Food and Agriculture Organization of the United Nations

AGRICULTURAL LIVELIHOODS AND FOOD SECURITY IN THE CONTEXT OF COVID-19

Results from household surveys in 11 countries with high pre-existing levels of food insecurity

Cross-country monitoring report
May 2021

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Abbreviations

COVID-19	Coronavirus disease 2019
FAO	Food and Agriculture Organization of the United Nations
FIES	Food Insecurity Experience Scale
FSIN	Food Security Information Network
GNAFC	Global Network against Food Crises
ILO	International Labour Organization
OxCGRT	Oxford COVID-19 Government Response Tracker
RDD	Random digit dialling
USAID	United States Agency of International Development
WFP	United Nations World Food Programme

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Executive summary

The assessment presented in this report uses livelihood survey data collected by the Food and Agriculture Organization of the United Nations (FAO) from June to November 2020 in 11 highly food insecure countries. This has been made possible with funding from the United States Agency for International Development (USAID). These efforts have led to the assembly of the survey data into one of the largest datasets so far used to look at coronavirus disease 2019 (COVID-19)-related impacts on rural and agricultural livelihoods. It contributes to the growing body of evidence by focusing specifically on agricultural households, and sheds new light on the impact of COVID-19 and other shocks on the lives and livelihoods of these households. All countries selected appear in the list of "food crisis countries" published annually by the multi-agency Food Security Information Network (FSIN). These countries are Afghanistan, Central African Republic, Colombia, Democratic Republic of the Congo, Liberia, Mali, Niger, Sierra Leone, Somalia, Yemen and Zimbabwe.

Key questions

This monitoring assessment aims to understand the impact of COVID 19 related restrictions on agricultural livelihoods by examining the following key questions:

- Question 1
  How important has the impact of COVID-19 related restrictions been compared to other shocks, including drought, flooding and conflict?
- Question 2
  Within the existing vulnerability context, have there been significant variations in impact according to the type of agricultural livelihood? For example, have there been significant variations between households relying mainly on crop cultivation compared to households more reliant on livestock production?
- Question 3
  Irrespective of type of agricultural livelihood, where has the biggest impact in terms of the production–marketing cycle taken place? Has the impact manifested itself more in terms of production or in terms of sales and marketing?

Other research conducted on the impact of COVID-19 on livelihoods has already highlighted how restrictions led to a decrease in income and consumption, threatening the food security of low-income households. It has also been noted how food price increases accompanied the restrictions. Moreover, for agricultural households, it is known that restrictions affected their access to inputs, labour and ability to sell their production. Previously available evidence highlighted the particular vulnerability of livestock producers to COVID 19 related restrictions due to their high reliance on inputs for feed and veterinary supplies, as well as due to the particular vulnerability of pastoral populations to movement restrictions and international border closures. Other agricultural sectors, such as forestry and fisheries, were also known to have been

affected, highlighting the need for a better understanding on mitigating the risks to agricultural households.

Results

This report uses ordinal logistic regressions to look at the correlations between COVID-19-related restrictions and other shocks on income change, as reported by households on a Likert scale. It also uses logistic regressions to understand the associations between COVID 19 related restrictions and other shocks on food security and access to markets.

Question 1

The results highlight how the impact of COVID-19-related restrictions on incomes and food security outcomes were comparable to that of major shocks, such as conflict or natural disasters. This is a highly significant finding, illustrating the importance of viewing the economic impacts of COVID-19 through the same lens that humanitarian and development actors would view a drought or a conflict. It highlights the need for emergency livelihood support strategies as well.

In addition, across the board and regardless of income source, female-headed households were more likely to report income losses or to become food insecure.

Question 2

When looking at the interaction between COVID-19-related restrictions and specific income sources, the findings allow to distinguish two groups of livelihoods for which the impact of COVID 19 related restrictions seems to differ.

The first group includes livestock and cash crop producers. As highlighted by other research, livestock producers were among the most severely affected by the restrictions. They were the most likely among agricultural producers to report difficulties in accessing inputs or selling their products. They were also heavily affected by restricted access to pastures due to movement restrictions. The second group was made up by small-scale fish and vegetable producers, petty traders selling fish and vegetables, many of whom are women, who were also highly affected by COVID-19-related restrictions. The latter producers were as heavily or more severely affected as petty traders outside the agricultural sector.

The difference between these two groups of agricultural producers is that livestock producers were to some extent able to cushion the impact of COVID-19-related restrictions on incomes and food security by delaying sales and engaging in distress sales, even though this led to asset depletion. This short-term coping strategy can have serious longer-term consequences in terms of a secure access to food and income in the future. Unlike livestock producers, vegetable and fish producers and sellers had no opportunity to mitigate their losses, given that their inability to access markets meant a complete loss of ready to sell produce; as such, this led to an immediate income shock. The only slight compensation for these producers was that they were able to consume their own production, slightly reducing the shock to their food security.

Question 3

In terms of the access to markets, the general pattern from the findings shows a stronger association between COVID-19-related restrictions and sales constraints than with input constraints. However, the difficulties most likely to be faced by agricultural producers varied by agricultural sub-sector.

The impact pathway of COVID-19-related restrictions largely depended on two factors: (i) the frequency at which households need to secure inputs for their production (livestock producers needing inputs the most frequently were the most affected by supply chain constraints) and (ii) the ability to store or keep agricultural production when faced with delays in accessing markets (fish and vegetable sellers were more affected by the inability to sell their production than by limitations in accessing inputs). Overall, the origin of these inputs (whether imported or locally sourced) probably affected their availability in local markets as well.

Conclusions

The findings presented in this report confirm that COVID-19-related restrictions led to severe shocks to livelihoods and food security in the countries analysed. In this respect, the key findings from this assessment are as follows.

- In highly food insecure countries, the correlation between COVID-19-related restrictions and food security is similar in magnitude to that of conflict or natural hazards.
- The overall decrease in income was particularly high for vegetable and fish producers whose products are highly perishable, highlighting how movement restrictions and consequent transportation delays of agricultural goods affected these groups the most, causing severe losses that could not be compensated once restrictions were lifted.
- Livestock producers were among the most severely affected by the restrictions, however the impact for many of them has been cushioned though either delayed sales or through asset depletion, whereby producers engaged in distress sales, selling their animals before they died as they were unable to feed them. This can lead to a cycle of poverty where in future years their herds have been depleted and their food security and livelihoods has been compromised.
- The enforcement of COVID-19-related restrictions has reduced the incomes of agricultural producers as well as their food security. As the pandemic and associated restrictions continue, both supply and demand-side measures are necessary, as outlined below.

Recommendations

Supply side

- In the face of movement restrictions, it is paramount that producers of rapidly perishable products are allowed to access markets safely and in a timely manner. Support for transportation, storage, the facilitation of green (non-taxed) channels, and support for processing can go a long way to safeguard agricultural livelihoods as well as moderate the increase in food prices.
- Market information systems could play a key role in making agricultural producers and traders aware of restrictions, supportive measures and other potential market disruptions, allowing them to better tackle these changes. This is potentially for all sectors, including pastoralism, for which phone-based information systems already exist.
- Access to inputs for both livestock (feed and veterinary supplies) and crops (seeds, fertilizers and pesticides) should be safeguarded. This can be done in various ways, including through subsidies and voucher schemes.

Demand side

- Market constraints had a double effect on agricultural livelihoods: increasing prices for consumption and reducing incomes from sales. This double effect led to significant increases in food insecurity. It is therefore necessary to accompany supply-side interventions with actions designed to increase food access. This can take the form of targeted transfers through cash, vouchers or direct food aid depending on market conditions. Such measures are particularly relevant for pre-existing vulnerable groups, such as female-headed households and those relying heavily on agricultural wage labour, charity and petty trade.
- In addition to these known vulnerable groups, COVID-19-related restrictions call for a redefinition of vulnerability. Many formerly food secure farmers, fisherfolk and livestock owners have been plunged into poverty due to an inability to access inputs and sell their production, as well as due to forced asset depletion. Targeted transfers to these households – allowing them to sustain the quality and quantity of their diets – can prove essential in preventing an increase in the prevalence of food insecurity.

Introduction

The coronavirus disease 2019 (COVID-19) pandemic may reverse years of progress made in reducing poverty and improving food security worldwide, its impacts having disrupted food systems throughout the world. The World Bank projects that COVID-19 will push more than 100 million additional people into extreme poverty in 2021, representing the first increase in extreme poverty worldwide since 1998 (World Bank, 2021). Preliminary projections suggest that the COVID-19 pandemic and its indirect impacts will increase the number of chronically food insecure people, from 690 million in 2019 to between 773 and 822 million in 2020 (FAO, IFAD, UNICEF, WFP and WHO, 2020).

The Global Network Against Food Crisis (GNAFC) highlighted that COVID-19 exacerbates acute food insecurity and stresses agri-food systems because it "places an additional burden on fragile political and social systems, compounding existing risks, including conflict, economic crises, natural disasters, climate extremes/variability, animal and plant diseases and pests" (GNAFC, 2020:2). It is plausible that attempts to contain the pandemic through movement restrictions and other measures, compounded by the ensuing economic recession, have had a compounding effect on pre-existing vulnerabilities and have increased the level of acute food insecurity among the most at-risk populations, particularly in localized hotspots (FAO and WFP, 2020).

During the first months of the pandemic, most literature on the impacts of COVID-19 were based on projections or theory. More recently, evidence on the impacts of the crisis on the livelihoods of households in several countries has been published. This report contributes to the growing body of evidence, focusing specifically on agricultural households in 11 of the world's poorest and most food insecure countries. As such, this report sheds new light on the impact of COVID-19-related restrictions and other shocks on the lives and livelihoods of these households, using original datasets collected by interviewing households from June to October 2020.

The present report, data collected and accompanying analysis are part of a project funded by the United States Agency for International Development (USAID), designed to assess the impact of COVID-19 and other shocks on agricultural livelihoods, with a specific focus on smallholder farmers in food crisis countries. This report focuses on 11 low and middle-income countries,[1] all of which appear in the list of "food crisis countries" published annually by the multi-agency Food Security Information Network (FSIN).

The information in this report is noteworthy, not least with respect to the sheer volume of data collected and being analysed. Spanning over 25 000 households across 11 countries, it is one of the largest datasets assembled so far to look at the impacts of COVID-19 on rural and agricultural livelihoods. Agricultural households have been defined broadly to include households engaged in crop and livestock production, as well as fisheries and forestry activities. The emphasis on the impact on agricultural livelihoods, complements other studies that focus on food access (WFP, 2020b; WFP and IOM, 2020) or policy responses (Gentilini *et al*., 2020 and IFPRI, 2020), particularly in the agricultural

[1] Afghanistan, Central African Republic, Colombia, Democratic Republic of the Congo, Liberia, Mali, Niger, Sierra Leone, Somalia, Yemen and Zimbabwe.

sector (FAO, 2020d; 2020e; 2020f). This report is the first in a series of multicountry COVID-19 monitoring reports planned to be released during 2021, with the data for these reports coming from a monitoring system operating in over 20 countries. As successive rounds of monitoring are completed, it will be possible to incorporate a time dimension and to assess the outcomes of policy changes, seasonality and spill over effects.

Recognizing the vast diversity of food systems among and within countries and, given their diversity and complexity, "exploring all the possible ways through which any crisis could affect [them] would be futile" (Savary *et al.*, 2020: 698). Still, stresses and shocks that harm livelihoods are the result of interactions between global forces and local contexts (De Haan, 2000; De Haan and Zoomers, 2003; Armitage and Johnson, 2006), and different shocks and stressors may interact with each other (Generoso, 2015; Kamarek *et al.*, 2020; Ansah *et al.*, 2020). At the individual level, the analysis of this and associated reports focuses on how different actors are affected by events and how this impedes their operations from being completed efficiently. In countries experiencing acute food insecurity, food systems are particularly vulnerable to disruption and may be less able to recover vis-à-vis food systems in countries not facing acute levels food insecurity. Against this backdrop, this report aims to document the extent to which these actors have been affected as a function of the ability of food systems to absorb and recover from shocks.

Research question and literature review

This report aims to inform the programming, messaging and positioning of the response and technical value added of FAO, the international community and resource partners by answering the following question.

> What has been the impact of COVID-19 on agricultural livelihoods in a cross-section of countries experiencing high levels of pre-existing acute food insecurity?

To answer this overarching question, the report considers the following sub-questions.

- How do increases in the severity of COVID-19-related restrictions, the occurrence of other shocks and the population's dependence on each type of livelihood affect income levels and/or food security?
- How did COVID-19-related restrictions interact with existing inequalities and affect the income or food security levels of households relying on different income sources?
- Among households engaged in agriculture, what pathways did COVID-19-related restrictions take in affecting agricultural livelihoods? Was the problem more related to the access to inputs or to fluctuations in sales?

COVID-19 and other shocks: fluctuations in income and food security

While the available literature indicates that COVID-19-related shocks have indeed had a negative impact on agricultural livelihoods, it is also the case that during 2020, agricultural households continued to face other types of shocks, unrelated to COVID-19. For instance, the incidence of outbreaks of crop and animal pests and diseases, including the Desert Locust pest, natural hazards (in particular, droughts, floods and cyclones) and conflict are particularly pronounced in many of the countries included in this assessment. It thus seems likely that the effects of COVID-19 will have been exacerbated by these other pre-existing conditions and factors. In fact, several studies have highlighted that the effects of COVID-19 on specific commodities and contexts are compounded by a multitude of other shocks (Steenbergen *et al.*, 2020; UNDESA, 2020; and GNAFC, 2020).

With measures in place to help curb the spread of COVID-19 consisting largely of movement restrictions, income-earning opportunities for many have been constrained, particularly in the informal sector. Informal workers lost an estimated 60 percent of their earnings in the month after COVID-19 was declared as a pandemic of international concern (ILO, 2020b). In Africa and Latin America, this figure was nearly 80 percent. In addition, worldwide remittances were expected to decrease by 20 percent in 2020 as migrant workers lost their employment in host countries (World Bank, 2020), which has been hard on rural populations since over 40 percent of these global remittances are sent to rural regions (FAO, 2020). While this loss of income will likely be more prominently felt among the urban poor, the rural poor have not and will not be exempt, with income losses already being found as a significant change resulting from COVID-19-related

regulations (Rahman and Matin, 2020; Aggarwal *et al.*, 2020; Hirvonen *et al.*, 2020; Pu and Zhong, 2020; Farias and de Araujo, 2020; Kansiime *et al.*, 2020; McKinsey, 2020; Rélouendé Zidouemba, 2020; Carreras *et al.*, 2020; Shariff Mohamed *et al.*, 2020).

Moreover, the World Bank has been conducting high-frequency phone surveys in several countries (Nkengne *et al.*, 2020). Results from the analysis of those surveys include the fact that, on average, 77 percent of surveyed households in Ethiopia, Nigeria, Malawi and Uganda have seen reductions in their incomes due to the pandemic (Josephson, Kilic and Michler, 2020). The share of households reporting income losses was highest among those households engaged in non-farm enterprises (over 80 percent of households in each of the countries), followed by those receiving remittances (ranging from 50 to 85 percent, depending on the country). Regarding on-farm income, wages and other sources of income, results varied across countries in terms of which households were impacted more. There was little difference between rural and urban households in terms of which households were more affected.

COVID-19-related restrictions have also resulted in decreased incomes among consumers, which threatens the food security of low-income households. In addition to decreased income, food security has been threatened due to rising food prices in some cases as a result of the movement and similar restrictions put in place to contain the spread of COVID-19. It is worth noting that, after initial soaring food prices, mostly due to panic buying (Yu *et al.*, 2020; Elleby *et al.*, 2020), there was evidence that food markets stabilized (GNAFC, 2020; UN, 2020; Varshney, Roy and Meenakshi, 2020).

Other evidence shows households reporting increases in food prices and other key consumption goods. For instance, 66 percent of surveyed households in Malawi and 90 percent of surveyed households in Nigeria reported these types of increases in July 2020, while 53 percent of households cited higher prices in August 2020 (Amankwah and Gourlay, 2021). More recent evidence shows that globally, food prices increased by 14 percent in 2020 in real terms (Malpass, 2021), and what's more, in January 2021 the FAO Food Price Index reached its highest level since July 2014 (FAO, 2021a). With decreased incomes coupled with increased food prices, food security outcomes are inevitably bound to deteriorate.

Integrated Food Security Phase Classification (IPC) analyses for 2020 are available for 13 countries, allowing a comparison of food security levels based on equivalent analyses for 2019. This allows for analysis on how food security has changed during the first year of COVID-19 pandemic, without attributing the change to the pandemic. In ten of those countries, the prevalence of acute food insecurity had increased from 2019 levels. Those ten countries were Burkina Faso, Central African Republic, Democratic Republic of the Congo, Eswatini, Haiti, Honduras, Lesotho, northern Nigeria (16 states and the Federal Capital Territory), Somalia and The Sudan (GNAFC, 2020).

Food insecurity assessments were carried out for five African countries during the second and third quarter of 2020 using the Food Insecurity Experience Scale (FIES) (Amankwah and Gourlay, 2021). These assessments show that more than 70 percent of adults in Nigeria and Malawi were moderately or severely food insecure, while the share of adults experiencing moderate or severe food insecurity was 47 percent in Ethiopia, 42 percent

in Burkina Faso and 43 percent in Uganda. It is not possible to know the extent to which those levels of food insecurity can be attributed to the onset of COVID-19. However, for Nigeria – but not for other countries – the survey data allow for a comparison of levels of food insecurity in July 2018 to those from June 2020. This data shows that the share of households experiencing moderate or severe food insecurity in July 2018 was 48.5 percent, increasing to 71 percent by June 2020. This increase is the result of 43 percent of households that were not food insecure in 2018 moving into states of food insecurity by June 2020. This increase is noteworthy and could be, at least partly, due to the onset of COVID-19.

In this assessment, FAO attempts at understanding the importance of COVID-19-related shocks vis-à-vis other shocks with respect to income and food security levels in food crisis countries. In particular, a key hypothesis tested during the assessment is that both COVID-19-related restrictions and other shocks are important and relevant when assessing the degree to which income and household food security levels have fluctuated.

Impacts on crop, livestock, fisheries and forestry-producing households

With the above in mind, this report considers the COVID-19-related restrictions and their impact on the incomes of households relying on non-agricultural activities as well as on those reliant on the production and sales of crops, livestock, forestry and/or fisheries products. Admittedly, households are seldom able to be grouped in terms of entirely agricultural or non-agricultural households, given that many of them are engaged in a combination of income-generating activities. In other words, agricultural households tend to be involved in many types of livelihoods, thus they are oftentimes engaged in various types of agricultural and non-agricultural activities (Winters *et al.*, 2009).

While it is likely that all agricultural households have been, and will continue being, affected by COVID-19-related restrictions to some degree, this assessment aims to study whether it is possible to discern differences among different sub-types of households in food crisis contexts. For instance, this assessment seeks to enquire whether it makes a difference, in this context, if households rely on crop or livestock production as their main source of income. Likewise, it aims to determine if a dependence on forest products or fisheries is a factor that increases household vulnerability in the face of COVID-19 and related movement restrictions. In this respect, a literature review stemming from available evidence follows in turn.

Crop production

Crop production has been impacted by COVID-19 and its related movement restrictions. These types of restrictions have prevented some farmer from accessing inputs, labour and markets. Survey data from nine countries in Central, Eastern and Southern Africa show that bean farmers, for example, struggled to obtain inputs and the labour needed for the common bean production; they also faced difficulties in reaching markets to sell their produce (Nchanji *et al.*, 2021). Similarly, evidence from phone surveys of farmers in Myanmar shows that movement restrictions implemented to contain COVID-19 prevented crop producers from accessing inputs and marketing their harvest

(Boughton *et al.*, 2020). Also related to this, a survey of farmers in Uttar Pradesh, India conducted from late March to early May 2020 showed that labour shortages and the inability to sell crops and vegetables as a result of lockdown measures were significant constraints facing farmers (Kumar, 2021).

Livestock production

Some livestock systems may be particularly vulnerable to shocks such as COVID-19 given that livestock production often requires the ability to follow pastures, water points and distant markets (Marchant-Forde and Boyle, 2020). Wang *et al.* (2020) found that the COVID-19 pandemic had affected the dairy industries in China and the United States of America in similar ways, such as decreased farm-gate prices of milk, disruption and difficulties of moving milk along supply chains, labour shortages, increased production costs and a lack of operating capital. Based on a survey of about 200 pig farmers in Jiangsu and Zhejiang provinces in China (Zhuo *et al.,* 2020) suggest that only 40 percent of surveyed pig farmers were able to sustain pig production during the pandemic, mostly because of the decrease in access to feed and the perceived market risk.

Movement restrictions and border closures can be particularly dire on animal production and transhumance[2] (ACF, 2020), and are likely to persist even after the restrictions are lifted (GNAFC, 2020). In Nigeria, for example, livestock productivity has seen a dramatic decline since the access to fodder, supplementary feeds, minerals, critical veterinary supplies and technical services has been restricted (Samson *et al.*, 2020). In these cases, mobility restrictions can lead to a concentration of animals, thus increasing pressure on natural resources due to overgrazing and the consequent deterioration of the health and value of livestock (GNAFC, 2020). Reducing returns to livestock could be both a cause and effect of a decrease in herd size (due to the death of animals and thinning), coupled with destocking as a coping mechanism (Khan *et al.*, 2020).

Moreover, the closure of international borders to travel has resulted in bottlenecks and delays in the movement of goods including animal health inputs, raw ingredients for animal feed, and live animals (Mercy Corps, 2020). The limited access to inputs and animal health services has been affecting livestock producers (FAO, 2020c; Griffith *et al.*, 2020), particularly if they depend on a continuous supply of these inputs throughout the year; this is unlike crop production, which is much more seasonal in nature. Other factors negatively affecting the sustainability of the livestock sector include the shortage of workers due to lockdown measures and curfews, (Hashem *et al.*, 2020) and the difficulties in processing animal products, due to delivery failures and bottlenecks and decreased processing and slaughtering capacities (Hashem *et al.*, 2020; Marchant-Forde and Boyle, 2020).

Finally, the COVID-19 pandemic has triggered income losses among urban consumers, which has caused the largest decline in global meat consumption in decades (FAO, 2020a; 2020b; 2020c). This trend seems to be ubiquitous across continents and livestock products: declining economic activity due to COVID-19 restrictive measures has led to rising unemployment, in turn leading to income losses and reduced purchasing power

[2] Transhumance refers to the seasonal movement patterns followed by pastoral groups.

among would-be consumers of livestock products (GNAFC, 2020; Eftimov *et al.*, 2020). As such, the loss of consumer income has eliminated a large market segment of meat and dairy products. Even where producers and traders have managed to work around market closures and movement restrictions (Mercy Corps, 2020), the sudden loss of end markets quickly stopped the need to continue supplying milk and live animals destined for meat consumption, which are usually more expensive and whose supply is more sensitive to income fluctuations among consumers (Tesfaye, Habte and Minten, 2020). Historically, when market closures have occurred, during an outbreak of a transboundary or zoonotic disease, for example, the reduced livestock supply levels have resulted in higher meat prices for end consumers (Mercy Corps, 2020).

Fisheries

Early research on the fisheries industries in four African countries (Mauritania, Morocco, Senegal and Seychelles) that rely heavily on small-scale fisheries has raised warnings on the degree of vulnerability of the sector to COVID-19-related restrictions (Tous and Soumaré, 2020). With this in mind, several of these countries tailored policy responses so that those engaged in fisheries activities were exempt from movement restrictions, allowing the sector to continue to operate.

The assessment, of which this report is part, expects to identify and study those COVID-19-related restrictions that have been, or that can be, associated with different livelihood outcomes for households, depending on the type of agricultural activity each household pursues.

Forestry

Special considerations must also be made for forest-dependent livelihoods, given that a wide array of forest-based products fulfil several livelihood requirements, from direct household provisioning to cash income, and as a fall-back measure in times of emergency or as a means of income diversification (Shackleton, Deland and Angelsen, 2011). Referred to by some as “forest incomes” (i.e. the combination of incomes stemming from timber, fuelwood, building materials, wild foods and medicinal plants) Nerfa, Rhemtulla and Zerriffi, 2020), these are common to many rural households living in proximity to forests. It is also important to recognize that the contribution of forest-based income streams vis-à-vis total household income is higher among the poorest households (Anglesen *et al.*, 2014).

Disruptions in forest-related supply chains stemming from COVID-19-related restrictions have resulted in a sharp decline in the trade of timber (ILO, 2020a; Blaser *et al.*, 2020) and non-timber products (ITTO, 2020), as the sector has not enjoyed exemptions like the operations related to food production and transport. For agricultural households whose main activity is forestry as opposed to crop, livestock or fisheries production, COVID-19-related shocks could carry dire consequences if the markets for timber and non-timber forest products are restricted.

Impacts on agricultural production and marketing

Insights from the 2014 Ebola epidemic

The 2014 Ebola epidemic in West Africa offers some insight that may be of relevance to the current COVID-19 pandemic. Back in 2014, border closures, quarantine measures and other restrictions seriously disrupted the trade and marketing of goods including agricultural commodities (FAO, 2014b). Trade activities declined significantly, particularly in quarantined districts, with volumes traded being significantly lower than those from previous years (FAO, 2014b; 2014c). Agricultural production was also particularly affected. Because of intense rates of disease transmission during the critical crop growth and harvesting periods, which are typically carried out as a community, food production was impacted (FAO, 2014b). In addition, the significant impact of Ebola on export earnings reduced the ability of affected countries to import agricultural inputs, which resulted in reduced agricultural productivity (FAO, 2014a; 2014c).

The Ebola epidemic also had a substantial impact on consumers. Employment opportunities decreased throughout the affected countries, impacting all livelihood groups (FAO, 2014a; 2014b; 2014c). In terms of its impact on key commodities, the price of imported rice spiked well above usual seasonal patterns too (FAO, 2014b). It is also worth noting that, in the three most heavily affected countries (Guinea, Liberia and Sierra Leone), a deterioration in food insecurity outcomes was more pronounced among rural households, as many farmers were unable to grow or sell crops (FAO, 2014a; 2014b; 2014c).

Agricultural production under COVID-19 restriction measures

Under the current COVID-19 pandemic, in some countries where a strict lockdown has been observed, smallholder farmers have at times not been regarded as essential workers, thus impacting the ability of many workers to access their land and markets. In South Africa, for example, small-scale producers did not receive permits to continue farming, while 32 percent of surveyed Zimbabwean farmers reported difficulties in accessing their farms (Paganini *et al.*, 2020). Other studies, including those focusing on China, have reported difficulties in farming due to a lack of labour and inputs (Pu and Zhong, 2020; Wei and Lu, 2020) that has delayed planting operations (Zhong *et al.*, 2020).

Other initial assessments confirm that initial concerns regarding the impact of the pandemic and related restrictions on farm production have not borne out, at least in the short term (Paganini *et al.*, 2020; Carreras *et al.*, 2020). Most restrictions on the movement of people and goods were put in place in March, gradually being lifted in April or May in many countries. This means that key operations in the Southern Hemisphere, where the main production cycle runs from October to April, have been less affected while those in the Northern Hemisphere may have been more affected. Furthermore, governments have adopted different support instruments responding to agricultural production, including general subsidies, tax exemptions and the distribution of subsidized inputs (GNAFC, 2020; Ozili, 2020).

Regardless of whether agricultural production has been impacted or not, numerous factors may have contributed to the erosion of marketing channels for crop and livestock producers. Throughout the course of the COVID-19 pandemic thus far, there has been a reduction in global demand, particularly for perishable food items (GNAFC, 2020), and some food consumption patterns have changed due to a severe impact on employment and incomes (Sommer *et al.*, 2020). The effects of decreased demand and lower sales have been felt throughout the food supply chain (in the food preparation, transport and distribution sectors), particularly among small and medium enterprises (Sommer *et al.*, 2020). This being said, a trade shock induced by the pandemic would have multiple repercussions, with countries dependent on the export of agricultural products being severely hit by a global recession (McKinsey, 2020; Troskie, 2020). This is confirmed by the few empirical studies available assessing crop and livestock activities in different parts of the world (Paganini *et al.*, 2020; Carreras *et al.*, 2020; Kansiime *et al.*, 2020).

In summary, the assessment outlined in this report aims to investigate whether and to what extent challenges in the production and marketing of crops and livestock products have been associated with, or have resulted from, COVID-19-related restrictions.

Data collection and analysis

This assessment draws on data collected as part of a multi-country monitoring system designed to understand the impact of COVID-19 and other shocks on agricultural livelihoods and value chains in food insecure countries. The monitoring system relies on primary data gathered from households, agricultural extension agents, agricultural inputs traders, food traders and other key informants (Table 1).

This report focuses on data collected from household surveys from the following eleven countries: Afghanistan, Central African Republic, Colombia, Democratic Republic of the Congo, Liberia, Mali, Niger, Sierra Leone, Somalia, Yemen and Zimbabwe. The limitation to these 11 countries was due to data availability at the time of analysis.

Table 1. Number of household respondents surveyed and informants interviewed, by country

Country	Households	Extension agents	Input traders	Food traders	Other key informants
Afghanistan	1 573	113	244	-	-
Central African Republic	3 230	7	20	-	17
Colombia	1 837	494	100	197	-
Democratic Republic of the Congo	2 460	30	133	522	135
Liberia	2 961	91	73	-	-
Mali	1 160	-	2	34	16
Niger	3 218	-	-	-	278
Sierra Leone	2 437	60	45	-	-
Somalia	2 464	49	22	-	-
Yemen	1 775	60	-	90	-
Zimbabwe	1 457	122	-	-	-
Total	**24 572**	**1 026**	**639**	**843**	**446**

Source: FAO, 2020; FAO assessment results

Most household surveys were conducted in the third and fourth quarters of 2020 (Table 7). The sampling for the household survey was designed to enable an understanding of the various impacts of COVID-19 and other shocks, on both agricultural and non-agricultural households. For most countries surveyed, the data is representative at the Administrative Level 1 for households involved in agriculture in some capacity. This makes it possible to show regional and state level results in country monitoring reports.

The sample design differs from country to country. For most countries surveyed, the sample was randomly selected using random digit dialling (RDD) with stratification at administrative levels one or two depending on the country. In Yemen, however, the sample was drawn from lists of FAO beneficiaries, while in Somalia and Colombia lists of beneficiaries were used in combination with an RDD approach to increase the sample size in some administrative areas.

In Central African Republic, Liberia and Sierra Leone, RDD was applied across the entire country to enable a more representative sample to generate national figures.

A quota of households reliant on agricultural livelihoods was also established in most countries. Nonetheless, certain country assessments focused on specific regions, such as the most food insecure regions were (as was the case for Yemen) or those most dependent on agricultural activities (as was the case for Mali). Wherever possible, weights were built and applied to the sample to improve the representativeness of the findings at the country level (Table 7). It is worth noting that these weights have not been used for the regression analyses presented in this report.

Lastly, the data collected do not allow for examination of intrahousehold dynamics or how women generally have been impacted by the pandemic. For this reason, in order to examine gender-specific considerations, this assessment remains limited to considering the experiences between male and female-headed households (Table 9).

Methodology

This report uses regression analysis to attempt to answer the following key questions.

- Question 1
  How have increases in the severity of COVID-19-related restrictions, the occurrence of other shocks and the dependence on each type of livelihood affected income change or food security? (Table 4)
- Question 2
  How have COVID-19-related restrictions interacted with existing inequalities and affect the income or food security of households relying on different income sources? (Table 5)
- Question 3
  For households engaged in agriculture, what pathways have COVID-19-related restrictions taken to affect their livelihoods? Has it been more of a problem of access to inputs or of volume of sales? (Table 6)

Question 1. How have increases in COVID-19-related restrictions, the occurrence of other shocks and dependence on each type of livelihood affected income change or food security?

We regress our index for COVID-19 on income change in Table 3 and on food security in Table 4. In both tables, we then add other shocks reported by households such as sickness or death of a household member, natural disasters, conflict and insecurity or animal diseases, then we add the economic shock "increased prices" and finally we control for other determinants of economic or food security vulnerability, namely, households' main income source. The results allow us to compare the severity of income change and the likelihood of food insecurity associated with COVID-19 restrictions and other shocks. The inclusion of income sources in the regression does not indicate the impact of COVID-19 on these income sources, but rather the different vulnerability of these households to changes in income or food insecurity, regardless of shocks incurred. These regressions use the full datasets (excluding records with missing observations in any of the regressors or outcome variable).

Question 2. How did COVID-19 restrictions interact with existing inequalities and affect the income or food security of households relying on different income sources?

The data in Table 5 helps depict the interaction between COVID-19-related restrictions and income sources in order to look at the specific effect of the restrictions on each livelihood group. While the first and third columns of Table 5 are a reminder of the coefficients found for each livelihood group on income change and food security in Tables 3 and 4, the addition of the interacted regressors (livelihood group × stringency felt) shows the specific change in income (Columns 1 and 2) or food security (Columns 3 and 4) associated with an increase in COVID-19 restrictions for each livelihood group. Table 5 also shows the full dataset used, with the exclusion of records having missing observations in any of the variables included in the specifications.

Question 3. For households engaged in agriculture, what pathways did COVID-19 restrictions take to affect their livelihoods? Was it more of a problem of access to inputs or of sales?

Lastly, Table 6 illustrates the relationship between COVID-19-related restrictions and the probability of a surveyed household reporting having experienced difficulties accessing agricultural inputs or marketing their production. In doing so, two logistic regressions are used (one for access constraints and another for sales constraints). In each of these regressions, only agricultural households are considered, that is, households who reported being engaged in either crop or livestock production. In addition to looking at the impact of an increase in the number, type and degree of observance of COVID-19-related restrictions on these constraints, this part of the analysis looks at the specific likelihood of crop and livestock-producing households reporting facing these issues. The analysis controls for the effect of other shocks, namely conflict and insecurity and natural hazards.

COVID-19 and changes in income

An ordinal logistic regression (OLR) model[3] is used to examine the effect of COVID-19-related restrictions, of other types of shocks and main income activities on income change. The change in income (i.e. the dependent variable) was collected as an ordinal variable, derived from the following question and answer alternatives presented to the surveyed households.

Question to households and answer alternatives
Has your income in the past 30 days changed compared to the same period last year?
1. Not changed
2. Significantly increased (more than 20 percent)
3. Marginally increased (5–20 percent)
4. Marginally decreased (5–20 percent)
5. Significantly decreased (20–50 percent)
6. Drastically decreased (more than 50 percent)
7. DON'T KNOW
8. REFUSED.

The options “do not know” and “refused” were treated as missing values while undertaking the modelling. Various specifications of the model were estimated. Each of them included a variable with the term stringency felt as well as country fixed effects and controlled for the gender of the household head. The second specification of the regression includes all aforementioned independent variables as well as shocks that are likely unrelated to COVID-19 (e.g. sickness or death of household members, natural hazards, drought or water scarcity, conflict or insecurity and animal or crop diseases). A third specification introduces a variable indicating increased price levels.

Stringency felt is a variable constructed as part of this assessment by combining information from our dataset with the stringency index from the Oxford COVID-19

[3] For more information on ordinal logistic regression, see (Agresti, 2003).

Government Response Tracker (OxCGRT) dataset (Hale *et al.*, 2021).[4] Given that the recall period for questions concerning income change, as well as for production and marketing difficulties, includes the three months preceding the survey, this assessment used the maximum stringency index recorded between the beginning of the global COVID-19 crisis until the end date of the survey used for this dataset, roughly equivalent to the same period. This information is drawn from the OxCGRT dataset, which is updated daily with publicly available information on restrictions imposed in countries worldwide.

The OxCGRT dataset provides a set of indicators (Table 2) used to create indexes that measure cross-national and cross-temporal variations in government responses. This allows for a comparison between government responses, based on these comparable indexes.

Table 2. Oxford COVID-19 Government Response Tracker (OxCGRT) indicators

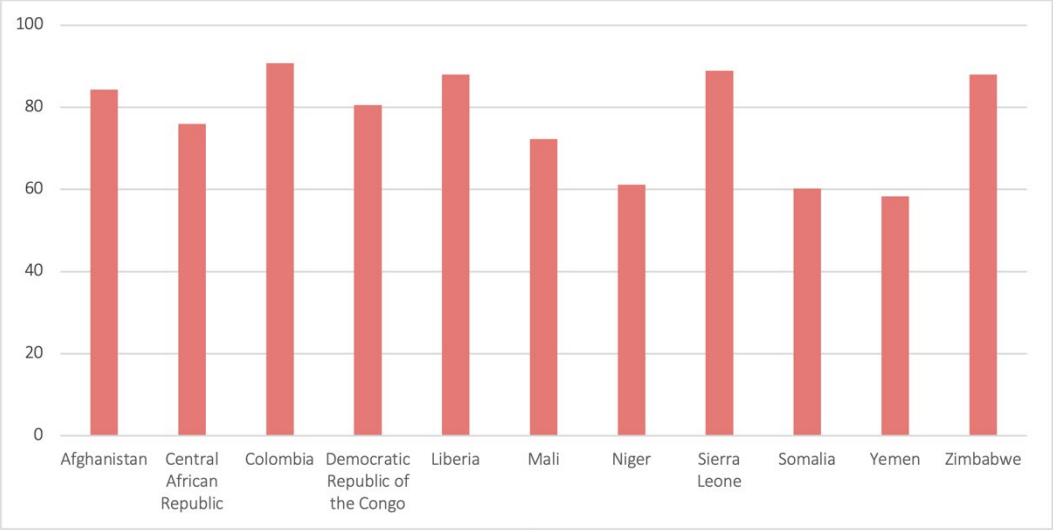
ID	Indicator	Type	Targeted / General
Containment and closure			
C1	School closing	Ordinal	Geographic
C2	Workplace closing	Ordinal	Geographic
C3	Cancelled public events	Ordinal	Geographic
C4	Restrictions on gathering size	Ordinal	Geographic
C5	Closed public transit	Ordinal	Geographic
C6	Stay at home requirements	Ordinal	Geographic
C7	Restrictions on internal movement	Ordinal	Geographic
C8	Restrictions on international travel	Ordinal	No
Economic response			
E1	Income support	Ordinal	Sectoral
E2	Debt/contract relief for households	Ordinal	No
E3	Fiscal measures	Numeric	No
E4	Giving international support	Numeric	No
Health systems			
H1	Public information campaigns	Ordinal	Geographic
H2	Testing policy	Ordinal	No
H3	Contact tracing	Ordinal	No
H4	Emergency investment in healthcare	Numeric	No
H5	Investment in COVID-19 vaccines	Numeric	No
H6	Facial coverings	Ordinal	Geographic
H7	Vaccination policy	Ordinal	Cost
Miscellaneous			
M1	Other responses	Text	No

Source: Hale et. al, 2021

The Oxford Stringency Index is calculated using the policy indicators from Cells C1–C8 and H1, as presented in Table 2. As such, the value of the stringency index is calculated as the average of these nine indicators. Each of these indicators has ordinal scales and can have different maximal values. Thus, the values of each indicator are weighted to ensure that no indicator weights more than others because it has more ordinal points. The results are then normalized on a scale spanning from 0 to 100.

[4] Oxford COVID-19 Government Response Tracker, Blavatnik School of Government, University of Oxford. Available at www.bsg.ox.ac.uk/research/research-projects/covid-19-government-response-tracker.

Figure 1. Maximum value of the Oxford Stringency Index in the period between the beginning of the pandemic and the survey in each country



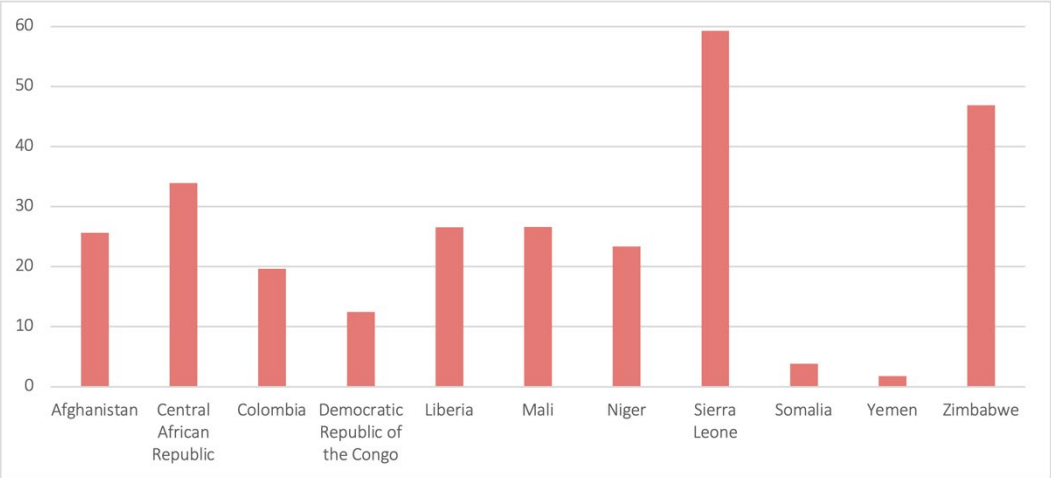
Source: Hale et. al, 2021 (available at: www.bsg.ox.ac.uk/covidtracker)

The Oxford Stringency Index, however, does not take into account the level of enforcement of the restrictions set in place by governments. Since policies and enforcement of COVID-19-related restrictions vary across countries, the indicator is moderated by multiplying it by the percentage of households having reported that the cause behind their income reductions were COVID-19-related restrictions (i.e. restrictions and constraints due to COVID-19 pandemic among a list of options to explain the impact of shocks to their livelihoods, or for Liberia and Afghanistan only, to explain issues accessing markets[5]).

These variables were normalized on a scale from 0 to 1 and used to create the stringency felt index by multiplying the Oxford Stringency Index by the normalized percentage of households reporting COVID-19-related restrictions or constraints to access markets as their main source of shocks.

[5] In Afghanistan the option "Restrictions and constraints due to COVID-19 pandemic" was not available in the set of shock responses, while in Liberia the equivalent available response choice was phrased differently and was insufficiently clear to surveyors and households. There was, however, a number of other options to the question on income shocks as well as difficulties experienced in terms of production and marketing of crop and livestock products, referring to constraints to access to markets or production inputs, which are presumably linked to COVID-19-related restrictions.

Figure 2. Stringency felt index, calculated as the maximum value of the Oxford Stringency Index since the beginning of the pandemic multiplied by the percentage of households reporting COVID-19 restrictions as a shock at Admin1 level



Source: Hale et. al, 2021 and FAO, 2021; FAO assessment results

The use of the stringency felt index, which varies at the Admin 1 subregional level (with 241 subregions in the dataset), allows for the use of country fixed effects. This would not be possible using the Oxford Stringency Index, as it is only available at the national level for the countries of interest to this assessment. By using country fixed effects it is possible to control for country-level biases, such as enforcement capacity, stage of the growing season and market infrastructure, among others, as well as biases artificially created by small differences in the questionnaires.

COVID-19 and impact on food security

A logistic regression model is used to examine how COVID-19-related restrictions have been associated with changes in food security levels. To this end, this assessment makes use of the FIES module to estimate the prevalence of food insecurity among households through an eight-part questionnaire, as follows.

Eight standard questions asked by the FIES module

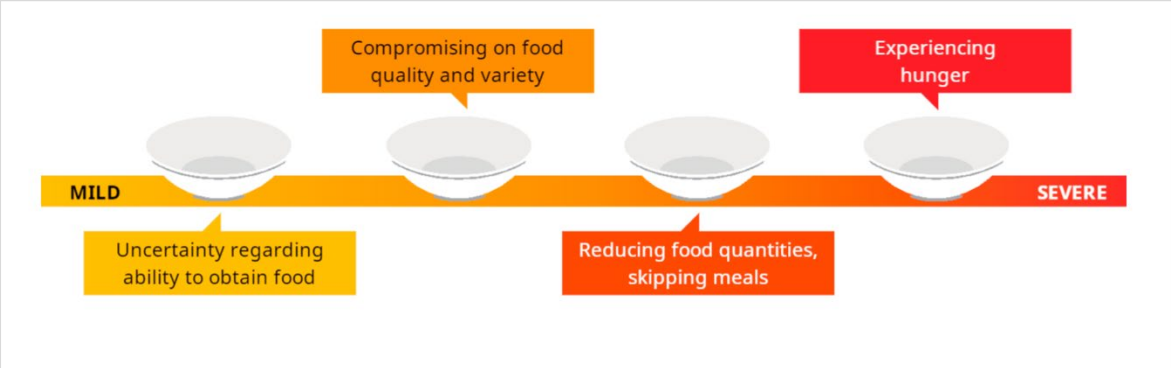
During the last 30 days, was there a time when:

- You or others in your household worried about not having enough food to eat because of a lack of money or other resources?
- Still thinking about the last 30 days, was there a time when you or others in your household were unable to eat healthy and nutritious food because of a lack of money or other resources?
- Was there a time when you or others in your household ate only a few kinds of foods because of a lack of money or other resources?
- Was there a time when you or others in your household had to skip a meal because there was not enough money or other resources to get food?
- Still thinking about the last 30 days, was there a time when you or others in your household ate less than you thought you should because of a lack of money or other resources?
- Was there a time when your household ran out of food because of a lack of money or other resources?
- Was there a time when you or others in your household were hungry but did not eat because there was not enough money or other resources for food?
- Was there a time when you or others in your household went without eating for a whole day because of a lack of money or other resources? Households refusing to respond or who respond that they do not know are excluded from the analysis, and only complete responses are analysed.

The FIES recognizes that the experience of food insecurity is incremental (Figure 3), starting with uncertainty and anxiety, followed by changes in the quality of the diet, which then becomes less diversified and nutritious as challenges to access food increase. It then reaches decreased levels in the quantity of food consumed as portion sizes are reduced, meals skipped and, ultimately, hunger is experienced in an extreme food insecurity situation.

The questions used in the FIES module to assess food security follow the order of severity that is roughly observed across the globe, so that people who experience lower levels of food insecurity tend to respond affirmatively to fewer questions. These questions tend to be at the beginning of the list (those concerning feeling worried about accessing food or reducing dietary diversity), while those who respond affirmatively to the latter questions (such as not eating for a whole day) tend to respond affirmatively to having adopted other, more common coping strategies too.

Figure 3. Incremental nature of food insecurity,
according to the Food Insecurity Experience Scale (FIES)



Source: FAO, 2021b

Each household respondent was assigned a "raw score" ranging from 0 to 8, where each response is assigned a value of zero for "No" responses and a value of one for "Yes" responses. The scores assigned for each question are then added. As recommended by the Voices of the Hungry team at FAO, in order to represent food security as a dependent variable for cross-country regression models with controls for country fixed effects, "food insecurity may be represented as a binary variable based on a raw cut-off score. Such models may be estimated using logistic regression, probit regression or linear probability […] models, depending on constraining factors" (FAO, 2015). For this assessment, the recommended threshold has been used, whereby raw scores of 4 or greater correspond to food insecurity and raw scores between 0 and 3 correspond to food security (FAO, 2015:4). The food security variable in this assessment is therefore 1 for food secure households (raw scores under or equal to 3) and 0 for food insecure households (raw scores greater or equal to 4).

The logistic regression model has been used to establish the relationship between household food security, either food secure (1) or not (0), and the same independent variables used for the regression used to examine income changes. The logistic regressions estimate the relationship between the binary dependent variable and a group of predictor variables.

COVID-19 and challenges in agricultural production and marketing

In order to assess agricultural production and marketing in relation to COVID-19-related restrictions, a logistic regression is also used. In the first specification, the dependent variable is a dummy variable describing households having cited that they experienced constraints in accessing inputs. It equals 1 if households reported any difficulty related to access to inputs[6] and 0 otherwise. For the second specification, there is a dummy variable describing sales constraints. It equals 1 for households reporting difficulties accessing markets[7] and 0 for those not reporting any such difficulties. The input constraint variable is regressed on the Oxford Stringency Index, as the stringency felt index cannot be used for this due to collinearity. Other regressors include a dummy for female-headed household as well as variables describing household engaged in crop production, another variable for livestock-producing households, in addition to natural hazard and conflict dummy variables. Fixed effects cannot be used since the Oxford Stringency Index is constant within countries. The same specification and independent variables are used for a regression with sales constraints as the dependent variable.

Logistic regression models

Logistic regression models use the maximum likelihood method to estimate the coefficients of the regressors used on the dependent variable reporting the logit-transformed probability as a linear relationship with the outcome variables. These are expressed as follows.

$$logit(p) = log\left(\frac{p}{1-p}\right) = \beta_0 + \beta_1 x_1 + \cdots + \beta_k x_k$$

Where β_0 is the constant, β_1 is the coefficient of interest for the Oxford Stringency Index and $\beta_2, \beta_3, \ldots, \beta_k$ is a vector of coefficients corresponding to the control variables. These include various shocks, gender of household head and income sources for the regression, looking at food security and the variables cited above. These are namely dummy variables to represent the gender of the household head and to account for crop-producing and livestock-producing households and for natural hazards or conflict.

The specification can be reordered to obtain the predicted probability of outcome, as follows.

$$p = \frac{e^{\beta_0+\beta_1 x_1+\cdots+\beta_k x_k}}{1 + e^{\beta_0+\beta_1 x_1+\cdots+\beta_k x_k}}$$

[6] The question asked to households was: Which of these unusual difficulties have you faced the most in the past three months with your crop production? The possible answers included: Access to land restricted by containment measures; Difficulty to access seeds; Difficulty to access fertilizers or pesticides; Labour not available; Labour too expensive or income insufficient to hire labour; Lack of perspective on possibility to sell products or on prices; Household members sick; Dryspell/drought; Heavy rains/floods; Hail/storms/strong winds; Outbreak of pests or diseases; Lack of storage facilities; Lack of agricultural extension; Recent conflict/insecurity; Other; Don't know and/or Refused.

[7] The question asked to household was: What is the highest unusual difficulty you faced to sell your main agricultural activity production in the last three months? Possible answers included: Constrained access to market (movement restrictions or closed market); Demand is lower than usual; Usual traders are not coming to buy the production anymore; Cost of transportation is higher than usual; Prices are too low; Other; Don't know and/or Refused.

Assessment results

COVID-19 and changes in income

The models shown in Table 3 consider how COVID-19-related restrictions and other shocks are associated with changes in income or food security. They also consider the changes in income experienced by households dependent upon different livelihoods. However, they do not describe the extent to which COVID-19-related restrictions have been responsible for changes in the income or food security of households based upon their different livelihoods.

The ordinal logistic regression of income on the stringency felt variable used in this assessment suggests that COVID-19-related restrictions did have a negative impact on household incomes.

In Column 1 of Table 3, the results show that for every increase by 10 units of the stringency felt variable used, the log-odds of reporting a positive income change decreased by $\eta_{Stringency\ Felt}$ = 0.147. As shown in Column 2, this effect roughly holds even after controlling for other shocks to household livelihoods, such as natural hazards or conflict, which are not statistically significant, as it is probable that not all countries studied encountered these phenomena in the three months preceding the survey. Households having reported the sickness or death of a household member experienced the most marked income reductions on average ($\eta_{SicknessOrDeath}$ = -0.195), while households reporting shocks linked to water scarcity or drought experienced less severe income changes than the average household. This highlights how at the time of the survey, COVID-19 and its related restrictions were one of the major and most consistent shocks reported across highly food insecure countries.

The results from Column 3 suggest that household reports of price increases have been associated with a strong deterioration of income ($\eta_{IncreasedPrices}$ = -0.442). The addition of this indicator reduces the negative coefficient associated with the moderated stringency index, or the stringency felt index, to $\eta_{Stringency\ Felt}$ = -0.122. This suggests that at least part of the impact of COVID-19-related restrictions relates to increases in consumer prices and production costs.

The specifications in Column 4 introduce variables describing the main income sources among households. The inclusion of income sources in the regression does not indicate the impact of COVID-19-related restrictions on these income sources, but it does show the different levels of vulnerability of these households to changes in income or food security levels, regardless of the shocks incurred.[8] It also suggests that, aside from those households relying on charity at the time of the survey and who were the most likely to report decreases in income ($\eta_{Charity}$ = -0.791), those surveyed households whose incomes decreased most severely were relying on forestry-related activities ($\eta_{Forestry}$ = -0.339),

[8] The reference category for income sources is the dummy for households relying on salary, income source coefficients are relative to the group of households relying on regular salary and other income sources.

self-employment ($\eta_{SelfEmployed}$ = -0.348), the sale of crops and vegetables ($\eta_{CropSales}$ = -0.346) or the sale of fish produce ($\eta_{FishSales}$ = -0.300).

This highlights how livelihoods in the agricultural sector were seriously affected by negative income changes during the period during which restrictions were in place. In fact, the reported income losses among households relying on the sales of crops, fish and forestry products were as great as or greater than those of household respondents engaged in petty trade outside of agriculture.

Table 3. Income change as a function of stringency felt, gender of household head, various shocks and main income source

	(1)	(2)	(3)	(4)
VARIABLES	Income change	Income change	Income change	Income change
Stringency felt index	-0.147***	-0.141***	-0.122***	-0.123***
	(0.0230)	(0.0230)	(0.0232)	(0.0234)
Household head gender: female	-0.0774**	-0.0767**	-0.0849***	-0.0617*
	(0.0324)	(0.0324)	(0.0326)	(0.0330)
Shock: Sickness/death		-0.195***	-0.149***	-0.141***
		(0.0246)	(0.0248)	(0.0251)
Shock: Natural hazards		0.0408	0.0358	0.0569*
		(0.0327)	(0.0326)	(0.0335)
Shock: Drought/water scarcity		0.137***	0.135***	0.143***
		(0.0377)	(0.0370)	(0.0379)
Shock: Conflict or insecurity		0.0491	0.0430	0.0520
		(0.0385)	(0.0377)	(0.0378)
Shock: Animal/crop diseases		-0.0952**	-0.0995***	-0.0486
		(0.0392)	(0.0386)	(0.0405)
Shock: Increased prices			-0.442***	-0.441***
			(0.0244)	(0.0247)
Income source: Sale of crops/vegetables				-0.346***
				(0.0416)
Income source: Sale of livestock				-0.137***
				(0.0491)
Income source: Sale of fish				-0.300***
				(0.0870)
Income source: Sale forest products				-0.339***
				(0.114)
Income source: Sale of cash crops				-0.246***
				(0.0546)
Income source: Self employment				-0.348***
				(0.0442)
Income source: Petty trade				-0.257***
				(0.0398)
Income source: Farm wage				-0.190***
				(0.0607)
Income source: Off-farm wage				-0.0860
				(0.0767)
Income source: Remittances				0.0171
				(0.110)
Income source: Charity				-0.791***
				(0.0742)
Observations	24 184	24 184	24 184	23 897
Country FE	Yes	Yes	Yes	Yes
Pseudo R2	0.0554	0.0565	0.0603	0.0614

Robust standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1

Source: FAO, 2020; FAO assessment results

Therefore, if it is true that restrictions were often more strictly enforced in urban areas, once they were effectively enforced their impact was just as felt on the agricultural sector as on other more urban-based livelihoods. Across the board and regardless of income sources, female-headed households were more likely to report income losses. They were the most likely to rely on petty trade and remittances, two income sources that were heavily affected as a result of COVID-19 and related restrictions.

These results are in line with the corresponding in-country analyses. For example, in Afghanistan, sickness and deaths in the family was the most frequently reported shock, followed by the loss of income and employment as a direct result of COVID-19-related restriction measures. In addition, the Afghanistan country report notes how households reported having suffered from high prices of food and non-food items, increased costs of production and insecurity arising from ongoing conflict (FAO, 2021c).

How do policy measures affect perceptions of the importance of COVID-19-related restrictions? Experiences from West Africa (the Niger and Sierra Leone)

The share of surveyed households citing restriction measures as a livelihood shock differ greatly between both countries: 38 percent in Niger and 67 percent in Sierra Leone. At first glance, these results are particularly surprising. In both countries, more than half of the population lives below the poverty line, with high employment dependency rates and jobs in the informal sector. Also, both countries have implemented COVID-19-related restriction measures. In Niger, authorities started adopting a number of strict measures even before the announcement of the state of emergency in April 2020, and in Sierra Leone a series of short-term national lockdowns of three days each, combined with policies of social distancing and a ban on inter-district travel, were implemented.

Analysis carried out by the FAO Food and Nutrition Security Impact, Resilience, Sustainability and Transformation (FIRST) project helps reconcile these survey findings. The analysis shows that, in Niger, the government limited a strict lockdown to the capital Niamey, which was the epicentre of COVID-19 cases in the country, while setting up movement restrictions between districts. However, these measures were not enforced as effectively and for as long as in other countries, given that riots erupted in April 2020 in response to them. In Sierra Leone, conversely, restriction measures were effectively enforced, and international partners noted that the response was structured and organized, based on the health infrastructure developed during the Ebola epidemic. As a result, the distribution of imported staples in rural regions has been problematic due to inter-district travel bans, a problem that has not been adequately addressed by the government. In addition, there was a tendency to attribute to the restrictive measures an increase in food price, even though food price inflation was already high prior to the onset of the pandemic.

While the COVID-19-related restriction measures were significant in the Niger and Sierra Leone, the extent to which these were perceived as a shock among the surveyed households could have been influenced by the number and type of mitigation measures adopted and the extent to which the restrictions measures were enforced in each country and district.

Source: FAO, 2020a; 2020d; 2020f

COVID-19 and impacts on food security

In line with the findings on the drivers of income changes, logistic regressions of food security on stringency felt, gender of household head, shocks and main income source suggest that COVID-19-related restrictions are associated with food insecurity. As expected, and as shown in Column 1 of Table 4, the log-odds of the stringency felt variable equals $\beta_{\text{Stringency Felt}} = -0.154$, and it is highly statistically significant. Results in Column 2 show the magnitude of the negative coefficient for COVID-19-related restrictions that slightly decreases, but remains similar to those of natural hazards ($\beta_{\text{natural hazards}} = -0.146$) or conflict ($\beta_{\text{conflict}} = -0.156$), or even the effects associated with animal or crop disease ($\beta_{\text{crop or liv. disease}} = -0.159$). These findings are in line with the earlier findings related to income change, suggesting that the relative impacts of these different COVID-19 and non-COVID-19-related shocks are similar for both income and food insecurity levels.

Female-headed households were found to be more vulnerable to food insecurity, as expected. Female-headed households are also more likely to be petty traders, or to rely on remittances or charity, which are three of the most severely affected income sources.

A noteworthy finding is that, by far, the highest coefficients are those associated with death or sickness of a household member, thus implying that this has had the single-largest effect on reduced household food security levels. The coefficient is comparatively much higher for food security levels than it is in relation to income reductions. This is likely due to the fact that the impact of sickness or death of a household member is more likely to be felt on food security through its impact on household expenditures, whereby medical expenditures reduce resources otherwise available for food purchases. An impact on income levels, may only be felt if it directly affects breadwinners.

Adding the variable “increased prices” as reported by households (Column 3) further lowers the magnitude of the negative coefficient for the stringency index, suggesting that at least part of the effect of these restrictions made itself felt through increased prices, thus affecting the ability of households to cover their essential needs.

Finally, this assessment considers which types of households, disaggregated by types of livelihoods pursued, showed the largest change in food security levels during the period in question. Column 4 shows that the most vulnerable households in terms of food insecurity levels were those depending on charity ($\beta = -0.723$) or off-farm wages ($\beta = -0.605$). This was followed by petty trade ($\beta = -0.428$), self-employment ($\beta = -0.394$) and households relying on cash crops ($\beta = -0.443$) or vegetable sales ($\beta = -0.391$).

The above is broadly in line with the findings on income changes, with the noticeable difference that households depending on off-farm daily wages tended to be more severely food insecure, on average, than other groups, even though their income had changed little, on average. This in turn suggests that these households were already among the most vulnerable to food insecurity, even prior to the onset of the COVID-19 pandemic. Similarly, female-headed households were more likely to be food insecure, regardless of shocks or types of livelihoods pursued.

Table 4. Food security as a function of stringency felt, gender of household head, various shocks and main income source

	(1)	(2)	(3)	(4)
VARIABLES	Food security	Food security	Food security	Food security
Stringency felt index (by 10)	-0.154***	-0.130***	-0.117***	-0.129***
	(0.0305)	(0.0303)	(0.0305)	(0.0310)
Household head gender: Female	-0.199***	-0.199***	-0.212***	-0.182***
	(0.0453)	(0.0456)	(0.0459)	(0.0469)
Shock: Sickness/death		-0.436***	-0.409***	-0.425***
		(0.0349)	(0.0351)	(0.0359)
Shock: Natural hazards		-0.146***	-0.155***	-0.146***
		(0.0428)	(0.0429)	(0.0442)
Shock: Drought/water scarcity		-0.104**	-0.0995**	-0.108**
		(0.0484)	(0.0486)	(0.0496)
Shock: Conflict		-0.156***	-0.167***	-0.168***
		(0.0493)	(0.0493)	(0.0498)
Shock: Livestock/Crop diseases		-0.159***	-0.152***	-0.0774
		(0.0511)	(0.0507)	(0.0527)
Shock: Increased prices			-0.335***	-0.349***
			(0.0350)	(0.0355)
Income source: Sale of crops/vegetables				-0.391***
				(0.0576)
Income source: Sale of livestock				-0.000171
				(0.0663)
Income source: Sale of fish				0.00945
				(0.123)
Income source: Sale forest products				-0.1511
				(0.160)
Income source: Sale of cash crops				-0.443***
				(0.0722)
Income source: Self employment				-0.394***
				(0.0617)
Income source: Petty trade				-0.428***
				(0.0619)
Income source: Farm wage				-0.200***
				(0.0769)
Income source: Off-farm wage				-0.605***
				(0.0971)
Income source: Remittances				-0.339**
				(0.164)
Income source: Charity				-0.723***
				(0.101)
Constant	1.475***	1.684***	1.667***	2.020***
	(0.107)	(0.108)	(0.108)	(0.118)
Observations	22 430	22 430	22 430	22 127
Country FE	Yes	Yes	Yes	Yes
Pseudo R2	0.149	0.156	0.160	0.168

*Robust standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1*

Source: FAO, 2020; FAO assessment results

The effect of increased prices was not equally felt across all countries concerned. For example, in Somalia, where few surveyed households reported being affected by COVID-19-related restrictions and where restrictions were mostly enforced in urban areas, there was only a brief increase in the price of imported rice. On the other hand, countries that enforced restrictions more strictly in rural and urban areas, such as Zimbabwe, saw a greater impact on price levels, where farmgate prices decreased, but retail food prices continued to increase. These trends exacerbated ongoing crises in countries like Zimbabwe or The Sudan, where hyperinflation predated the COVID-19 pandemic.

Changes in income and food security based on livelihoods

This assessment also considered the extent to which changes in the income of households (according to their source of livelihoods) may have been associated with the implementation of COVID-19-related restrictions. In order to do so we interact the income source variables with the stringency felt variable. This is done both for the ordinal logistic regression with income change as the dependent variable and for the logistic regression with food security as the dependent variable.

In turn, two additional specifications of the earlier models are introduced in Table 5 in order to examine the extent to which COVID-19-related restrictions have been responsible for changes in household income or food security levels, based on the different types of livelihoods they pursue.

Table 5 shows in Column 1 the same specification as Column 4 in Table 3, (the shock variables, charity income source and gender variables are not shown here to the keep the table short but they are included in the specification). Column 2 adds interactions of the stringency felt variable with the main income sources to look at the specific impact of COVID-19 restrictions on households reliant on different income sources. The drastic increase in the coefficient for each income source seen across the board (except for the self-employed) indicates that much of the negative income change was driven by COVID-19 restrictions.

The main income sources interacted with the stringency felt index show the specific effect of the restrictions applied to the income source groups on income change. Two groups of livelihoods can be distinguished for which the impact of COVID-19 seems to differ. First, the restrictions seem to have disrupted most strongly the sale of cash crops ($\eta_{cash\_crop\_sales\#stringency\_felt} = -0.249$), followed by those relying on remittances ($\eta_{remittances\#stringenc} = -0.205$), petty traders ($\eta_{petty\_trade\#stringency} = -0.178$), livestock producers ($\eta_{livestock\_sales\#stringency\_felt} = -0.166$), and those relying on off-farm wages ($\eta_{off\_farm\#Stringency} = -0.110$). For all these types of livelihoods, however, the residual income change (the income sources not interacted with the stringency felt index) is positive and significant: the log-odds of the residual coefficient for cash crop sales, for example is $\eta_{cash\_crop} = 0.414$, while for livestock sales it is $\eta_{livestock} = 0.275$, and it is above 0.200 for petty traders and off-farm daily workers. This suggests that those households were able to cushion the negative effect of the restrictions either as they sold more animals than usual rather than losing them because they were unable to feed

them, or, if pasture was available, as they could sell it once the restrictions were lifted, as livestock, cash crop or items sold by petty traders are usually not rapidly perishable goods.

The second group of livelihoods is composed of fisherfolks and fish sellers ($\eta_{Fish\_sales\#Stringency}$ = -0.152), those who rely on vegetable production and sales ($\eta_{crop\_veg\_sales\#Stringency\_felt}$ = -0.144) and those relying on farm wages ($\eta_{farm\_wage\#Stringency\_felt}$ = -0.110), for whom the residual income change is closer to zero and not statistically significant. This suggests that these households did not have residual income changes independent from the COVID-19-related restrictions that could help absorb or defray the losses, most likely because transportation and marketing delays caused by the COVID-19-related restrictions resulted in losses and damage of a product that they were no longer able to sell at a later point in time. In the case of households relying on farm wages, the above suggests that they lost their work opportunities as the growing season advanced.

Columns 3 and 4 of Table 5 add the logit regressions looking at the effect of COVID-19-related restrictions on food security. Column 3 results include the same specification as in Column 4 of Table 4 (in this case, the shock variables, charity income source and gender variables are not displayed in the table either, but are included in the specification).

The results are very similar to those in Columns 1 and 2 (Table 5). The addition of the interaction terms increases the coefficient for each income source on food security, suggesting that much of the experiences of food insecurity was linked to COVID-19-related restrictions. The interaction terms, in turn, suggest that the COVID-19-related restrictions significantly increased the likelihood of food insecurity for *all* types of income sources (except for households relying on off-farm wages, the relation of which is not statistically significant). The effects range from $\eta_{farm\_wage\#c.stringency\_felt}$ = -0.131 for daily farm workers to $\eta_{forestry\_sales\#c.stringency\_felt}$ = -0.316 for households relying on forest-related production as their primary income source.

Those relying on livestock, forestry, fish, crop and vegetable sales, in addition to the self-employed, seem to have had mitigating factors compensating their risk to food insecurity, as their residual income change (in the rows above in the same table for the non-interacted income sources) was positive and statistically significant. This may have happened either through the ability to adopt coping strategies (for example, through selling animals that livestock producers could not feed adequately because of the crisis), or by relying on the consumption of their own food production (for example, crop sellers who were unable to sell their crops could at least consume it themselves).

Similar findings emerged from the assessment of COVID-19-related restrictions in China, where it was found that the most affected agricultural households were those relying on fish or vegetable and fruits sales, as they were most likely to have lost their rapidly perishable production from the difficulties faced in finding transportation to markets.

Key takeaways from the above include the fact that agricultural producers in the selected countries, all of which had high levels of food insecurity prior to the pandemic, were strongly affected by COVID-19-related restrictions, sometimes more so than households not involved in the agricultural sector. As highlighted by other research, livestock producers were indeed negatively affected. This is in line with the findings in Table 6, showing how livestock producers have been among the most likely group among agricultural producers to report difficulties in accessing inputs or selling their production. Likewise, cash crop producers were the most affected by COVID-19-related restrictions, perhaps as their production – more likely to be exported – suffered from longer restrictions as borders remained closed, even as restrictions were gradually being lifted within their respective countries. In Colombia, for example, coffee producers were found to be the most severely affected by COVID-19-related restrictions, while subsistence farmers who were shielded from market disruptions were relatively less affected (especially in terms of food insecurity), as coffee beans are not readily consumable.

An important finding though, is that both cash crop and livestock producers were able to cushion their income losses in other ways, potentially through distress sales and, most likely, making use of their ability to store their production (or keep their livestock) without incurring complete losses. A common coping strategy identified in this assessment is the selling of animals before they die of malnutrition, increasing an immediate income or cash flow even though this practice in the long term would deplete their assets. This was not the case, however, for vegetable and fish producers, for whom the losses incurred due to the restrictions were not compensated by the adoption of similar mitigation strategies. As such, this often translated into complete losses of their production (oftentimes ending up entirely damaged while awaiting transportation). Those same food producers, however, were also able to consume their own production, slightly reducing the shock to their food security levels.

Table 5. Change in income or food security as a function of stringency felt, gender of household head, various shocks, main income source and interaction terms

	(1)	(2)	(3)	(4)
VARIABLES	Income change	Income change	Food security	Food security
Stringency felt index	-0.123***	-0.0274	-0.129***	0.0508
	(0.0234)	(0.0305)	(0.0310)	(0.0386)
Income source: Crops/vegetables sales	-0.346***	0.0347	-0.391***	0.219**
	(0.0416)	(0.0881)	(0.0576)	(0.108)
Income source: Livestock sales	-0.137***	0.275***	-0.000171	0.455***
	(0.0491)	(0.1000)	(0.0663)	(0.116)
Income source: Fish sales	-0.300***	0.0732	0.00945	0.564***
	(0.0870)	(0.137)	(0.123)	(0.210)
Income source: Sale of forestry products	-0.339***	-0.198	-0.151	0.578*
	(0.114)	(0.236)	(0.160)	(0.328)
Income source: Cash crop sales	-0.246***	0.414***	-0.443***	0.0961
	(0.0546)	(0.0988)	(0.0722)	(0.115)
Income source: Self-employment	-0.348***	-0.609***	-0.394***	0.288**
	(0.0442)	(0.0916)	(0.0617)	(0.117)
Income source: Petty trade	-0.257***	0.220**	-0.428***	0.217*
	(0.0398)	(0.0879)	(0.0619)	(0.120)
Income source: Farm wage	-0.190***	0.101	-0.200***	0.117
	(0.0607)	(0.120)	(0.0769)	(0.132)
Income source: Off-farm wage	-0.0860	0.209*	-0.605***	-0.404***
	(0.0767)	(0.115)	(0.0971)	(0.134)
Income source: Remittances	0.0171	0.534***	-0.339**	0.350
	(0.110)	(0.161)	(0.164)	(0.276)
Crop_veg_sales#c.stringency_felt		-0.144***		-0.251***
		(0.0281)		(0.0373)
Livestock_sales#c.stringency_felt		-0.166***		-0.189***
		(0.0355)		(0.0426)
Fish_sales#c.stringency_felt		-0.152***		-0.260***
		(0.0517)		(0.0847)
Forestry_sales#c.stringency_felt		-0.0557		-0.316**
		(0.0866)		(0.131)
Cash_crop_sales#c.stringency_felt		-0.249***		-0.242***
		(0.0315)		(0.0426)
Self_employed#c.stringency_felt		0.0869***		-0.289***
		(0.0298)		(0.0427)
Petty_trade#c.stringency_felt		-0.178***		-0.277***
		(0.0284)		(0.0463)
Farm_wage#c.stringency_felt		-0.110**		-0.131***
		(0.0448)		(0.0459)
Off_farm_wage#c.stringency_felt		-0.110**		-0.0294
		(0.0541)		(0.0626)
Remittances#c.stringency_felt		-0.205***		-0.310***
		(0.0512)		(0.0955)
Constant			2.020***	1.603***
			(0.118)	(0.131)
Number of observations	23 897	23 897	22 127	22 127
Country FE	Yes	Yes	Yes	Yes

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source: FAO, 2020; FAO assessment results

COVID-19 and challenges in agricultural production and marketing

In Table 6, logistic regressions are used to look at the relationships between the Oxford Stringency Index (by increments of 10) and the likelihood of facing either input or sales constraints. Column 1 of Table 6 shows the results of the logistic regression of households reporting having experienced difficulties in accessing inputs during the period preceding the survey, with relation to the Oxford Stringency Index, the gender of the head of household, whether the household is a crop producer or a livestock producer, and whether they reported being affected by natural hazards or conflict. In turn, Column 2 of Table 6 adds dummy variables equal to 1 if the household declared either crop, livestock, fish or forestry sales as their main income source. This allowed to take into consideration both subsistence farmers and farmers who were able to market their production.

Column 3 of Table 6 presents the results of the logistic regression of households reporting having had difficulties in marketing their agricultural production in the same period, while Column 4 adds dummy variables for agricultural income sources, as shown in Column 2.

These results suggest that the effect of COVID-19-related restrictions were stronger and more significant on marketing than on access to inputs. This being said, several results are worth noting.

First off, COVID-19-related restrictions created constraints to both the access to inputs and marketing opportunities for agricultural households. Every increment by 10 points of the stringency index is associated with an increase in the log-odds of having faced constraints in the access to inputs of $\beta_{\text{Stringency Index}} = 0.115$ and in an increase in the log-odds of having faced sales constraints of $\beta_{\text{Stringency Index}} = 0.203$. This effect adds to the already substantial impact of conflict and natural hazards on the access to markets. Therefore, in countries already affected by other shocks, such as the Democratic Republic of the Congo, Yemen or Somalia, even relatively mild COVID-19-restrictions have been heavily felt by agricultural producers and sellers, as it has worsened an already dire situation. The Oxford Stringency Index ranged from a low of around 60 in Somalia and Yemen to around 90 in Sierra Leone, Zimbabwe and Colombia.

Columns 3 and 4 in Table 6 illustrate how female-headed households may have been more severely affected by COVID-19-related restrictions, as they seem to have relied more heavily on agricultural sales, potentially vegetable sales, which represent highly perishable goods.

Furthermore, if the general pattern shows a stronger association with sales constraints than with constraints in the access to inputs, the difficulties most likely to have been faced by agricultural producers varied by sub-sector. Livestock producers were the most likely to have reported constraints in the access to inputs ($\beta_{\text{livestock\_prod}} = 0.934$). Among them, those relying on livestock sales as their main income source were almost equally likely to report having faced constraints in marketing their production as much as having faced constraints in the access to inputs. Crop producers, on the other hand, were generally more likely to reporting issues in accessing inputs ($\beta_{\text{crop\_producer}} = 0.347$) yet less

likely in reporting difficulties selling or marketing their production (β_{crop_prod} = -0.366). This is the case since, in highly food insecure countries, they are generally less likely to be selling their production, as many of them are subsistence farmers. However, crop and vegetable sellers, whose product is more perishable, were much more likely to report issues with sales constraints ($\beta_{crop\_veg\_sales}$ = 0.551) than with constraints in accessing inputs ($\beta_{crop\_veg\_sales}$ = 0.202). Similarly, fish sellers were the most likely to report difficulties in selling their production (β_{fish_sales} = 1.027) but the least likely to report difficulties in accessing inputs (β_{fish_sales} = -0.620), perhaps because they do not need to purchase inputs as frequently as producers from other agricultural sub-sectors, or likely due to the fact that their main inputs (such as petrol) were readily available in markets, unlike those of crop or livestock producers.

Table 6. Logistic regression of production inputs versus likelihood of reporting production input difficulties or sales constraints as a function of COVID-19 restrictions, gender of household head, agricultural activity, natural hazards and conflict

Variables	(1) Input constraint	(2) Input constraint	(3) Sales constraint	(4) Sales constraint
Oxford Stringency Index (by 10 points)	0.115***	0.117***	0.203***	0.213***
	(0.0138)	(0.0140)	(0.0135)1	(0.0135)
Shock: Natural Hazard	0.129***	0.0734*	0.182***	0.117***
	(0.0384)	(0.0389)	(0.0382)	(0.0391)
Shock: Conflict	0.404***	0.424***	0.448***	0.452***
	(0.0398)	(0.0402)	(0.0392)	(0.0397)
Household head gender: Female	0.0517	0.0583	0.231***	0.271***
	(0.0407)	(0.0412)	(0.0397)	(0.0405)
Agricultural producer: Crop	0.347***	0.379***	-0.366***	-0.348***
	(0.0366)	(0.0402)	(0.0365)	(0.0392)
Agricultural producer: Livestock	0.934***	0.756***	-0.169***	-0.270***
	(0.0349)	(0.0379)	(0.0341)	(0.0372)
Income Source: Crop and vegetable sales		0.202***		0.551***
		(0.0369)		(0.0366)
Income Source: Livestock sales		0.756***		0.715***
		(0.0551)		(0.0530)
Income Source: Fish sales		-0.620***		1.027***
		(0.126)		(0.113)
Constant	-1.905***	-2.007***	-1.510***	-1.801***
	(0.113)	(0.116)	(0.111)	(0.112)
Number of observations	19 092	18 887	19 122	18 910
Country FE	No	No	No	No

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source: FAO, 2020; FAO assessment results

Based on the above, the impact pathway of COVID-19-related restrictions can be seen as largely depending on several factors: (i) the frequency at which households needed to secure inputs for their production (livestock producers required inputs more frequently and were therefore most affected by supply chain constraints); (ii) the ability to store or keep agricultural production when faced with delays in accessing markets (fish and vegetable sellers were mostly affected by the inability to sell their production rather than by difficulty in accessing inputs) and; (iii) the exposure to international markets, with those either depending on imported inputs or those relying on exports affected by border closures, in addition to facing local market disruptions.

The findings from the Liberia country monitoring report illustrate well these findings, with one-fifth of surveyed farming households citing difficulties in accessing agricultural labour, inputs (such as seeds, fertilizers and pesticides) and credit. In turn, this led to a reduction in area planted; they also reported high costs of transportation and generally constrained market access (FAO, 2021d).

Conclusions and programmatic and policy implications

The results from this assessment shall help guide programmatic and policy efforts in supporting agricultural livelihoods in food-crisis countries during the COVID-19 pandemic. The analysis included in this report has confirmed many of the findings reported in the literature review, namely:

- COVID-19-related restrictions were the second-most severe shock reported by surveyed households, after the death or sickness of a household member, both of which reduced their income levels.
- Income reductions were compounded by a clear effect of COVID-19-restrictions on increased prices, which reduces purchasing power and threatens food security.
- COVID-19-related restrictions heavily affected access to markets for farmers, both to access essential inputs and to sell their production. This effect was larger for those engaged in livestock production compared to those engaged in crop production.

This assessment likewise sheds light on the following findings and considerations.

- In highly food insecure countries, the correlation between COVID-19-related restrictions and food security is similar in magnitude to that between conflict or natural hazards.
- Cash crop producers have been the most severely affected by COVID-19-related restrictions, as they are, by definition, the most heavily reliant on sales. In addition, this finding calls for a better investigation of the impact of border closures on agricultural livelihoods.
- The overall decrease in income was greater for vegetable and fish producers whose products are highly perishable, highlighting how movement restrictions and consequent transportation delays of agricultural goods affected those types of households most heavily. This caused severe losses that could not be compensated once restrictions were lifted. However, these producers experienced less of an impact in their food security as they could eat the food they produced.
- While livestock producers were among the most severely affected by the restrictions, certain factors contributed to softening the impact on their incomes and food security, including the likelihood of their abilities to keep their animals alive and defer sales, as is also observed for cash crop producers. Also, adopting distress sales was another coping mechanism, such that they sold their animals before they died as they were unable to feed them. However, it is worth noting how these coping mechanisms can result in poverty cycles, given that in future years their herds may have been depleted and their food security and livelihoods have in turn been compromised.
- The enforcement of COVID-19-related restrictions has had economic consequences through its impact on the access to markets, reducing agricultural incomes and increasing food prices. Mitigation measures moving forward must take place on both the supply side and the demand side, as outlined further below.

Subsequent rounds of data collection and food monitoring surveys under the framework of the monitoring system in these countries will allow for an even better understanding of the trends in production and incomes levels and on the extent to which ongoing COVID-19-related restrictions may affect food security levels.

Recommendations

Supply side

- In the face of movement restrictions, it is paramount that producers of rapidly perishable products are allowed to access markets safely and in a timely manner. Support for transportation, storage, the facilitation of green (non-taxed) channels, and support for processing can go a long way to safeguard agricultural livelihoods as well as moderate the increase in food prices.
- Market information systems could play a key role in making agricultural producers and traders aware of restrictions, supportive measures and other potential market disruptions, allowing them to better tackle these changes. This is potentially for all sectors, including pastoralism, for which phone-based information systems already exist.
- Access to inputs for both livestock (feed and veterinary supplies) and crops (seeds, fertilizers and pesticides) should be safeguarded. This can be done in various ways, including through subsidies and voucher schemes.

Demand side

- Market constraints had a double effect on agricultural livelihoods: increasing prices for consumption and reducing incomes from sales. This double effect led to significant increases in food insecurity. It is therefore necessary to accompany supply-side interventions with actions designed to increase food access. This can take the form of targeted transfers through cash, vouchers or direct food aid depending on market conditions. Such measures are particularly relevant for pre-existing vulnerable groups, such as female-headed households and those relying heavily on agricultural wage labour, charity and petty trade.
- In addition to these known vulnerable groups, COVID-19-related restrictions call for a redefinition of vulnerability. Many formerly food secure farmers, fisherfolk and livestock owners have been plunged into poverty due to an inability to access inputs and sell their production, as well as due to forced asset depletion. Targeted transfers to these households – allowing them to sustain the quality and quantity of their diets – can prove essential in preventing an increase in the prevalence of food insecurity.

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Annex

Table 7. Period of household survey implementation across countries and sample design and weights

Country	Start date (2020)	End date (2020)	Approximate duration in months	Strata	Household sample frame	Weights used
Afghanistan	early July	mid-October	3.5	Admin 1	RDD	Yes
Central African Republic	mid-August	late November	3.5	Admin 1	RDD	No
Colombia	late June	mid-October	3.5	Admin 1	FAO/WFP beneficiaries	No
Democratic Republic of the Congo	late July	mid-November	3.5	Admin 1	RDD	No
Liberia	early July	mid-September	2.5	Admin 1	RDD	Yes
Mali	mid July	early October	2.5	Admin 1	National survey	Yes
Niger	late July	early October	1.0	Admin 1	Mixed	Yes
Sierra Leone	early July	early August	1.0	Admin 2	RDD	Yes
Somalia	early August	early September	1.0	Admin 1	FAO beneficiaries and RDD	No
Yemen	early August	mid-September	1.0	Admin 1	FAO beneficiaries	Yes
Zimbabwe	mid-July	late August	1.5	Admin 1	RDD	Yes

Source: FAO, 2020; FAO assessment results

Table 8. Surveyed households across countries, by main source of income

Country	Households surveyed	Percentage of households, by type of sales					Self-employed or artisan	Petty trade	Farm wage	Off-farm wage	Salary or pension	Remittances	Charity/ humanitarian aid	Other
		Field crops and vegetables	Livestock	Fisheries	Forest products	Cash crops or orchards								
Afghanistan	1 206	44.1	11.0	-	0.4	23.3	9.1	1.8	0.4	1.2	7.5	0.2	-	0.9
Central African Republic	3 585	9.9	6.0	1.2	1.4	4.5	11.3	32.4	11.1	0.9	18.5	0.8	0.8	1.2
Colombia	1 791	25.5	7.0	1.7	0.2	1.7	22.2	-	3.3	5.1	12.1	2.1	8.9	10.2
Democratic Republic of the Congo	2 441	6.6	6.8	3.6	3.1	2.5	11.4	26.4	8.9	2.8	22.9	1.3	1.4	2.1
Liberia	2 954	13.2	2.3	0.7	2.0	3.6	19.1	19.2	1.9	0.5	21.3	0.3	13.6	2.3
Mali	1 153	28.4	8.1	3.1	0.3	2.6	14.7	12.5	15.6	8.3	3.9	0.8	0.8	1.0
Niger	3 192	30.4	18.9	1.3	0.1	8.6	5.4	13.6	5.5	0.7	10.0	0.2	0.6	4.7
Sierra Leone	2 434	21.6	2.9	1.8	1.1	13.5	20.1	19.3	5.3	0.4	9.3	1.3	2.6	0.8
Somalia	2 444	30.1	15.2	0.5	1.0	9.0	19.4	13.0	2.5	1.4	1.4	1.4	4.2	0.9
Yemen	1 694	-	9.4	5.4	-	19.8	3.7	1.6	11.3	22.4	12.5	2.0	8.4	3.5
Zimbabwe	1 427	30.4	13.3	0.6	0.3	9.6	16.0	4.1	1.4	3.2	14.7	3.8	2.7	-
TOTAL	**24 321**	**20.1**	**9.0**	**1.7**	**1.0**	**8.1**	**13.8**	**15.8**	**6.1**	**3.3**	**13.2**	**1.1**	**4.1**	**2.5**

Source: FAO, 2020; FAO assessment results

Table 9. Share of surveyed households by gender of head of household and type of livelihood

Country	Percentage of female-headed households	Percentage of surveyed households (disaggregated by type of livelihood)				
		Crops	Livestock	Fisheries	Forestry	No agricultural activities
Afghanistan	0.2	88.4	19.2	-	-	-
Central African Republic	29.4	60.4	19.9	4.0	23.2	-
Colombia	33.0	40.7	13.3	4.0	1.6	48.4
Democratic Republic of the Congo	18.3	43.8	30.7	11.6	7.7	21.2
Liberia	24.0	47.0	4.3	1.7	5.3	46.1
Mali	4.8	70.5	21.7	5.2	3.8	18.2
Niger	6.5	58.0	32.7	2.3	0.4	23.5
Sierra Leone	22.1	59.2	13.2	2.5	1.3	34.0
Somalia	21.2	52.5	27.1	3.2	5.5	19.7
Yemen	3.9	64.9	66.9	5.7	-	15.6
Zimbabwe	18.1	79.3	51.3	1.4	2.9	12.1
TOTAL	**18.2**	**57.7**	**25.7**	**4.1**	**6.8**	**22.4**

Source: FAO, 2020; FAO assessment results

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