum_{i=1}^N w_i f(y_i, \beta_0 + x_i \beta') + \lambda \sum_{j=1}^p \theta_j |\beta_j|$$

where  $N$  is the number of observations,  $w_i$  are observation-level weights,  $f(\cdot)$  is the model likelihood contribution,  $\lambda \geq 0$  is the lasso penalty parameter, and  $\theta_j$  are coefficient-level weights. In other words, we assume that the probability of being food insecure and poor is a function of a set of health variables which themselves are determined by household and location characteristics. Following Belloni et al. (2016), the model takes the following form:

$$E[y|\mathbf{d}, \mathbf{x}] = G(\mathbf{d}\alpha' + \beta_0 + \mathbf{x}\beta')$$

where  $G(a) = \exp(a)/\{1 + \exp(a)\}$ ,  $\mathbf{d}$  contains the  $J$  covariates of interest, and  $\mathbf{x}$  the  $p$  controls. In our analysis,  $y$  is a binary variable equals to one if household's daily budget in January-February 2022 is lower than the daily budget in April 2020. Vector  $\mathbf{d}$  includes variables (health variables such as fever and difficulty breathing, prior exposure to Ebola and Cholera, existence of confinement measures). Finally, the controls ( $\mathbf{x}$ ) include household demographics (age, gender, size, location), share of value chains involvement (crop production, livestock, processing, and distribution), daily budget in May 2022 and the size of land owned. The vector  $\mathbf{d}$  variables were selected based on their potential to reflect households' vulnerability to negative effects of COVID-19 on food security and poverty.

**Table 21 reports summary statistics of variables of interest used in our analysis.**

**Table 21 : Descriptive statistics**

Variables	Number of observations	Mean	Standard deviation	Minimum	Maximum
Gender (1 if male, 0 if female)	2,090	0.5	0.5	0.0	1.0
Age (years)	2,090	45.4	15.5	16.0	95.0
Household size	2,090	5.9	2.7	1.0	35.0
Daily budget in April 2020 (Francs)	2,090	7482.6	10014.9	7.0	210000.0
Daily budget in January-February 2022 (Francs)	2,090	7189.6	6603.7	58.0	70000.0
Daily budget in May 2022 (Francs)	2,090	8999.0	5651.4	0.0	120000.0
Land size (ha)	1,577	0.8	1.2	0.0	20.0
<i>Time allocation per value chain (%)</i>					
Crop	2,090	65.7	37.7	0.0	100.0
Livestock	2,090	6.0	11.1	0.0	100.0
Processing	2,090	0.7	6.1	0.0	100.0
Distributing	2,090	2.7	13.1	0.0	100.0
Other	2,090	22.9	37.7	0.0	100.0
<i>Health related variables</i>					
Fever (1 if affected, 0 otherwise)	2,090	0.6	0.5	0.0	1.0
Breathing difficulty (1 if affected, 0 otherwise)	2,090	0.5	0.5	0.0	1.0
Ebola exposure (1 if exposed, 0 otherwise)	2,090	0.9	0.3	0.0	1.0
Cholera exposure (1 if exposed, 0 otherwise)	2,090	0.1	0.2	0.0	1.0
Confinement measures (1 if exist, 0 otherwise)	2,090	0.1	0.4	0.0	1.0

Source: Burundi Covid Impact Survey (BCIS), 2022

Estimation results are reported in Table 3. As expected, all health related variables, except confinement measures imposed by the government, have a positive sign suggesting that households exposed to these health issues are more likely to lose their livelihoods in the form of daily budget. However, only breathing difficulty and exposure to Ebola are significant. In other words, although breathing problems may be a symptom of the COVID-19 pandemic, other lingering health issues such as Ebola and Cholera may still increase the probability of Burundians to fall below food security and poverty thresholds. Indeed, negative shocks such as illness of an income-earning household member, job loss, bankruptcy of a non-farm family business, and increase in the price of a major food item increase the probability of depleting households' assets to cope and ultimately threaten their food security standings (Ulimwengu et al., 2021). With respect to demographics, the findings do not exhibit any gender discrimination pattern. This confirms the discussion on WEAI where there was no significant difference in terms of empowerment between male and female headed households. However, the results show that the higher the density (proxied here by the sample weight), the higher the probability of falling below food security and poverty benchmarks. Higher population density is expected to increase the speed of COVID-19 contagion, therefore contributing to negative impacts on food security.

**Table 22 Estimation results.**

Dependent variable (1 one if household's daily budget in January-February 2022 is lower than the daily budget in April 2020)	Coefficient	Robust standard errors
Health related variables		
Fever (1 if affected, 0 otherwise)	0.0867	0.1228
Breathing difficulty (1 if affected, 0 otherwise)	0.4814 <sup>a</sup>	0.1187
Ebola exposure (1 if exposed, 0 otherwise)	0.4260 <sup>b</sup>	0.1806
Cholera exposure (1 if exposed, 0 otherwise)	0.0949	0.2643
Confinement measures (1 if exist, 0 otherwise)	-0.2508	0.1607
Demographics		
Density	0.0001 <sup>a</sup>	0.0000
Gender (1 if male, 0 if female)	0.0500	0.1082
Household size	0.0099	0.0229
Age (years)	-0.0055	0.0035
Time allocation per value chain (%)		
Crop	-0.0117 <sup>a</sup>	0.0028
Livestock	-0.0093 <sup>c</sup>	0.0053
Processing	-0.0062	0.0154
Distribution	-0.0081	0.0079
<hr/>		
Number of observations	1,577	
Number of controls	12	
Number of selected controls	7	
Wald chi <sup>2</sup> (13)	66.2	
P-value	0.00	

Source: Authors' estimation results

Note: a, b and c denote statistical significance at 1%, 5% and 10%, respectively.

Finally, overall, active participation to agricultural value chains appears to prevent a decline in household daily budget as a results of health shocks. More specifically, households in crop and livestock production are less likely to experience a decrease in their income. This also confirms the preponderance of crop and livestock sectors among Burundians.

## 7. Main findings and recommendations

Burundi's Health Minister confirmed the country's first two cases of covid-19 on 31 March. The Government of Burundi had gradually put in place measures to contain the spread of the pandemic, including the closure of the Bujumbura International Airport and a ban on flights except for cargo, sanitary and diplomatic flights, the closure of border crossings, except for land transportation of food products and other cargo. These measures that reflected the political will to fight the pandemic by not slowing down normal life. Overall, the average household budget in April 2020 (prior to COVID-19 restrictions), was 9066 FB in the urban area and 5935 FB in the rural area. In January-February, the budget had slightly increased in the rural area while at the same time, a decline was observed in urban areas. The share of households forced to reduce the number of meals and/or portion of each meal usually eaten was slightly the same from April 2020 to May 2022. Same trends were observed for the inability to buy the usual amount of food because of the income or high prices. However, as expected, difficulties related to mobility were more pronounced during the pandemic. Across provinces, less than 40 % of households reported having experienced movement restrictions because of COVID-19. The highest (above 20 %) shares are recorded in Karusi, Kirundo, Makamba, Muyinga, Rumonge and Rutana. With respect to involvement in agricultural value chains, about 57% of the household's sample are involved in production, processing, and distribution activities. Among these 57%, the majority focus exclusively on primary production. Overall, the minimum acreage of land own by most farmers is 0.81 hectares where they mostly grow beans (49.87%) and cassava (18.27%), corn (10.32%), rice and sweet potatoes (5.63% each) respectively and palm oil (1.05%), amaranth (0.47%) and green bananas or plantains (0.79%) is the least grown crops. Almost 72% of the respondents in rural own land for commercial purpose. The study also found that 43% of respondents residing in urban areas do not have land for planting commercial crops against 28% with land where they plant crops for both domestic and commercial use.

Most of farmers (65.0%) stated that because of the pandemic they spent most of their time farming in their own land without any assistance as compared to the previous years. Moreover, 56.6% of the farmers reported that they hired workers so that they can assist in planting, cultivating and harvesting of the crops. About 12.3% of farmers spent more number of days taking care of their farms compared to those who hired workers. Our findings suggest that the majority of farmers spent the same amount of seeds and other inputs compared to the previous years. Only about 25% the respondents reported that they spent less seeds and inputs as compared to the previous years. Overall, farmers tend to spend more on inputs while harvesting the same amount of harvest.

With respect to the crop prices, the results show that 47.6% of farmers expect the prices to increase while 28.5% believe the price will remain the same. Overall, despite the government's effort to contain food prices (corn, beans, etc.), expectations are such that prices will keep increasing because of the disparity between the supply and demand on one side but also due to increasing cost of inputs and other factors of production.

Due to the disruptions induced by the pandemic, about 61% of the respondents stated that they are likely not to sell their crops to the same intermediaries, markets or places against 35.8% who are willing to sell their crops to the same intermediaries, markets or places. Willingness of the majority of farmers to change intermediaries maybe an indication that they prefer to sell directly to the market to maximize their earnings. With respect to livestock, the results are almost the reverse of

that of crop sector; indeed, the majority of the respondents stated that they hope to sell their livestock products to the same intermediaries, places or markets.

To analyze the impact of the pandemic on women empowerment, we used the Abbreviated Women's Empowerment in Agriculture Index (A-WEAI), covering a period just before (recall data) and after (current data) the COVID-19 pandemic. Comparing the adequacy rates before and after COVID-19, the global pandemic clearly had little or no impact on the empowerment profile of men and women. While men experienced a small decrease in asset ownership (-1.51 %-points) combined with a similarly sized increase in group participation (+1.58%-points), there are no statistically significant changes among women. Despite the reassuring observation that COVID-19 did not worsen people's empowerment in Burundi, as can also be inferred from the mean empowerment scores, it certainly did not challenge or change the structural inequalities that exist between men and women. However, we observed a minor impact of COVID-19 combined with structural gender inequalities reflected in the disadvantaged position of women regarding control over income sources and workload. We also found substantial variation in post-COVID female disempowerment across provinces. Whereas mean disempowerment rates are below 0.200 in Muyinga, Cankuzo and Bururi, women in various provinces throughout the country are suffering from high levels of disempowerment. This is particularly the case for women living in Kayanza and Cibitoke, where rates exceed 0.500, while those in Rutana, Kirundo, Gitega and Muramvya are also substantially more constrained than what is on average observed by women in Burundi (0.355).

While controlling for household characteristics and their locations attributes, we found that health related variables (often associated to vulnerability to COVID-19) had positive impact on households daily budgets (used here as proxy for food security and poverty). Especially, households affected by breathing difficulty and exposed to Ebola. In other words, although breathing problems may be a symptom of the COVID-19 pandemic, other lingering health issues such as Ebola and Cholera may still increase the probability of Burundians to fall below food security and poverty thresholds. Indeed, negative shocks such as illness of an income-earning household member, job loss, bankruptcy of a non-farm family business, and increase in the price of a major food item increase the probability of depleting households' assets to cope and ultimately threaten their food security standings. With respect to demographics, the findings do not suggest any gender discrimination pattern. This confirms the discussion on WEAI where there was no significant difference in terms of empowerment between male and female headed households. However, the results show that the higher the density (proxied here by the sample weight), the higher the probability of falling below food security and poverty benchmarks. Higher population density is expected to increase the speed of COVID-19 contagion, therefore contributing to negative impacts on food security. Our findings suggest that active participation to agricultural value chains appears to prevent a decline in household daily budget as a results of health shocks. More specifically, households in crop and livestock production are less likely to experience a decrease in their income. This also confirms the preponderance of crop and livestock sectors among Burundians.

Overall, challenges facing different agricultural value chains participants due to COVID-19 include workers absenteeism and travel restrictions, difficulties in finding spare parts or repairment for their machines, and difficulties in accessing suppliers and financial services. Most requested supports evolve around prices stabilization, inputs subsidies and tax breaks.

## References

- Abaya, S. W., Mandere, N., & Ewald, G. (2009). Floods and health in Gambella region, Burundi: A qualitative assessment of the strengths and weaknesses of coping mechanisms. *Global Health Action*, 2(1), 1-10.
- Assessment Capacities Project. (2020). Outbreaks in East Africa Desert Locusts and COVID-19. Briefing Note - May 14, 2020.
- Africa Centres for Disease Control and Prevention. (2020). Outbreak Brief #50: Coronavirus Disease 2019 (COVID-19) Pandemic, December 29, 2020.
- African Development Bank. (2020). Nepal macroeconomic update, April 2020.
- Alliance for a Green Revolution in Africa, Bill & Melinda Gates foundation, Federal Ministry for Economic Cooperation and Development, USAID & partners. (2020). COVID-19 Situation Report No. 8, August 21, 2020.
- Alkire, S., Meinzen-Dick, R., Peterman, A., Quisumbing, A., Seymour, G., Vaz, A. (2012). The Women's Empowerment in Agriculture Index. IFPRI Discussion Paper 1240. Washington, D.C.: International Food Policy Research Institute.  
<http://ebrary.ifpri.org/cdm/singleitem/collection/p15738coll2/id/127346>
- Baldwin, R. (2020). Thinking ahead on Covid19 and GVCs. The COVID concussion and supply-chain contagion waves.
- Baldwin, R., & Di Mauro, B. W. (2020). Introduction. In R. Baldwin & B. W. Di Mauro (Eds.), *Economics in the time of COVID-19*.
- Catherine, S. (2020). The mid-year review of the 2020 humanitarian response plan, United Nations Burundi.
- Coaches and Mentors Association of South Africa. (2020). Macroeconomic impacts of COVID-19 in Sub-Saharan- Africa, Special Report, June 5, 2020.
- Food and Agricultural Organization. (2020h). Impact of COVID-19 on agriculture, food systems and rural livelihoods in Eastern Africa: Policy and programmatic options, July 2020.
- Famine Early Warning Systems Network. (2020a). 2019 short rains in East Africa among the wettest on historical record. Famine Early Warning systems Network (FEWS NET), January 29, 2020.
- Programme Alimentaire Mondial (2017), Evaluation de la Situation alimentaire en situation d'urgence au Burundi

République du Burundi (2019), Rapport sur le Développement Humain

United Nation news. (2020). East Africa locusts threaten food security across sub-region, alerts United Nation agriculture agency, 20 January 2020.

United Nation. (2020a). Department of economic and social Affairs, May 13, 2020.

United Nation. (2020b). The long-term impact of COVID-19 on poverty, UN/DESA Policy Brief No.86: Department of Economic and Social Affairs, 15 October 2020

World Bank. (2020b). Global economic prospects, June 2020. (World Bank 2020).

World Bank. (2020c). Tackling the impacts of COVID-19 is imperative to Burundi's journey to prosperity, 29 October 2020.

Week, D. A., & Wizer, C. H. (2020). Effects of flood on food security, livelihood and socio-economic characteristics in the flood-prone areas of the core Niger Delta, Nigeria. *Asian Journal of Geographical Research*, 3(1), 1–17.

World Food Program; climate responses adaptation in Burundi

World Food Program. (2020a). COVID-19 economic and food security implications in East Africa, March 28, 2020.

World Food Program. (2020c). Burundi: Situation Report No 1, 17 April

World Food Program. (2020e). WFP EAST AFRICA external situation update no. 1 July 2020.

World Food Program. 2020d. WFP EAST AFRICA update on the desert locust outbreak, June 12, 2020.

Abaya, S. W., Mandere, N., & Ewald, G. (2009). Floods and health in Gambella region, Burundi: A qualitative assessment of the strengths and weaknesses of coping mechanisms. *Global Health Action*, 2(1), 1-10.

ACAPS. (2020). Outbreaks in East Africa Desert Locusts and COVID-19. Briefing Note - May 14, 2020.

ACDC. (2020). Outbreak Brief #50: Coronavirus Disease 2019 (COVID-19) Pandemic, December 29, 2020. ADB. (2020). Nepal macroeconomic update, April 2020.

Adugna, A., Habtamu, B., Aboma, Z., Bokretzion, G., Desalegn, N., Boja, D., Abnet, A., Tujuba, E., Birhanu, G., Henok, B., Hailemariam, D., Bacha, M., Helina, L., Firdawek, B., Kalkidan, M., Seble, S., Heven, S., Nebiyou, Y., Mesfin, T., Hiwot, A., Ashenafi, A. (2020). Establishment of COVID-19 testing laboratory in resource-limited settings: Challenges and prospects reported from Burundi. *Global Health Action*, 13(1), 1-7.

- AGRA, Bill & Melinda Gates foundation, Federal Ministry for Economic Cooperation and Development, USAID & partners. (2020). COVID-19 Situation Report No. 8, August 21, 2020.
- Baldwin, R. (2020). Thinking ahead on Covid19 and GVCs. The COVID concussion and supply-chain contagion waves.
- Baldwin, R., & Di Mauro, B. W. (2020). Introduction. In R. Baldwin & B. W. Di Mauro (Eds.), *Economics in the time of COVID-19*.
- Beyene, M. L., Ferede, T., & Diriba, G. (2020). The economy wide impact of the COVID-19 in Burundi: Burundi in economic association: policy and recovery options policy working paper 03/2020, July 2020
- Browning, M., & Rigolon, A. (2019). School green space and its impact on academic performance: A systematic literature review. *International Journal of Environmental Research and Public Health*, 16(3), 429.
- Bundervoet, T., & Finn, A. (2020). Burundi poverty assessment: What can it tell us about the likely effects of the coronavirus? World Bank blog, 16 April.
- Caeolina, S. P. (2020). COVID-19 will hit the poor hardest. Here's what we can do about it, April 23, 2020
- Catherine, S. (2020). The mid-year review of the 2020 humanitarian response plan, United Nations Burundi.
- COMENSA. (2020). Macroeconomic impacts of COVID-19 in Sub-Saharan- Africa, Special Report, June 5, 2020.
- Connors, C., Malan, I., Canavan, S., Sissoko, F., Carmo, M., Sheppard, C., & Cook, F. (2020). The lived experience of food insecurity under Covid-19: A bright harbour collective report for the food standards agency.
- Cressman, K. (2016). Desert locust. *Biological and Environmental Hazards, Risks, and Disasters*, 87–105. <https://doi.org/10.1016/B978-0-12-394847-2.00006-1>
- Devereux, D. (2020). Social protection responses to the COVID-19 lockdown in South Africa. *The Conversation*. Accessed on April 22, 2020
- EPHI. (2020). COVID19 update. Addis Ababa. May 23, 2020.
- FAO. (2020a). The worst desert locust outbreak in decades threatens food security across East Africa, GIEWS Special Alert, 29 January 2020

FAO. (2020b). FAO appeals for urgent support to fight worsening desert locust upsurge in the Horn of Africa, Rome, and 30 January 2020.

FAO. (2020c). Desert locust upsurge – Progress report on the response in the Greater Horn of Africa and Yemen (January–April 2020).

FAO. (2020d). Anticipating the impacts of COVID-19 in humanitarian and food crisis contexts, 4 April 2020

FAO. (2020e). FAO in emergencies: Helping to build the world without hunger, 13 April 2020.

FAO. (2020f). Desert locust emergency in Somalia UPDATE 4 | 18 May 2020

FAO. (2020g). Addressing the impacts of COVID-19 in food crises. Food and Agriculture Organization of the United Nations.

FAO. (2020h). Impact of COVID-19 on agriculture, food systems and rural livelihoods in Eastern Africa: Policy and programmatic options, July 2020.

FEWS NET. (2020a). 2019 short rains in East Africa among the wettest on historical record. Famine Early Warning systems Network (FEWS NET), January 29, 2020.

FEWS NET. (2020b). Impacts of COVID-19 on crop and livestock production. Global Special Report, August 2020.

FSNWG. (2020a). East Africa desert locust and food security update: Current upsurge threatens upcoming 2020 agricultural season, special report, 17 February 2020

GNAFC & FSIN. (2020). Global report on food crisis, April 2020.

HLPE. (2020a). Food security and nutrition: Building a global narrative towards 2030 report.

HLPE. (2020b). Impacts of COVID-19 on food security and nutrition: Developing effective policy responses to address the hunger and malnutrition pandemic. Committee on World Food Security High Level Panel of Experts on Food Security and Nutrition. HLPE issues paper. September 2020 Rome.

Ho, A., & Dascalu, I. (2020). Global Disparity and solidarity in a pandemic. *Global Disparity and solidarity in a pandemic. Hastings Center Report*, 50(3), 65–67.

Hurnik, J., Kober, C., Plotnikov, S., & Vavra, D. (2020). Socio-economic Impact Analysis of COVID-19, August 2020

IFRC. (2020b). East Africa: Red Cross raises the alarm over a “triple menace” of floods, COVID-19 and locusts.

ILO. (2020a). COVID-19 and the world of work: Impact and policy responses, 18 March 2020.

- ILO. (2020b). COVID-19 and the world of work (Fifth ed.). 30 June 2020.
- IPC. (2020b). BURUNDI: Belg pastoral and agro pastoral producing areas analysis, July 2020 – June 2021 Issued September 2020
- Josephson, A. (2020). Socioeconomic impacts of COVID-19 in four African countries. Policy Research Working Paper 9466.
- Kansiime, M. K., Tambo, J. K., Mugambi, I., Bundi, M., Kara, A., & Charles Owuor, C. (2020). COVID-19 implications on household income and food security in Kenya and Uganda: Findings from a rapid assessment. *World Development*, 137.
- Kimani, J., Adhiambo, J., Kasiba, R., Mwangi, P., Were, V., Mathenge, J., Macharia, P., Cholette, F., Moore, Shaw, S., Becker, M., Musyoki, H., Bhattacharjee, P., Moses, S., Fowke, F. R., McKinnon, L. R., & Lorway, R. (2020). The effects of COVID-19 on the health and socio-economic security of sex workers in Nairobi, Kenya: Emerging intersections with HIV. *Global Public Health*, 15(7), 1073–1082.
- Laborde, D., Martin, W., Swinnen, J., & Vos, R. (2020). COVID-19 risks to global food security. *Science*, 369(6503), 500–502.
- Malapit, H., Kovarik, C., Sproule, K., Meinzen-Dick, R., Quisumbing, A. (2020). Instructional Guide on the Abbreviated Women’s Empowerment in Agriculture Index (A-WEAI). Washington, D.C.: International Food Policy Research Institute (IFPRI).  
<http://ebrary.ifpri.org/cdm/ref/collection/p15738coll2/id/129719>
- Mbow, M., Lell, B., Jochems, S. P., Cisse, B., Mboup, S., Dewals, B. G., Assan Jaye, A., Alioune Dieye, A., & Yazdanbakhsh, M. (2020). COVID-19 in Africa: Dampening the storm? *Science*, 369(6504), 624–626.
- Mengistu, A., Pramila, K. P., Maaskant, K., Meyer, J. C., & Krkoska, E. (2020). Firms in Burundi’s industrial parks: Covid-19 impacts, challenges, and government response, September 24, 2020.
- Mercy Corps. (2020). Assessment and recommendations: Economic impact of COVID-19 in the Somali region, June 2020.
- OCHA. (2020a). Eastern Africa region: Floods and locust outbreak snapshot, May 2020.
- OCHA. (2020b). Humanitarian bulletin Burundi issue no. 16 September 14–27, 2020.
- OECD. (2020). COVID-19 and developing countries: What policies and partnerships to respond, reset and rebuild? May 7, 2020.

Ouko, K. O., Gwada, R. O., Alworah, G. O., Onganga, Z. M., Ochieng, S. V., & Ogola, J. R. O. (2020).  
 Review article on effects of covid-19 pandemic on food security and household livelihoods in kenya. *Review of Agricultural and Applied Economics Acta Oeconomica Et Informatica*, 23(2), 72–80.

Pangestu, M. E. (2020). Hunger amid plenty: How to reduce the impact of COVID-19 on the world's most vulnerable people. *World Bank Blogs*.

UN news. (2020). East Africa locusts threaten food security across sub-region, alerts UN agriculture agency, 20 January 2020.

UN. (2020a). Department of economic and social Affairs, May 13, 2020.

UN. (2020b). The long-term impact of COVID-19 on poverty, UN/DESA Policy Brief No.86: Department of Economic and Social Affairs, 15 October 2020

UNCTAD. (2020). The Covid-19 shock to developing countries: Towards a 'whatever it takes' program for two-thirds of the world's population being left behind. March 2020.

UNE. (2020). Policy brief: The impact of COVID-19 on food security and nutrition, June 20, 2020. [reliefweb.int/report/world/policy-brief-impact](http://reliefweb.int/report/world/policy-brief-impact)

UNECA. (2020). Impact assessment of Covid-19: The case of Eastern Africa

UNHCR. (2020). Refugees, asylum-seekers, refugee returnees and IDPs as of 31 March 2020.

UNICEF. (2020). Burundi situation reports humanitarian action for children.

USAID. (2020). East Africa-Desert locust crisis. Fact sheet #7, September 30/2020.

WB. (2020a). Emergency locust response program (P173702). Uganda Annex, 4 March 2020.

WB. (2020b). Global economic prospects, June 2020. (World Bank 2020).

WB. (2020c). Tackling the impacts of COVID-19 is imperative to Burundi's journey to prosperity, 29 October 2020.

Week, D. A., & Wizer, C. H. (2020). Effects of flood on food security, livelihood and socio-economic characteristics in the flood-prone areas of the core Niger Delta, Nigeria. *Asian Journal of Geographical Research*, 3(1), 1–17.

Welt Hunger Hilfe. (2020). Drought, locusts, Coronavirus, and now a once-in-a-century flood, September 2020.

WFP. (2020a). COVID-19 economic and food security implications in East Africa, March 28, 2020.

- WFP. (2020b). Impact of Covid-19 outbreak on livelihoods, food security and nutrition in East Africa, 15 April 2020.
- WFP. (2020c). Burundi: Situation Report No 1, 17 April
- WFP. (2020e). WFP EAST AFRICA external situation update no. 1 July 2020.
- WFP. (2020f). East Africa regional food security & nutrition update regional Bureau Nairobi, November 2019.
- WFP. 2020d. WFP EAST AFRICA update on the desert locust outbreak, June 12, 2020.
- Wolf, J., Prüss-Ustün, A., Cumming, O., Bartram, J., Bonjour, S., & Higgins, J. P. T. (2014). Systematic review assessing the impact of drinking water and sanitation on diarrhoeal disease in low- and middle-income settings: Systematic review and meta-regression. *Tropical Medicine and Health*, 19(8), 928–942.

## Appendix

The table below show the partition of the first part of the sample.

**Table 23: Partition of sample 1**

Province	Total number of CDs			Number of CD to be drawn			Number of households to be drawn		
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
BUBANZA	16	305	321	3	7	10	34	84	118
BUJA RURAL	17	540	557	2	7	9	23	82	104
BURURI	30	539	569	2	8	10	24	96	120
CANKUZO	3	231	234	3	7	10	34	81	115
CIBITOKÉ	19	431	450	5	4	9	60	47	107
GITEGA	35	692	727	3	7	10	15	81	96
KARUSI	8	433	441	3	7	10	20	84	104
KAYANZA	21	623	644	5	7	12	58	84	142
KIRUNDO	13	626	639	3	7	10	36	83	119
MAKAMBA	10	407	417	4	4	8	48	42	90
MURAMVYA	8	299	307	3	7	10	36	84	120
MUYINGA	9	604	613	3	7	10	35	64	99
MWARO	3	281	284	3	7	10	33	79	112
NGOZI	35	659	694	3	7	10	36	83	119
RUMONGE	4	180	184	4	7	11	46	79	125
RUTANA	8	334	342	5	7	12	58	83	141
RUYIGI	6	398	404	3	7	10	36	82	118
BUJA MAIRIE	463	0	463	12	0	12	141	0	141
Total	708	7582	8290	71	120	191	852	1440	2090

Source: Burundi Covid Impact Survey (BCIS), 2022

The **BCIS** is based on a sample of 191 CDs distributed over the 36 strata. A systematic drawing of CDs within each stratum with probabilities proportional to the size of the CDs was conducted, where size is the number of households per CD. The CDs were drawn independently in each stratum with unequal probabilities using the cumulative totals method.

The probability of a CD being drawn is calculated as follows:

$$P_{hi} = \frac{N_h * M_{hi}}{\sum M_{hi}}$$

- $P_{hi}$  is the probability of selecting CD  $i$  from stratum  $h$  in the first stage.
- $N_h$  the number of CDs to be drawn in stratum  $h$ .
- $M_{hi}$  The number of households in CD  $i$  in stratum  $h$ .

#### **Drawing of households**

The enumeration of households in each of the sample CDs drawn provided a list of households from which sample households are selected in the second stage. Households were drawn after a census of all households in each sample CD. A systematic draw of 12 households without replacement in each CD was conducted. Thus, all households in the same CD had the same probability of being included in the sample. The probability of drawing a household in CD  $i$ ,  $P_{mi\_male}$ , is given by:

$$P_{mi} = \frac{m_i}{M'_i} * C_i$$

- $m_i$  : the number of households to be drawn in CD  $i$  of the sample.
- $C_i$  : the oversampling correction coefficient.
- $M'_i$ : the total number of households in a CD.

#### **Calculation of final weights**

The survey weights are determined from the drawing probabilities. They are calculated for each household according to the following formula:

$$W_{mi} = \frac{1}{P_{mi} \times P_{hi}}$$