

## APPLYING SYSTEM MAPPING TECHNIQUES TO UNDERSTAND SHOCKS COVID-19 UPDATE REPORT NO. 4 (21 SEPT 2020)

### Executive Summary

This report captures key impacts of COVID-19, and the corresponding government response, on the agriculture market system in Uganda. It is based on our analysis of more than 250 sources, including open-source data, articles, and reports, combined with targeted key informant interviews and insights derived from our system maps. This report provides updates to our previous analysis, as well as a discussion of the impact of COVID-19 on smallholder farmers. We also discuss which components of the agricultural market system should be monitored over the next few months in order to evaluate the impact on the system moving forward.

#### Impact on inputs sector does not seem as dire as initially expected

Key Informant Interviews conducted in August confirmed that inputs retailers are facing higher transportation costs, but suggested that access to finance is not as difficult as initially expected. Neither wholesale nor retail input prices have uniformly increased, and the demand outlook for the current planting season is mixed: some expect higher demand for inputs, some lower. These results, though from a small sample, suggest that the impact on the inputs sector has been less severe and more heterogeneous than expected. Based on the information we were able to gather, the inputs sector appears relatively resilient at this stage; this may change if input purchases drop off dramatically this planting season.

#### Commodity distribution sector still challenged by low prices and low demand

Wholesale and retail maize prices continued to decline in July and August, though still within recent historical ranges. These prices were likely impacted by the increase in supply from the June-July harvest combined with continued low domestic and export demand. The average gross margin for maize remains elevated, though it dropped somewhat from the three-year high seen in June. The value and volume of formal maize exports picked back up in June and July, approaching the five-year average, though below historical seasonal trends. Informal cross-border trade (ICBT) export values have remained at essentially zero, corresponding to roughly \$8 million of lost revenue for informal traders from April through July. We expect continued challenges for the commodity distribution sector until prices recover, as the combination of low prices and low demand likely means continued low profitability for businesses, particularly those trading in maize and especially for smaller and informal traders.

#### Smallholder farmers have suffered income losses but are resilient

The first season harvest was near average, but many farmers struggled to find buyers and faced low commodity prices. Smallholder farm households have generally experienced a drop in income, both from agriculture and off-farm sources. Many households have experienced greater food insecurity, and have reduced consumption. Many also reported higher food prices, even though the prices of staples in major markets have been on a downward trend. Overall nutrition has likely declined. However, rural households appear to have fared better than urban households: 67% of rural households reported in a Uganda Bureau of Statistics [survey](#) that they had relied on their farm as their main source of food since the outbreak, while 67% of urban households were forced to rely on the market. The most common coping mechanism for households that experienced a shock was to rely on savings, and only 3% reported selling assets, which signals a promising level of resilience. The prospects for the upcoming season are mixed: while there are reports of new entrants into agriculture, many farm households will be unable to afford agricultural inputs this season (or may not have access to them), which will impact yields.



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### Sentinel indicators can fill knowledge gaps moving forward

It is essential to continue monitoring the impact of COVID-19 on the market system over the near- to medium-term. Particularly in the context of a complex system, there might be latency in the effect of a shock, so it is important to continue monitoring key nodes in the system even after it appears that the shock has passed. We have proposed a set of sentinel indicators to serve as early warning indicators of system change at key system nodes. We also recommend cultivating a network of contacts across the system who can provide information quickly and efficiently through Key Informant Interviews.

### Uganda's market system has proved resilient

From a systems perspective, the past few months have demonstrated that the market system in Uganda is relatively resilient. Though there have been increased costs, disruptions, and delays, businesses across the agricultural supply chain were able to adapt and continue operating in some form. Smallholder farm households also appear to have been relatively resilient in the face of this shock. A shock in a system can be an opportunity to promote behavior change: policymakers can identify and discourage maladaptive responses before they become entrenched, and encourage positive behavior changes that will help actors adapt to the current shock and render the system more resilient in the future.

The analysis in this report is the product of a Rapid System Assessment of the agricultural market system in Uganda. The USAID/Uganda Feed the Future Market System Monitoring team developed this methodology in order to anticipate the likely impacts of COVID-19. As a sense-making strategy, using a system map helps to organize information that is constantly being updated in a systematic way, and enables practitioners to visualize the status of a system. Structuring the analysis in this way also enables decision-makers to frame the situation in a way that allows them to act dynamically and anticipate how the system will change over time.

Our analysis focuses on a few key subsystems, which represent the parts of the system that are most closely linked to USAID's current market system development programming. Our objective is to inform USAID's response to the situation and provide guidance on which parts of the system should be monitored going forward. The insights presented here represent our best understanding of the system status. To learn more about our methodology and read our previous reports, we encourage you to access the following resources:

- Rapid System Assessment Methodology:  
<https://dspace.mit.edu/handle/1721.1/127658>
- Uganda Agriculture Market System Map with COVID-19 shock:  
<https://kumu.io/MSM/usaids-uganda-ftf-msm-activity-covid-19-map#full-map/shock-status>
- Guide to interpreting the COVID-19 shock map:  
<https://dspace.mit.edu/handle/1721.1/127277>
- Update Report No 1: Representing the Shock & Initial Hypotheses:  
<https://dspace.mit.edu/handle/1721.1/127279>
- Update Report No 2: Deep-Dive on Agricultural Inputs:  
<https://dspace.mit.edu/handle/1721.1/127280>
- Update Report No 3: Deep-Dive on Commodity Distribution:  
<https://dspace.mit.edu/handle/1721.1/127281>

Please contact our team at [msm.uganda@mit.edu](mailto:msm.uganda@mit.edu) with any questions or feedback.



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## Methodology

The USAID/Uganda Feed the Future Market System Monitoring team has been conducting a Rapid System Assessment of the agricultural market system in Uganda. The Rapid System Assessment methodology was developed in order to anticipate the likely impacts of both COVID-19 and the preventative measures implemented by the Government of Uganda. Our analysis focuses on a few key subsystems, which represent the parts of the system that are most closely linked to USAID's current market system development programming in Uganda. Our objective is to inform USAID's response to the situation and provide guidance on which parts of the system should be monitored going forward.

→ For more on our Rapid System Assessment methodology, please visit <https://dspace.mit.edu/handle/1721.1/127658>

The methodology is founded on the System Pathways framework that our team developed, a system mapping approach that is accessible to practitioners and tailored for the international development context. As part of our engagement in Uganda, the MSM team developed a map of the agricultural market system, the Uganda Agricultural Market System Map. This map reflects our fullest understanding of the system, and is based on extensive consultations with stakeholders as well as deep-dive research studies.

The Uganda Agricultural Market System Map was an essential foundation for rapid analysis. Our team already had an understanding of the system, both how it is organized and how its constituent parts are interconnected. This is incredibly valuable when a shock or crisis occurs - a systems perspective allows you to contextualize each new development and understand its broader implications. Having a system map enabled us to identify how a shock is propagating through the system, where we anticipate the shock will have an effect, and through what mechanism this effect will occur.

To conduct this analysis, we conceptualized COVID-19 and the government's preventative measures as shocks to the market system. The government's preventative measures, including the closure of nonessential businesses and a ban on public and most private transportation, were likely to have significant economic implications. These shocks, as well as the second- and third-order effects they generate, were layered onto our



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system map as a new set of elements. For a summary of the shocks that we considered, please consult our first update report: <https://dspace.mit.edu/handle/1721.1/127279>.

Our team then generated first stage hypotheses about the status of the system as a result of the shocks. We limited our outreach to key stakeholders at USAID, which allowed us to rapidly create an initial mental framework for interpreting the impact of COVID-19. The exercise informed our strategy for further information gathering, by highlighting which parts of the system were most likely to be severely impacted. The results of this exercise are detailed in our first update report.







Once this exercise was complete, our team began collecting information about the impact of COVID-19 and the associated restrictions on the market system. We systematically gathered open-source information, including news, data, and white papers, and conducted Key Informant Interviews with more than two dozen actors across the market system. Since May, our team has consulted more than 250 sources. The information we gathered was then used to determine the status of particular system elements, with a view towards understanding the impact on the overall status of the system.

Each element was color-coded to represent its status, as you will see in the figures below. We have provided a legend for reference, but we encourage you to review our guide to interpreting the map for a more thorough explanation of what each shape and color represents: <https://dspace.mit.edu/handle/1721.1/127277>. We also updated the first-, second- and third-order shock effects as necessary, including the paths each shock traveled through the system.

- The version of the Uganda Agricultural Market System Map used for this analysis is available to view on the Kumu platform at <https://kumu.io/MSM/usaid-uganda-fff-msm-activity-covid-19-map#full-map/shock-status>.
- For a guide to interpreting the system maps, please consult <https://dspace.mit.edu/handle/1721.1/127277>.

Our mixed-method assessment approach has allowed us to interpret shocks to the system and anticipate the impact of these shocks on different system elements, which we have distilled into this analysis. The insights presented here represent our best understanding of the system status. Please contact our team at [msm.uganda@mit.edu](mailto:msm.uganda@mit.edu) with any questions or feedback.

### Legend

-  Shock Status: Impacted to point of being non-functional
-  Shock Status: Significantly impacted
-  Shock Status: Somewhat impacted
-  Shock Status: Not impacted
-  Shock Status: Improved
-  Shock Status: Impact unknown

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### Update: Agricultural Inputs

Our second update report, published in June, focused on the agricultural inputs supply chain. In this section we update our analysis based on information we have reviewed since then.

Headlines from Update Report No. 2:

- Input availability likely decreased in the short-term, with higher input prices.
- Risk to businesses along the inputs supply chain.
- Demand for inputs will likely be reduced, with increased risk of counterfeit inputs.

→ Our second update report is available here: <https://dspace.mit.edu/handle/1721.1/127280>

### Agricultural Input Importers and Manufacturers

Our team was able to review full results from a survey conducted by the International Fertilizer Development Center in May (link not available), providing additional insight into the early impact on the sector. The survey confirmed several of our assessments from the previous report. First, it is clear that there was a negative impact of import delays and increased operating costs. All of the agro-chemical importer-wholesalers surveyed reported that they were selling fewer products, had not been able to fulfill all orders (for herbicides in particular) and had experienced a supply chain shortfall (for herbicides and pesticides in particular). This shortfall was overwhelmingly (89%) attributed to import difficulties. The seed companies reported similar issues: 90% were selling less product, and 86% were having more difficulty sourcing raw materials/inputs. All reported having difficulty fulfilling orders, particularly for bean seed; none reported issues with maize seed.

These impacts led to liquidity challenges, as discussed in our second update. As expected, 33% of agro-chemical importer-wholesalers with preferred retailers reported that they were unable to give their retailers credit advances. 81% of seed companies reported having difficulties paying off loans/credit, and both types of businesses cited a need for support with subsidies or financing.

The businesses also had concerns about meeting demand for the second planting season, which is currently underway. 89% of agro-chemical importer-wholesalers expected to have trouble meeting demand, and expected increased counterfeits due to shortages of legitimate supply. An anti-counterfeit [raid](#) was recently conducted, but it still likely that prevalence will increase. Similarly, 90% of seed companies expected an impact on their ability to meet demand, though they were expecting demand for seed to be reduced.

These responses are now several months old, but provide confirmation of some of the assessments in our previous report based on other sources. We would recommend a follow-up survey in the next month to ascertain the status of these businesses after the current planting season is complete.

### Agricultural Input Distributors and Retailers

The International Fertilizer Development Center survey also included input retailers. Again, the results confirm several of the assessments in our previous report. The disruptions to the importers and manufacturers had trickled down the supply chain, as 96% reported having trouble sourcing inputs. The restrictions on movement did have a negative impact on distribution: 76% of businesses reported they were finding it more difficult to distribute their products. A more recent [UNDP report](#) also confirmed that domestic travel restrictions, particularly public transportation, interrupted farm input supply. As a result, 97% of input stockists reported they were selling fewer products. This led to financial difficulties, with 82% of input stockists reporting



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difficulties paying off loans/credit. As expected, this also forced these businesses to reduce the amount of credit provided to customers, which many farmers rely on. 74% of the input retailers surveyed reported that more of their clients were asking for inputs on credit, but only 49% were giving more credit to clients.

In order to update our assessment, our team conducted a few Key Informant Interviews with input retailers in late August, which provided interesting new information. As expected, all reported that transportation costs have increased, and mentioned that they were using new delivery channels to reach farmers – primarily, using motorcycles for deliveries. Access to finance was not an issue: all of the input dealers said they had either accessed a loan or would be able to if they wanted one.

Though we expected wholesale input prices to increase as a result of the supply chain disruptions, the responses from input retailers were mixed: some had experienced increased prices, while some had not. This led to a mixed picture on retail prices as well: some had increased their prices, while others had not. We also spoke to cooperatives that provide access to inputs for their members in some form, and only some reported that input prices had increased.

We also asked about anticipated demand for inputs for the current planting season, and again the picture was mixed: some expected higher demand, some expected reduced demand. Most of the cooperatives we spoke to said demand for inputs had increased this year. In general, the input dealers were expecting more engagement in farming but decreased use of inputs, though the situation made it difficult to anticipate. Several mentioned that farmers in their area had had trouble finding buyers for their produce, which would in turn mean less ability to purchase inputs for the current season.

These results, though from a small sample, suggest that the impact on the inputs sector has been less severe and more heterogeneous than expected. We had anticipated that wholesale input prices would increase across the board, and that these increases would be passed on to farmers. The mixed picture we received could be attributable to several factors: there are likely regional differences in transportation costs, and some suppliers may pursue different pricing strategies depending on the amount or type of stock they have on hand, or how exposed they were to import delays. The retailers may be reluctant to increase prices, as demand for inputs is already expected to be lower, and higher prices would further reduce sales. Regardless, the inputs sector appears relatively resilient at this stage; this may change if input purchases drop off dramatically for this current planting season.

### Update: Commodity Distribution

Our third update report, published in July, focused on agricultural commodity distribution, particularly wholesalers, transporters, processors, and distributors. In this section we update our analysis based on information we have reviewed since then.

Headlines from Update Report No. 3:

- Transportation costs have increased, along with operating expenses, negatively impacting profitability.
- Wholesale maize prices are low, though within historical range.
- Imports and exports have declined, impacting commodity distributors – particularly smaller, informal traders.

→ Our third update report is available here: <https://dspace.mit.edu/handle/1721.1/127281>





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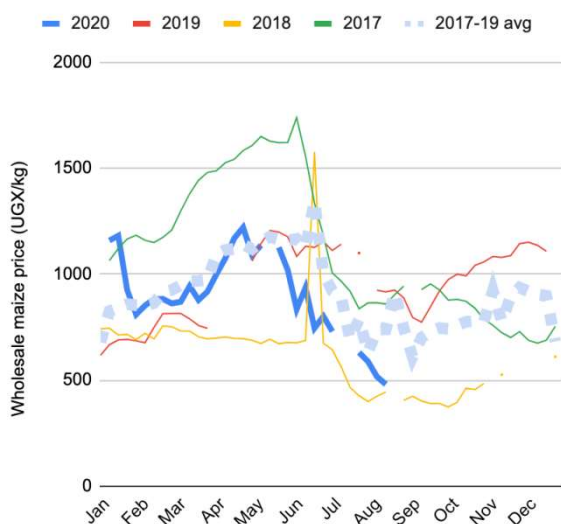
### Maize Prices

As seen in the graph below, wholesale maize grain prices have continued to decline into July and August, but remain within historical range. This decline is in line with seasonal trends, although the prices are slightly below the average prices for August. This continues to be in line with the assessment in Report 3 – wholesale demand likely declined during the pandemic, particularly from reduced institutional demand from schools, hotels, and restaurants. Schools have remained closed, and it remains unclear when all students will return under the planned [phased reopening](#). We spoke to two traders in August, who confirmed that volumes were down.

Retail maize grain prices also declined in line with seasonal trends through July, and declined below the three-year average in August. Report 3 discussed projections that the first season harvest (June-July) would be average, whereas [a more recent report](#) has indicated that the maize harvest was slightly below average. Depending on how significant this drop in production has been, we may expect to see maize prices increase. However, the continued drop of both wholesale and retail prices in August remains in line with the assessment from Report 3 that demand has declined over the course of the pandemic. Although public transportation has resumed, reduced capacity and increased fares may still be causing barriers to market access. Furthermore, household income has likely remained depressed due to widespread salary cuts and loss of jobs. [FEWS NET](#) offers a similar assessment, concluding that demand for staples is still below normal, which is attributed to school closures, reduced demand from institutions, hotels and restaurants, and declining consumption, particularly by the urban poor.

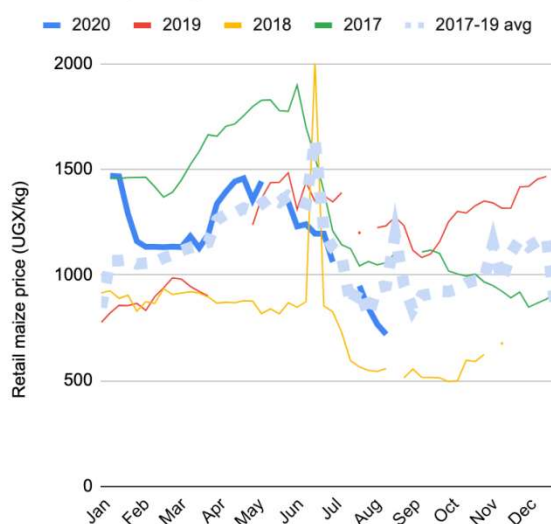
**Wholesale maize grain price**

Cross-country average, from RATIC



**Retail maize grain price**

Cross-country average, from RATIC



Although both wholesale and retail maize prices dropped in July and August, the wholesale price decreased more than the retail price. The average gross margin for maize grain is still high – down from its highest value in June, but still well above the three-year average. As noted in Report 3, this may be due to reduced wholesale demand, from fewer mills operating and reduced institutional purchases. It is also possible that retailers are keeping prices high to recover lost income from earlier in the pandemic. At this point, it is unclear whether restoring the retail-wholesale price ratio to normal levels depends on an increase in the average wholesale price, a decrease in the average retail price, or both, as both are below their three-year average.

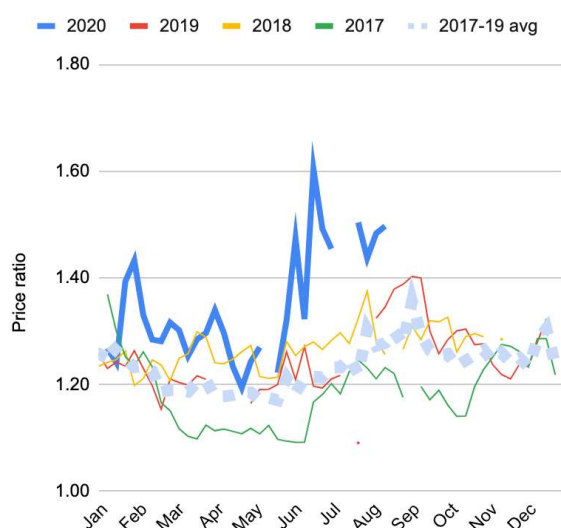


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As seen below, the retail-wholesale price ratio for maize has remained particularly high in Masindi - typically the retail markup for maize grain in Masindi is 10%, but has recently been as high as 80%. The markup in Masindi has in recent years been the lowest, which suggests a relatively efficient market. The retail price in Masindi is more or less tracking with the price in other markets, and is not anomalous compared to recent history. The wholesale price is below the other markets, which suggests a surplus of maize in Masindi, driving down wholesale price. This seems reasonable, as Masindi typically has a maize surplus, and was not significantly affected by flooding this year. Also, informal cross-border trade to DRC and South Sudan has almost completely ceased, which could further drive down wholesale prices, as increased supply in local markets pushes prices down. The retail markup for maize grain is also particularly high in Kapchorwa (around 80% as well).

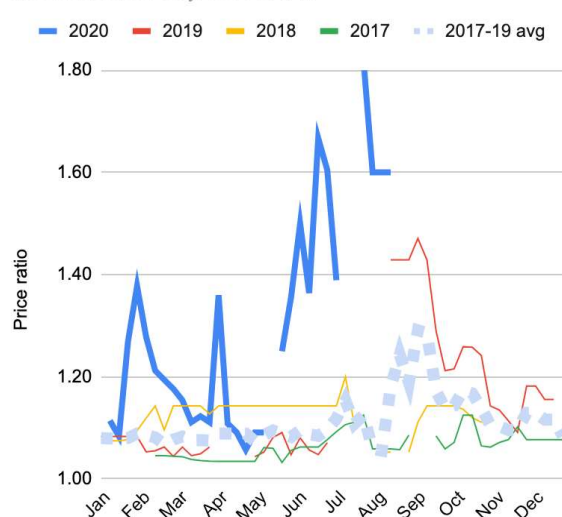
### Retail to wholesale price ratio for maize grain

Cross-country average, from RATIN



### Retail to wholesale price ratio for maize grain

Masindi market only, from RATIN



### Exports and Imports

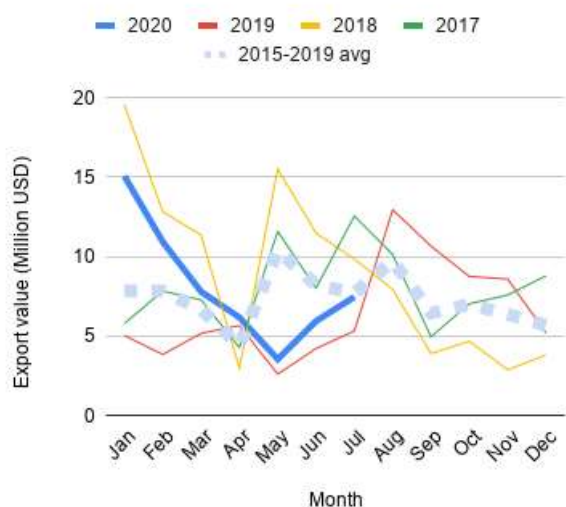
The value and volume of formal maize exports picked back up in June and July, approaching the five-year average, though below historical seasonal trends. This is in line with our analysis in Report 3 – a lower than average yield may have resulted in lower volumes, and transportation delays and increased logistics costs have slowed the movement of goods. [FEWS NET](#) attributes low regional export demand to the impact of COVID-19 across the region, a strong harvest in Tanzania, and changes to Kenyan trade policy for maize. Maize export prices in June and July have continued to track roughly with the five-year average. [Global agricultural commodity markets have remained stable](#), so significant deviation from seasonal trends is not expected.



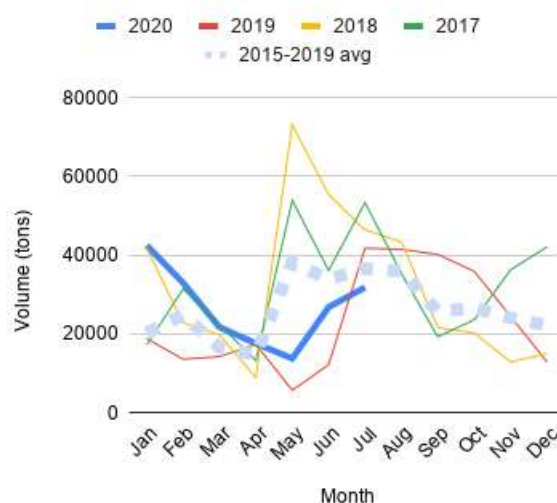
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### Maize formal export value

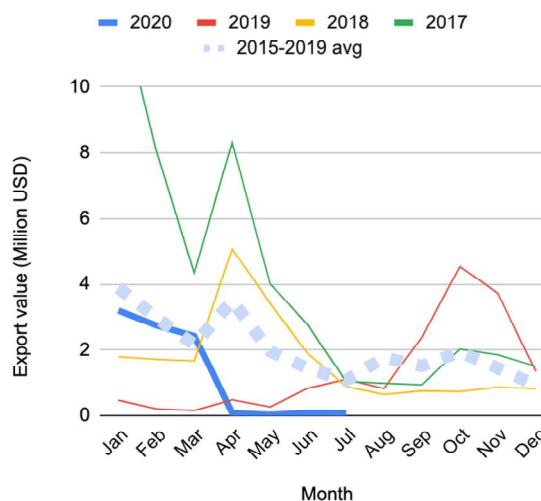


### Maize formal export volume



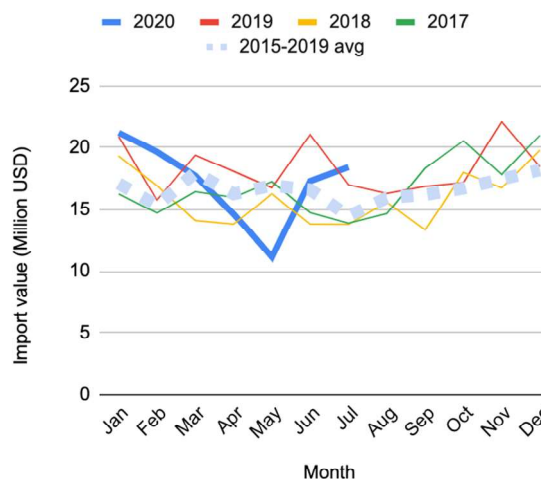
Informal cross-border trade (ICBT) export values have remained at essentially zero, corresponding to roughly \$8 million of lost revenue for informal traders from April through July. This remains in line with the Report 3 predictions – ICBT trade will remain essentially at zero until restrictions in border districts are lifted. ICBT values for other products have also remained at nearly zero since April. Informal maize exports have accounted for about a third of total maize exports since 2003, so their complete halt is significant, and ICBT value will be important to monitor in the future. This strongly impacts border communities, particularly women, who make up 80% of ICBT traders.

### Maize ICBT export value



Imports for "Vegetable Products, Animal, Beverages, Fats & Oil" have continued to track with seasonal trends through July. Again, this is a broad category that makes it difficult to draw conclusions from, but seems to support the claim from Report 3 that agriculture-related imports have not suffered as much as other sectors. Imports for "Prepared Foodstuff, Beverages & Tobacco", as seen at right, have picked back up above the seasonal average after falling to their lowest level since 2011 in May. Report 3 hypothesized that the previous decrease in import value was driven by a decrease in household income and subsequently in demand for processed food, but this update may indicate otherwise. There is little indication that household income recovered from May

### "Prepared Foodstuff, Beverages & Tobacco" imports value



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to June, so other factors are likely at play here. It is possible that the decrease was simply driven by increased operating costs for importers due to border restrictions, and importers have since been able to adapt. It is also possible that traders simply ran out existing inventories while waiting for the uncertainty created by the pandemic to be resolved. Now that a “new normal” has emerged, perhaps they have resumed importing.

#### Agricultural Service Providers

In our previous reports, we did not focus on the various types of agricultural service providers, such as processors, but these businesses have also been impacted by the lockdown. An early [survey](#) conducted by TechnoServe in several other African countries found that food processors were facing disruptions in their supply chains for equipment, packaging, and raw materials, and experienced distribution challenges.

We expect that service providers of all types, including processors, have faced business continuity issues in Uganda, due to supply chain disruptions in spare parts, packaging, and other critical raw materials. They will also have faced decreased demand and higher transportation costs. We spoke to an association of village agents, who provide a variety of agricultural services in their local communities, and who are now having to decrease their fees (or focus on their own farms) in the face of low demand.

Domestic demand for processed food products appears reduced, as suggested by the import figures and the fact that many households have cut back on food consumption or switched to cheaper alternatives. This will impact profitability. Larger food processors that export products will also have faced higher operating and transportation costs, similar to the experience of raw commodity exporters.

One of our key informants suggested that Uganda’s nascent food processing, distribution, and retail sector is at risk, given it is composed predominantly of small- to medium-sized enterprises, many of which were already highly indebted at the beginning of the lockdown. Many of these businesses will have had difficulty accessing additional finance, and it is likely that there have been a number of bankruptcies in the sector. This could set back the development of value addition and other key supply chain roles in Uganda.

#### Focus on Smallholder Farm Households

Smallholder farmers constitute a key beneficiary group for USAID’s programming in Uganda. As such, it was essential to analyze the potential welfare effects of the COVID-19 restrictions on smallholder farmer households. As part of our work in Uganda, our team has explored the linkages between agricultural production and household resilience. The interplay between income generation (both agricultural and off-farm income), food security, and household resilience is embedded in our system map, and informed our approach to this analysis. Note that we do not discuss urban households, though their livelihoods and food security have also been seriously impacted. We also do not consider the Karamoja region, which has a relatively unique set of circumstances and has been extensively covered [elsewhere](#), or refugees, who have also been [uniquely](#) impacted.

We first discuss the impact of the government restrictions on both agricultural and non-agricultural income, then the impact on food security, nutrition, and household resilience. This section concludes with a discussion of the prospects for the current season.

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### Impact on Agricultural Income

As mentioned in our previous reports, the imposition of COVID-19 restrictions occurred after the first season (June-July harvest) was underway, which limited the potential impact. In most bimodal rainfall areas, planting had concluded, and most smallholder farmers had already purchased seeds and other inputs for the season. This minimized the impact of the movement restrictions and supply chain issues on farmer access to inputs. However, there was a significant impact on farmers' ability to earn an income from their produce, particularly once the first harvest began in June.

As expected, there was not a significant impact on production levels during the first season. The Uganda Bureau of Statistics, with support from the World Bank, conducted a survey of more than 2,000 households in June (hereafter referred to as the UBoS survey; the report is available [here](#), with further tabulations [here](#)), in which 93% of respondents in the agriculture sector reported that they had continued working during the lockdown. FEWS NET [estimates](#) that the first season harvest of pulses, legumes, and maize was slightly below average, while the harvest of perennial staples and cash crops was above average. Unfortunately, there were floods and mudslides in [48 districts](#) in the first half of 2020, which led to crop losses and displaced residents, and did impact overall production volume. Labor mobility was reduced as a result of the movement restrictions, which would have impacted farmers that rely on hired labor for harvesting, but did not significantly reduce overall production. A UN [report](#) from July confirmed that subsistence production was not severely impacted by the lockdown. As for livestock, according to the UBoS survey, only 8% of households with livestock reported that COVID-19 had affected their livestock production.

Despite a more or less average first season harvest, however, many farmers were unable to market their produce. As discussed in our third update report, the closure of public transportation and many large markets along with overall increases in transportation and operating costs meant that many commodity buyers had difficulty reaching farmers. According to the UBoS survey, 44% of households reported that they needed to sell produce between March and June, and 41% of these (or 18% of all farm households in the sample) said that they were unable to do so. These difficulties likely persisted after June. Several of the input dealers we spoke to mentioned that farmers in their area had trouble finding buyers for their produce. The cooperatives we interviewed all engage in collective marketing on behalf of their farmer members, and reported a mixed picture. Their main crops were maize, beans, and soya, and the majority said that the volumes they sold on behalf of their members had increased this year. Some had trouble finding buyers (or buyers offering acceptable prices), while others did not.

Farmers that were able to find buyers unfortunately often faced lower prices for their produce. FEWS NET monitors regional retail prices of staples. Based on the August [update](#), retail prices for matooke (measured in Kampala and Mbarara) have been below both 2019 levels and the five-year average since March. Sorghum prices in Gulu, Lira, and Soroti remained relatively consistent with the five-year average from March to May, but dropped 20-30% across all three markets in June and July. Millet prices in Lira and Soroti also tracked with the five-year average from March to May, then dropped below the average in June and July. Beans prices have been the most unusual. In Gulu, Kampala, and Lira, retail prices were above the five year average since March. They were highest in April and May and declining in June and July, but still about 30% above the five-year average in July. As for maize, as discussed above, the wholesale price of maize continued to decline in July and August.

Overall, the retail price of the main staples in Uganda tracked with historical averages in the early months of the pandemic, then dropped in June and July as the harvests came online. As discussed in our assessment of commodity distribution, the absence of institutional buyers and decline in cross-border trade (particularly



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informal) has led to a surplus on the market, which would explain prices in June and July dropping below (or further below) the five-year average. Except for beans: the price dropped but remained well above average, which FEWS NET [attributes](#) to three consecutive below-average harvests.

As we observed in our third update, the impact of COVID-19 on commodity buyers appears to have trickled down to the farm level. The combination of low demand and low prices has forced down farmgate [prices](#) for many products. Given that the movement restrictions have limited farmers' options, many have been forced to accept these low prices, or save their produce for home consumption instead. UBoS reported that 13% of rural households experienced a decrease in output prices. The cooperatives we spoke to had mixed experiences: some encountered higher prices, some lower.

Overall, the COVID-19 restrictions appear to have negatively impacted agricultural income for smallholder farmers, despite a reasonable first season harvest. UBoS reported that 60% of farm households experienced income loss (less or no earnings) from March to June, and these losses likely persisted after the first season harvest as prices for staples have remained low. Though these low staples prices have eased some of the pressure on food security, as we discuss below, they have compounded the impact of limited access to buyers and markets. As a result, we expect that smallholder farmers' incomes from agricultural production have remained reduced through the summer.

#### Impact on Non-farm Income

Many smallholder households rely on non-farm income sources, so to understand the welfare effects on these households, it is important to look at the status of this income generation. These income sources were more vulnerable to the COVID-19 restrictions, as non-essential businesses and many large markets were closed, and public transportation was not available.

The UBoS survey asked about non-agricultural income. Overall, 70% of respondents reported in June that they were still working; the figure for rural areas was over 70%, for urban areas around 60%. This suggests that there was not as much total unemployment as might have been expected. However, the households were not earning as much: 87% reported reduced or no income from at least one of their sources of livelihood, and 90% of households with non-farm family businesses suffered income losses. Furthermore, 14% of rural households experienced a non-farm business failure. Finally, many households, particularly in rural areas, also rely on remittances for some portion of their income. UBoS reported that (as of June) in-country remittances from family had decreased for 83% of households that had received this type of income in the previous 12 months.

A series of surveys conducted by BRAC also asked about the impact of COVID-19 on income. In [April](#), 47% of respondents said their income had completely stopped, while 32% reported that it had reduced "a lot"; in [June](#), this had improved to 29% and 44%, and by [July](#) only 16% of respondents reported that their income had completely stopped, with 52% reporting it had reduced "a lot." FEWS NET also touched on this subject in their most recent [update](#): open-air food and livestock markets (weekly/monthly) are still closed in rural areas, and households are still earning less from both on-farm and off-farm income sources.

This confirms what we have heard from anecdotal reports: the impacts on non-farm income have been significant and widespread. The overall impact on resilience will depend on the income composition of rural households – how reliant they are on agriculture versus non-farm income, and the number and variety of non-farm income generating activities they engage in. Even now, though many restrictions have been lifted and the situation will improve, it will take some time for economic activity to fully recover, so we expect many



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households will continue to see reduced incomes for a few more months, with full recovery depending on the type of business.

### Food Security Status

Food security is a core component of household resilience, and is intrinsically linked to both agricultural production and overall household income. The World Food Programme [projected](#) in April that 1.2-1.6 million people in Uganda risked facing acute hunger. Since then, there have been indications of widespread pressure on food security, though the situation has not been as dire as it could have been.

Though most smallholder farm households grow food for consumption, many also purchase food: the UBoS survey reported that 72% of households in rural areas buy their main staple food. Households that rely on purchased food faced increased prices during the first few weeks of the restrictions. This has largely been attributed to panic buying and supply chain disruptions, as discussed in our third update report. These price spikes were short-lived, and had [subsided](#) by April as retail prices of most staples returned to near-average. As discussed above, the prices of key staples (except for beans) in select markets were average or below average from March to May and dropped in June and July following the harvest. This was problematic for farmers looking to sell their produce, but should have limited the potential impact on households that purchase staples.

Yet many households reported spending more on food. BRAC [reported](#) that, across the period covered by their surveys, 66% of respondents in rural areas reported increased prices. UBoS also reported that 29% of rural households experienced an increase in the price of "major food items", which is the shock that the largest number of rural households cited as "most severe." The cause of this disparity is not immediately clear. These households may have been in areas not covered by the FEWS NET sample, or prices may have been higher outside of the market centers.

In addition to localized price increases, many households have been impacted by other dimensions of the restrictions. 16% of the households in the UBoS sample reported that they were unable to buy their main staple food during the preceding week; the main reasons cited were an increase in price and a lack of money. Residents of rural areas were more likely to report lack of cash as a reason, which speaks to the impact on overall income – both the difficulties selling farm produce and reduced income from non-farm sources. The households also face issues with access: some could not reach markets without public transportation (though these restrictions have now largely been lifted), and many open-air markets still remain closed.

All together, the price increases, reduced income, and difficulties with market access have led to reduced food consumption. Back in April, 58% of households in the [BRAC survey](#) reported their food consumption had reduced "a lot", while 24% had reduced consumption "a little". In June, the [figures](#) stood at 57% and 25%; by [July](#) they had improved, but 44% were still reporting consumption was reduced "a lot" and 41% reported it was reduced "a little." However, these results combined rural and urban respondents; a separate report provided figures for rural respondents from the June survey: 49% of rural respondents reported that consumption had reduced "a lot", and 29% reported that it was reduced "a little". UBoS constructed a measure of food security based on the Food Insecurity Experience Scale, and found that 8% of respondents had experienced severe food insecurity in the previous 30 days, and 42% had experienced moderate or severe food insecurity. There was no significant difference between rural and urban areas. FEWS NET [reported](#) in August that food availability and access had improved following the easing of certain lockdown measures and the June-July harvest.





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Households that were able to rely on their own-farm production for consumption seemed to fare better. As discussed above, the first harvest in June and July was slightly below average to above average, depending on the crop. As is to be expected, across all three BRAC surveys, households that grow their own food reported being able to meet their consumption needs for longer. According to the UBoS survey, 67% of rural households cited their garden as their main source of food since the outbreak, followed by the market (28%). Urban households were the reverse: 29% from the garden, 67% from the market. FEWS NET [reported](#) in June that the majority of households that rely on own-farm production in bimodal areas were able to access their minimum foods. Of course, the districts impacted by flooding are less food secure: the government [warned](#) in July that food shortages are expected in certain areas between November 2020 and March 2021, due to natural disasters and the impact of COVID-19.

This suggests that the level of subsistence production in Uganda, though often regarded as a sign of insufficient progress in agricultural modernization, was an asset in this instance. According to the [WFP](#), only 38% of rural households in Uganda rely on market food purchases, as opposed to 76% of rural households in Kenya. Though the UBoS survey reported that 72% of rural households buy their main staple food, it is likely that many of these households are not entirely dependent on the market, and are able to cut back on purchases and rely on their own production if needs be. Self-sufficiency seems to have served as a bulwark against a more serious decline in food security for many rural households. As we will discuss below, there seems to have been an increase in the number of households engaged in farming as a response to the COVID-19 shock, as they turn to a safety net that leaves them less exposed to price fluctuations. Indeed, the impact of the COVID-19 restrictions on smallholder farm households may well depend on how linked they are to regional markets or to Kampala, or to how reliant they are on cross-border trade or access to international markets (such as for coffee production).

Finally, we must briefly mention nutrition. In addition to reduced food consumption, there are indications that dietary diversity has decreased, as households purchase cheaper, less nutrient-rich foods. This is the result of reduced incomes (staples are generally less expensive) intersecting with access issues and increased prices. The World Food Program [predicted](#) in May that income shocks would likely lead families to purchase staples rather than perishable foods, and nutritious foods would become even more out of reach for low-income households. In July, the UN [reported](#) that access to dietary diversity has decreased, particularly for vulnerable groups. FEWS NET [reported](#) that prices for sweet potatoes and vegetables were below average in July in rural and urban markets, but as seen above, these prices do not always reflect the reality outside the market centers. Though the food security picture is not as bleak as it could have been, it appears that the nutrition composition of household consumption has changed, due to the erosion of purchasing power for many households. This may have long-term impacts on health outcomes, particularly for children.

#### Other Dimensions of Resilience

Though we did not research this extensively, as our focus was on impacts to the market system and agricultural production, there are many additional dimensions to resilience that have also been impacted by the COVID-19 lockdown. Education access is now significantly more [challenging](#), and physical access to essential services such as healthcare was reduced while public transportation was closed. As discussed above, many households also have reduced income, which further reduces their access to education, healthcare, and other essential services. There have been impacts on [maternal health](#), as well as an increase in [gender-based violence](#). The situation has also [disrupted](#) treatment for HIV, tuberculosis, and malaria, such that the country could lose progress in beating back these diseases.



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The UBoS survey paints a picture of overall household resilience. The survey asked about a number of shocks, both related to the COVID-19 restrictions (such as higher food prices) and not (such as crop pests or floods). Interestingly, 41% of rural households had not experienced any shocks from March to June. For the rural households that did experience shocks, the most common were an increase in the price of major food items, a non-farm business failure, and a fall in output prices. Among all households that experienced a shock (both rural and urban), the most common coping mechanisms were relying on savings (43%), reducing food consumption (28%), doing nothing (23%), reducing non-food consumption (21%), and assistance from friends and family (19%).

According to UBoS, only 3% reported having sold assets as a coping mechanism, which is a proximate indicator of household resilience. Selling assets is a damaging coping strategy, as productive assets can only be sold once, and once they've been sold the household's ability to earn income is further reduced. Also, if many households sell their assets at the same time – as would be the case for a covariate shock such as COVID-19 – the price for these assets could crash. The fact that so many households relied on other strategies, particularly savings, shows a promising level of resilience to shocks.

Access to formal finance does not appear to have been an issue, or a major coping mechanism. The UBoS report indicated that only 38% of rural households in the survey needed to access to a financial institution, and nearly all (98%) of these were able to access one. Less than 1% of households that experienced a shock since March reported having taken a loan from a financial institution as a coping mechanism, and only 7% borrowed from friends and family.

Going forward, the long-term impact on household resilience will depend (at least in part) on how long it takes for households to return to their previous income levels and replenish their savings. As the situation has already lasted nearly six months, and many households have used their savings, we may see more adverse coping mechanisms in the near future – particularly if non-farm sources of income do not recover, or another lockdown is imposed. For smallholder farmers, their welfare prospects will also depend on the outcome of the second season harvest. There will also likely be long-term impacts on the educational and health status of these households, though this may be difficult to quantify for quite some time.

#### Prospects for the Upcoming Season

Land preparation and planting for the second season is underway, and there are already indications that this season will be different as a result of COVID-19.

First, usage of agricultural inputs may decrease. As discussed above and in our second update report, there may be issues with access to inputs in certain localities. Input dealers reported supply chain disruptions back in May, and if these have not been rectified, product availability may be limited. It is also possible that some input retailers have gone bankrupt as a result of the lockdown limiting their business activities; in some rural areas, there may be only one or two nearby retailers, so closures could severely limit access. The Uganda National Farmers' Federation [predicted](#) in June that food production would drop between 15-40%, in part caused by input access issues.

As you can see in the map below, the "Farmer purchases and uses quality inputs" element is shaded red, indicating that it is impacted to the point of being non-functional. There is limited information available about input usage at the farm level, so this assessment is largely based on the status of other system elements that enable access to inputs; in particular, the elements that represent access to available, affordable inputs and





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no clear strategy, and farmers are adjusting their farm size and crop portfolio based on their individual circumstances (available land, budget, etc.). The report did indicate that increasing the area cultivated was the strategy most commonly cited by respondents in the poorest consumption quintile. The reasons respondents gave for making these changes: being advised to stay home (51%), movement restrictions (42%), labor availability (17%), other input availability (6%). Farmers who were unable to find buyers, or who faced low commodity prices, may change their planting decisions as a result, such as shifting to other crops or focusing more on cultivating crops for their own consumption. Households that are concerned about access to nutrition may also have changed their planting strategy accordingly, such as adding vegetable gardens.

There are also anecdotal [reports](#) that more Ugandans have taken up farming, either as an alternative livelihood or as a safety net. More than half of the cooperatives we spoke to said the number of acres under cultivation in their area had increased; we heard mixed reports from the inputs dealers. The village agent association said its members were focusing on their farms, and we heard reports that teachers were taking up farming.

As for prospects for the harvest, rainfall for September to December is [forecast](#) to be below average, which will negatively impact production volumes. Overall production levels will also depend on how many new acres are under cultivation, weighed against lower yields on individual farms as a result of lower inputs usage. Farmers may continue to have trouble finding buyers after the next harvest, particularly if their local traders were forced to spend their capital on living expenses and can no longer operate. In general, it will be important to monitor how farmers' access to both input dealers and traders has changed as a result of the shock, particularly in rural areas where there may be few such businesses to begin with.

### Identifying Information Gaps

Finding and processing information about COVID-19 in Uganda was an essential component of this analysis. Our team developed a procedure for information intake that identified the relevant pieces of information ("facts") in each source and assigned them to elements on the map. This allowed us to quickly and systematically organize the information we collected, and to easily assess the status of an element based on the facts that were assigned to it. An additional benefit of this approach is that it allows us to visualize which areas of the system have available information, and where there are gaps in our knowledge.

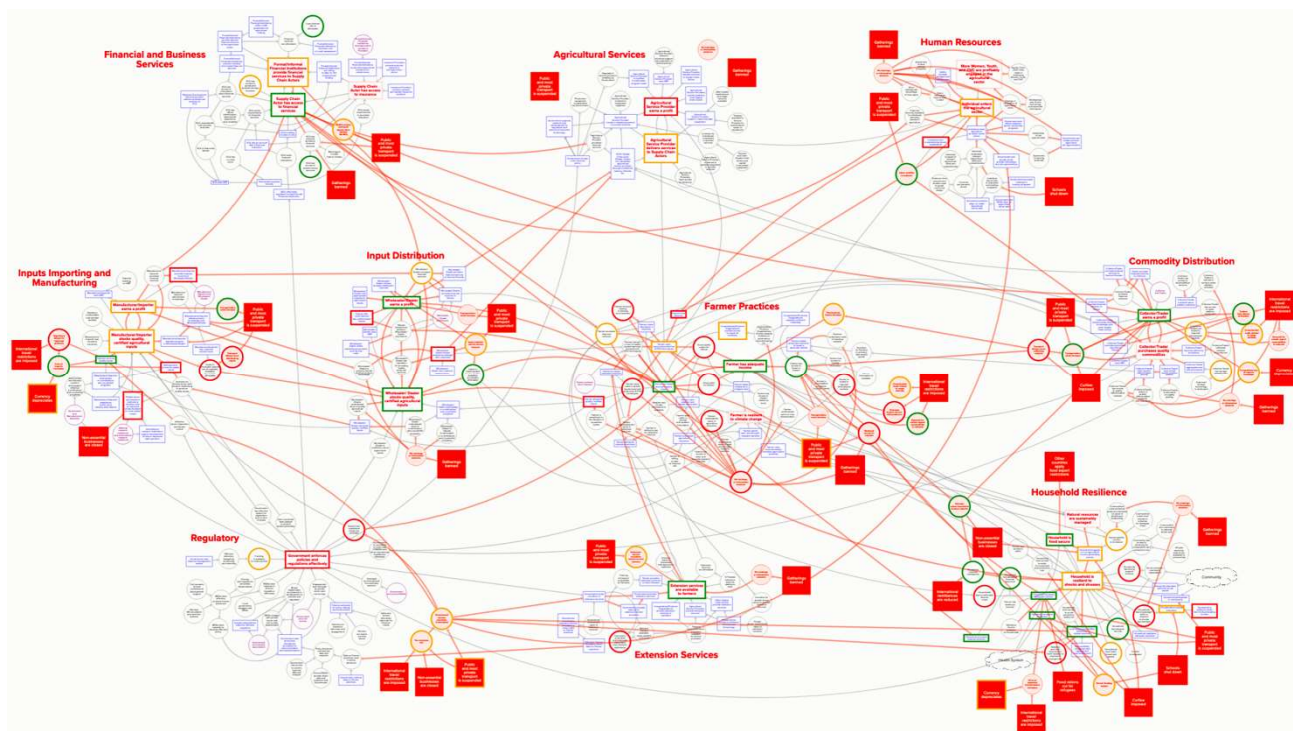
The figure below includes an overlay to the map that shows the information coverage for the system elements. We categorized each fact based on its source, allowing us to view the coverage of news sources, data sources, other studies, and our interviews. It is also possible to view the total information coverage (all available sources) which is shown in the figure. The element outlines represent the number of facts that were found for that element. If an element has one corresponding fact, the element's outline is **red**. If it has two or three corresponding facts, the outline is **orange**. If the element has four or more corresponding facts, the outline is **green**. Elements with no facts have no bold outline.

- To view this more clearly, please access the map online at <https://kumu.io/MSM/usaaid-uganda-fff-msm-activity-covid-19-map#full-map/shock-status>.
- Our guide to Kumu explains how to access this view: <https://dspace.mit.edu/handle/1721.1/127277>





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Overall, we were able to find information for about a third of the system elements (including the shock elements). Given the level of detail represented in the map, that is to be expected – the available sources, particularly news articles, tended to focus more on high-level themes than specific mechanics. As you can see in the map below, the majority of this information is concentrated in the Farmer Practices and Household Resilience subsystems. This appears to be for two reasons: first, there was understandably a significant amount of coverage on the human impact of the lockdown, and these two subsystems represent the household level. Second, we benefitted from several broad studies that focused on households, such as the Uganda Bureau of Statistics survey. The density of information in the Household Resilience subsystem may also reflect the fact that it represents a variety of concepts in a more condensed way than the other subsystems, and not all of the information is specific to smallholder farmers.

The Inputs Importing and Manufacturing subsystem (middle left) and the Commodity Distribution subsystem (middle right) were the next most saturated; as these sectors operate at the national level, and interact with international markets, it is easier to extrapolate the impact of the lockdown on these sectors. There was also an extensive study focused specifically on the inputs sector. In general, the backbone of the supply chain, which runs horizontally through the middle of the map, is decently well-covered. This makes sense, as the movement of physical material through the system is relatively easy to observe and measure. However, it is still worth noting that although many of these elements have some information associated with them, the reliability of the information can vary.

It is equally interesting to see which areas of the system have less publicly available information. Financial and Business Services has some coverage, particularly around loan affordability and mobile money usage. Other subsystems are less well covered. Human Resources has eight facts in total. Extension Services has good coverage on the key outcome (“Extension services are available to farmers” has five facts), but little coverage elsewhere. Regulatory has some coverage, although some facts are not particularly specific about government





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we used the information layer in a similar way to inform our recommendations for sentinel indicators, which are discussed in the next section.

### Sentinel Indicators

We recommend creating sentinel indicators to measure the impact of the shock on the system over time. These indicators are designed to gauge the impact on particular key elements, and are chosen deliberately as signals of change in the system. A change in these sentinel indicators indicates an imminent ripple effect on the status of other connected elements. The sentinel indicators allow you to keep an eye on changes to the system in a targeted way, acting as early warning indicators of nearby system change. They also help to indicate where further information gathering (perhaps more in-depth or rigorous data collection) is needed. Particularly in the context of a complex system, there might be latency in the effect of a shock, so it is important to continue monitoring key nodes in the system even after it appears that the shock has passed.

Based on our understanding of the system and the level of information that is already available, we have developed a set of proposed sentinel indicators. These are a menu of options, depending on which parts of the system are considered a priority for continued monitoring – though of course as our map demonstrates, the system is highly interconnected, and we recommend tracking as broad a portfolio of sentinel indicators as possible. We proposed collection intervals for the sentinel indicators, but timing could also correspond to certain triggers, such as when borders are opened or if new lockdown measures are imposed.

We would particularly recommend collecting information on access to finance. This was not as serious an issue as we initially anticipated, but may still be challenged going forward. Although the Bank of Uganda [cut its benchmark rate](#), commercial banks have not significantly lowered their rates, leading the BoU to [threaten to cap their interest rates](#). The Uganda Development bank received [additional funding](#) for business loans, but these loans are [not necessarily accessible](#) to SMEs, particularly since they do not address short term liquidity needs. Many businesses will have used their existing capital, and households have depleted their savings; particularly if another lockdown is imposed, ensuring access to finance may be essential to supporting actors across the supply chain. We have suggested several sentinel indicators focusing on access to finance in the tables below.

The sentinel indicators, organized by subsystem, rely primarily on existing data sources and Key Informant Interviews (KIIs). KIIs are a valuable tool in this context, as they allow decision-makers to quickly gather information about the status of system elements without requiring a large investment in data collection. In fact, by reaching out to a few key stakeholders in each sector to keep a pulse on what is happening, it is possible to narrow and focus any broader data collection efforts on the areas of the system that are particularly impacted.

The KIIs that we collected were a convenience sample, based on our existing contacts and contacts provided by the USAID activities. We would also recommend that decision-makers responding to shocks in complex systems cultivate a network of KIIs across the system. This could be done via existing programs, industry associations, or coordination with other stakeholders focused on particular sectors. Having a network of contacts who can provide information about key system nodes is vital to understanding the impact of a shock on the system, and to assessing how best to address the impact going forward.

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### Inputs Importing and Manufacturing

Sentinel Indicator	Purpose	Information Source	Collection interval
Measure of sector health / number of bankruptcies	Input companies facing higher costs & liquidity issues; closures could negatively impact access to inputs	Industry associations or interviews with targeted KIIs	Quarterly
Access to finance / number of companies seeking credit because of COVID	Alternate indicator of business health / ability of businesses to withstand increased costs	Industry associations or interviews with targeted KIIs	Quarterly

### Input Distribution

Sentinel Indicator	Purpose	Information Source	Collection interval
Measure of sector health / number of bankruptcies	Input access is already limited; closure of businesses could further reduce access to inputs	Partner with UNADA to survey input dealers or interview targeted KIIs	Before and after each planting period
Access to finance / number of companies seeking credit because of COVID	Alternate indicator of business health / ability of businesses to withstand increased costs	Partner with UNADA to survey input dealers or interview targeted KIIs	Quarterly
Retail input prices	Increased input prices could discourage farmers from using inputs	Partner with UNADA to survey input dealers or interview targeted KIIs	Before each planting period
Retail input volumes	Measure of how input usage has been impacted; farmers with stressed incomes may purchase less	Partner with UNADA to survey input dealers or interview targeted KIIs	After each planting period
Input availability	Some products may be more difficult to obtain as a result of import disruptions or higher costs; portfolio of available products may be reduced	Partner with UNADA to survey input dealers or interview targeted KIIs	Before each planting period
Prevalence of counterfeit inputs	More counterfeits may appear on the market as a result of reduced border enforcement or demand for cheaper products	Survey of input dealers who have already been trained to identify counterfeit inputs	After each planting period

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### Commodity Distribution

Sentinel Indicator	Purpose	Information Source	Collection interval
Measure of sector health / number of bankruptcies, transportation costs	Commodity distributors facing higher operating and transportation costs; closures could reduce access to markets for both smallholders and commercial agribusinesses	Industry associations or interviews with targeted KIIs	Quarterly
Access to finance / number of companies seeking credit because of COVID	Alternate indicator of business health / ability of businesses to withstand increased costs	Industry associations or interviews with targeted KIIs	Quarterly
Informal cross-border trade volumes	Border communities negatively impacted by restrictions on exports	Collected by <a href="#">Bank of Uganda</a>	Monthly
Formal export volumes Formal export prices	Exports may be reduced as a result of increased costs/less supply from farmers, which would negatively impact the sector	Collected by <a href="#">Bank of Uganda</a>	Monthly
Average border transit time	Proxy for increased costs as a result of testing and border closures	TradeMark East Africa / URA	Bi-weekly or monthly
Wholesale commodity prices (maize, beans, other staples)	Indication of whether this year behaving differently than previous years / expected trends, impact on commodity wholesalers and retailers	Collected by <a href="#">RATIN</a>	Bi-weekly

### Farmer Practices

Sentinel Indicator	Purpose	Information Source	Collection interval
Ability to access inputs	Issues with input access would signal both supply chain blockages and potentially lower harvests	UBoS-LSMS <a href="#">high frequency phone surveys</a>	After each harvest season
Crops planted compared to previous seasons	Indication of how many farmers are changing their crop portfolio as a coping mechanism	UBoS-LSMS <a href="#">high frequency phone surveys</a>	After each harvest season
Acres planted compared to previous seasons	Indication of how many farmers are changing their farm size as a coping mechanism	UBoS-LSMS <a href="#">high frequency phone surveys</a>	After each harvest season
Ability to sell harvest	Issues with market access would indicate both supply chain blockages and lower household incomes	UBoS-LSMS <a href="#">high frequency phone surveys</a>	After each harvest season

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Farmgate prices	Proxy for impact on household income from farming	Available from <a href="#">FEWS NET</a>	After each harvest season
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**Household Resilience**

Sentinel Indicator	Purpose	Information Source	Collection interval
Income from non-farm activities	Rate of recovery of non-farm income will serve as a measure of impact on households	UBoS-LSMS <a href="#">high frequency phone surveys</a>	Quarterly
Access to / use of credit	Formal or informal loans may increasingly be used as a coping mechanism	UBoS-LSMS <a href="#">high frequency phone surveys</a>	Quarterly
Retail commodity prices (maize, beans, other staples)	Proxy for impact on household spending on basic food basket	FEWS NET <a href="#">Price Bulletins</a>	Quarterly
Food security status and composition of diet	Households may continue to face decreased food security and nutrition	UBoS-LSMS <a href="#">high frequency phone surveys</a>	Quarterly

**Other Subsystems**

Sentinel Indicator	Purpose	Information Source	Collection interval
Availability of extension services at sub-county level (Extension Services)	Indication of how significantly access to extension services has been reduced	Directorate of Agricultural Extension Services or interviews with targeted KIIs	After each planting period
Measure of sector health / number of bankruptcies (Agricultural Services)	Service providers facing higher costs and potentially limited access to credit	Interviews with targeted KIIs	Quarterly
Access to finance / number of companies seeking credit because of COVID (Agricultural Services)	Alternate indicator of business health / ability of businesses to withstand increased costs	Industry associations (Grain Council) or interviews with targeted KIIs	Quarterly
Status of agricultural lending (value and volume, for different levels/tiers of customers) (Financial and Business Services)	High-level indicator of throughput in agricultural lending and availability of credit	Industry associations or interviews with targeted KIIs	Quarterly



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### Looking Ahead

We hope that this analysis has demonstrated the value of using a systems perspective to understand the impact of a shock. As a sense-making strategy, using a system map helps to organize information that is constantly being updated in a systematic way, and enables practitioners to visualize the status of a system. The process of assigning statuses to system elements creates a framework that helps to structure thinking about the system and can lead to a deeper understanding of how the system operates. Structuring the analysis in this way also enables decision-makers to frame the situation in a way that allows them to act dynamically and anticipate how the system will change over time.

The lockdown achieved its purpose: the number of COVID-19 infections in Uganda was contained for several months. There were issues with how the lockdown was enforced, including instances of [violence](#) and concerns about the erosion of [human rights](#) and [civil liberties](#), but the lockdown did [successfully](#) limit transmission of the virus. However, as we have discussed over the course of these update reports, there have been significant impacts on the agricultural market system in Uganda. Many households have suffered income losses, and there have been significant supply chain disruptions, with the risk of bankruptcies in several key sectors. The lockdown has broadly disrupted agricultural production, a key component of gross domestic product, and the extent of the impact may not be fully realized until 2021.

### Uganda's market system has proved resilient

From a systems perspective, the past few months have demonstrated that the market system in Uganda is relatively **resilient**. Though there have been increased costs, disruptions, and delays, businesses across the agricultural supply chain were able to adapt and continue operating in some form. In our experience, informal, fragmented markets tend to be more resilient. Logistics and commodity distribution in particular are very decentralized in Uganda, and this likely lessened the impact of the lockdown on the broader supply chain. As a result, the overall impact on commodity prices was not nearly as severe as initially anticipated – the fact that the prices of maize and other staples remained within the recent historical range is an encouraging sign. As discussed above, smallholder farm households also appear to have been relatively resilient in the face of this shock, able to engage in adaptive coping mechanisms and largely rely on their farms to maintain a level of food security. Going forward, it is vital for policymakers to consider ways to promote greater resilience within the system, building on what we have learned through this analysis.

### Shocks present opportunities to encourage behavior change

A shock in a system can also be an opportunity to promote **behavior change**: as has been seen across the supply chain, many actors will be open to new ways of doing business as they try to mitigate the effects of the shock. This situation provides an opportunity for policymakers to both identify and discourage maladaptive responses before they become entrenched, and encourage positive behavior changes that will help actors adapt to the current shock and render the system more resilient in the future. This is another way in which a systems perspective can be useful: for identifying the key behaviors that are essential to enabling a particular type of change in the system.

We hope the insights we have generated across these update reports have proved valuable. We encourage questions and feedback: please contact us at [msm.uganda@mit.edu](mailto:msm.uganda@mit.edu).



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## Appendix

The stacked imports plot in the appendix of Report 3 showed a large increase in Minerals imports from April to May. The Bank of Uganda has since revised their statistics and recategorized this increased value as being from Petroleum. From May to June, imports have continued to increase, again largely driven by petroleum.

Imports - 2020

