RESILIENCE, EVALUATION AND LEARNING AWARD (REAL)

THE DOWNSTREAM ECONOMIC EFFECTS OF COVID-19 ON RESILIENCE IN EASTERN DRC

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Resilience Evaluation, Analysis and Learning

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REAL is a consortium-led effort funded by the USAID Center for Resilience. It was established to respond to growing demand among USAID Missions, host governments, implementing organizations, and other key stakeholders for rigorous, yet practical, monitoring, evaluation, strategic analysis, and capacity building support. Led by Save the Children, REAL draws on the expertise of its partners: Food for the Hungry, Mercy Corps, and TANGO International.

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EXECUTIVE SUMMARY

The first case of COVID-19 was reported in the Democratic Republic of the Congo (DRC) on March 10, 2020. In response, the government enacted a state of emergency to slow the spread of the pandemic, which included international and provincial border closures, school and business closures and curfews. In the short run, these restrictions had many economic consequences for poor farmers in eastern DRC, including decreasing demand for informal labor, reducing domestic trade between rural and urban areas and limiting the availability of imported agricultural inputs. The restrictions also led to increased demand for commodities resulting in increased prices for food and non-food items. Aid agencies assumed that poor farmers in the region would see fewer agricultural labor opportunities, reduced agricultural productivity and decreased ability to sell agricultural goods. Although all restrictions were removed by the government by August 15, 2020, agencies remain under the assumption that income-generating activities and food security will continue to be impacted by the pandemic for some time to come (Famine Early Warning System Network, 2020).

The South Kivu Food Security Project (FSP) has been working in eastern DRC since 2016 to build resilience to six main shocks and stresses: crop disease and pests, land degradation, theft, multiple taxation, uncertain land tenure and land disputes and waterborne diseases. Their interventions focus on building individual's capacity (especially women and youth) to cope and respond to these shocks and stresses, with the ultimate aim of improving food and nutrition security and economic wellbeing. When the first cases of COVID-19 were detected in eastern DRC in Spring 2020, FSP quickly recognized that COVID-19 and it's downstream economic effects had the potential to significantly affect the communities they were working with and exacerbate the high-levels of food insecurity that already existed in their implementation areas. They also knew that they had a unique opportunity to understand how the downstream economic effects of COVID-19 could impact their participant population overtime. Leveraging longitudinal data from their Seasonal Farmer-based Survey (SFBS), FSP sought to understand:

1. The effects that shocks related to COVID-19 had on participant's food security, agriculture and resilience outcomes
2. The relationship between participant resilience capacities and food outcomes despite the downstream economic effects of COVID-19
3. How capacities developed among participants with high and low program exposure in the context of COVID-19, and
4. The relationship between FSP exposure and food security, agriculture and resilience outcomes despite the downstream economic effects of COVID-19.

SUMMATIVE KEY FINDINGS

Key Message #1: The economic impact of COVID-19 on FSP participants appears to have been minimal so far.

- Food and non-food prices and availability remained fairly stable from April 2020 to September 2020.
- FSP communities experienced greater price spikes and less availability of non-food versus food items.
- The regression results did not show any statistically significant relationships between the downstream effects of COVID-19 and wellbeing outcomes. FSP team members observed that the economic impact from COVID-19 was minimal and short-lived, which could explain why there was no statistically significant relationship with wellbeing outcomes.

Key Message #2: Greater exposure to FSP improved farming techniques, which in turn had a small positive effect on reducing severe food insecurity

- On average, individuals who attended more than 15 trainings practiced more agricultural techniques during the 2020 Season B, estimated between 0.55 techniques (using the propensity score matching analysis approach) and 0.77 techniques (using the multivariate regression analysis approach).
- Individuals that used more improved farming techniques had lower likelihood of severe food insecurity (3 to 4 percentage points less likely to have gone a day without eating, per additional technique).
- Descriptive statistics showed that there were high average levels of food insecurity across all survey rounds (with slight worsening over time), so even a modest decrease in likelihood of severe food insecurity is meaningful.

Key Message #3: Greater exposure to FSP increased access to financial services, which in turn had a moderate positive effect on reducing negative food coping strategies

- Participants who attended more than 15 FSP trainings throughout the study period (August/September 2019 - August/September 2020) were 13 percentage points more likely to gain or maintain access to any financial instrument from Round 1 to Round 2 than participants who attended less training. However, this result was not statistically significant using the propensity score matching analysis approach.
- Individuals with access to any financial instrument during Round 0 used fewer negative food coping strategies from Round 1 to Round 2 than individuals who did not access financial services during round 0. The analysis observed a -4.8 point reduction in the coping strategies (rCSI) index score. The rCSI score measures what people will do when they cannot access enough food. A lower score indicates reliance on fewer negative coping strategies.
- FSP participant's increased use of any financial service (i.e., savings and credit) was most likely driven by participating in VSLAs. Participating in VSLAs may have reduced reliance on negative coping strategies to access food in three different ways: 1). VSLA loans may have been used to buy food directly, 2). Income generated from non-farm livelihood activities (which were financed through VSLA loans) was used to buy food, and /or 3). Loans were used to increase agricultural production, which increased participant's access to nutritious food.

Key Message #4: Having greater livelihood sources is a key factor in increasing crop sales overtime

- Individuals with more diverse livelihood sources (more than 4) at Round 0 saw greater increases in the value of their crop sales between $15.09 to $15.53 relative to those with less than 4 livelihood sources.
- Average seasonal crop sales were fairly stable across all of the survey rounds; average seasonal livestock sales almost doubled from Round 1 to Round 2 (from $12.10 to $20.50).
- Levels of agricultural diversification changed very little from Round 0 to Round 2.

Key Message #5: Focusing on improving how FSP measures exposure to interventions could enhance the ability to show impact

- This analysis showed some promising results around three types of resilience capacities; however, the majority of results were null.
- Having a more nuanced measure of FSP exposure may improve the program's ability to understand whether participation in FSP improved outcomes in future analyses.
- This could include being able to evaluate the quality of training and engagement in other interventions besides training.

THE SOUTH KIVU FOOD SECURITY PROJECT (FSP) ACTIVITY

South Kivu Food Security Project (SK-FSP) is a five-year (October 2016 -September 2021) initiative funded by USAID through the Bureau of Humanitarian Assistance (BHA) and implemented in consortium by three international organizations Mercy Corps (MC), World Vision (WVI) and Harvest Plus in association with the local organization Association pour la Paix et la Concorde (APC) and the Université Evangélique en Afrique (UEA). FSP supports USAID's strategic objectives for the Democratic Republic of the Congo (DRC) by working with households, community leaders, the government of DRC and other development programs in pursuit of the project's goal of improved food and nutrition security and economic well-being of vulnerable households in South Kivu. To meet its goal, the project is implementing activities under three key Purposes:

1. Income increased for vulnerable households despite exposure to shocks and stresses
2. Improved nutritional status of children under two, pregnant and lactating women and other women of reproductive age
3. Operating environment for sustainable development made more stable and inclusive

The program aims to strengthen individual, household and community resilience to the stresses and shocks that impede their food security. These shocks and stresses include: land degradation, pest/crop disease, theft, uncertain land tenure and land disputes, multiple taxation and waterborne disease outbreaks. Operating in the three Health Zones of Miti Murhesa and Katana (territory of Kabare) and Kalehe (territory of Kalehe), FSP expects to reach approximately 35,000 households or 210,000 people living in 24 health areas.

CONTENTS

METHODOLOGY

RESEARCH QUESTIONS

In order to understand the impact that downstream effects of COVID-19 had on the FSP population, the project leveraged the panel data from their SFBS to explore the following research questions:

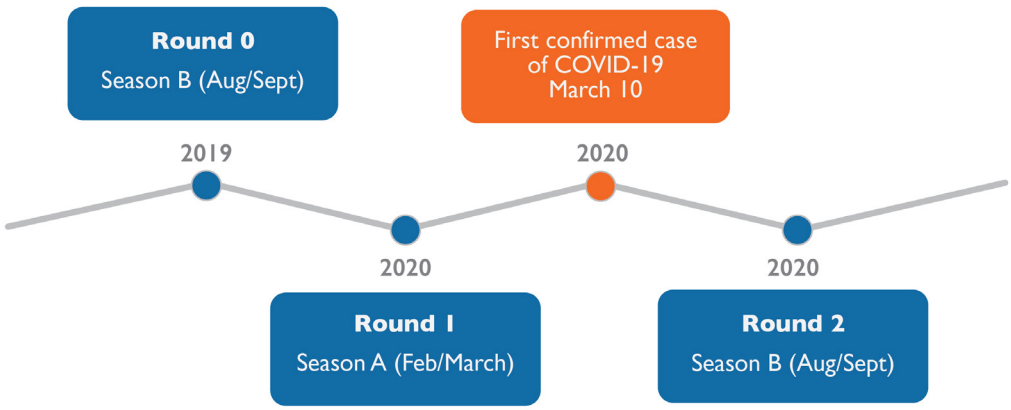
1. What effect did the downstream impacts of the coronavirus pandemic have on FSP participant's wellbeing outcomes?
2. What FSP-promoted resilience capacities are related to improved outcomes despite the downstream effects of COVID-19?
3. How is exposure to FSP (high versus low) related to access to and use of FSP-promoted capacities, despite the downstream economic effects of COVID-19?
4. How is exposure to FSP (high versus low) related to food security, agriculture and resilience outcomes over time (from Season A to B), despite the downstream effects of COVID-19?

DATA COLLECTIONS

SEASONAL FARMER-BASED SURVEY

The Seasonal Farmer-based Survey (SFBS) is collected from a sample of participants in agriculture activities, including value chain activities and nutrition-sensitive agriculture activities in February/March. In 2019, FSP added another round to the SFBS, expanded the survey to include a module on resilience and embedded a panel study in the SFBS that follows a small subset of the same households over time. The resilience module collects data on capacity building outputs (e.g., training exposure), resilience capacities, shocks and lower-level wellbeing outcomes, with the goal of understanding interactions between the project and participants' resilience trajectories and wellbeing outcomes. As of March 2021 the panel study has collected three rounds of data that effectively capture the situation of FSP participants before and after the state of emergency period in DRC.

Figure 1: Seasonal Farmer-Based Survey Timeline



VARIABLES

Figure 2: Resilience Variable Definitions

Downstream Economic Effects of COVID-19 Measure

As previously stated, FSP is interested in understanding how the downstream economic effects of COVID-19 have impacted their participant population over time; as such, this analysis does not measure the prevalence or incidence of COVID-19 itself. To create the downstream economic effects of COVID-19 measure, the analysis combined individual-level reporting of crop theft (collected through the farmer-based surveys) with community-level measurements of 1) changes in food and non-food market availability, 2) average price changes in food and non-food market availability, and 3) highest price increases ("price spikes") for food and non-food market availability.[1] The community-level measures were collected via a Minimum Expenditure Basket (MEB) Monitoring Tool on a bi-weekly basis from April 2020 to September 2020. This data was assigned to individuals based on their community of residence to create a complete set of shock effects acting on each individual.

The analysis used principal components analysis (PCA) to create composite variables which represent distinct groupings of the shock variables listed above. Essentially, PCA checks to see whether it's "random" which downstream effects of COVID-19 shocks affect people and communities, or whether there are distinct "groups" of shocks that affect people. The results of this exploratory analysis guided the analysis in assigning the individual shock measurements to one or more composite indices (see Appendix 2 for more details on the PCA results).

1 This analysis originally intended to also incorporate participants reporting of inter/intra-community conflict and deterioration in currency exchange rates, but at R2 (when COVID-19 shocks were most expected to affect communities), very few households reported conflict or deterioration in currency exchange.

Table 1: Downstream Effects of COVID-19 Indicators

Indicator	Definition	Data Source
Crop theft (pre- and post-harvest)	Binary variable indicating that the participant was affected by crop theft, either pre-harvest or post-harvest.	Seasonal Farmer-based Survey
Maximum price increase (%) food items	The maximum price increase of the food minimum basket in any given bi-weekly measurement within a market, from the starting point in April. Captures the greatest extent of food price increases during April - September.	Minimum Expenditure Basket Survey
Maximum price increase (%) non food items	The maximum price increase of the non-food item minimum basket in any given bi-weekly measurement within a market, from the starting point in April. Captures the greatest extent of market price increases during April - September.	Minimum Expenditure Basket Survey
Average price change (%) food items	The average % change in price of the food item minimum basket from the starting point in April. Captures long-lasting changes in food price.	Minimum Expenditure Basket Survey
Average price change (%) non food items	The average % change in price of the non- food item minimum basket from the starting point in April. Captures long-lasting changes in market prices.	Minimum Expenditure Basket Survey
Maximum spike in item availability decrease (%) food items	The largest % decrease in food categories (e.g. cassava flour, beans, oil) available in any bi-weekly measure, from the starting point in April. Captures the greatest extent of losses in food availability, but not the longevity.	Minimum Expenditure Basket Survey
Maximum spike in item availability decrease (%) non food items	The largest % decrease in non-food item types (e.g. soap, pots, washing basins) available in any bi-weekly measure, from the starting point in April. Captures the greatest extent of losses in market availability, but not the longevity.	Minimum Expenditure Basket Survey
Average item availability change (%) - MEB food items	The average % of food categories (e.g. cassava flour, beans, oil) which were available in a market in April that were not available at later MEB data collection periods. Captures wide-scale and long-lasting limits on food availability.	Minimum Expenditure Basket Survey
Average item availability change (%) non food items	The average % of non-food item types (e.g. soap, pots, washing basins) which were available in a market in April that were not available at later MEB data collection periods. Captures wide-scale and long-lasting limits on market availability.	Minimum Expenditure Basket Survey

FSP Exposure Variable

Based on the guidance of the FSP team, this analysis modelled FSP exposure as the number of training sessions attended by participants over the duration of the study (from Rounds 0 to 2). This approach captures intensity of training, but does not differentiate by training quality or curriculum. In the absence of a pathway in the Theory of Change connecting specific training types to resilience to COVID-19 and its downstream effects, this intensity variable was considered the best approach for summative program impact.

The FSP intensity variable was operationalized in the regression analysis as a binary of high versus low attendance. Attendance was rated as high if a participant attended 15 or more sessions (48.4% of respondents), and low if a participant attended fewer than 15 sessions (51.6%). In the Ordinary Least Squares (OLS) regression models used for verification, we used a continuous count of the number of training sessions attended, to test for more specific variations between very high and very low attendance.

This approach allowed for several possible temporal interactions: participants who attended many training sessions early may have already modified their agricultural and business techniques, while those who attended many trainings shortly before or during COVID-19's spread could benefit from recently learned new skills. We also tested models using only FSP training sessions attended at Round 0, to focus specifically on participants who may have modified their behavior over a longer period, and FSP training attended at Round 1 to allow for the benefits of recent training. These models yielded similar results.

ANALYSIS APPROACH AND ESTIMATION STRATEGY

This analysis primarily used multivariate regression analysis to answer the research questions. The following regression models were used for each research question:

RESEARCH QUESTION 1 (MODEL 1): EFFECT OF DOWNSTREAM EFFECTS OF COVID-19 ON RESILIENCE AND WELL-BEING OUTCOMES

This model used multivariate regression analysis to explore the relationship between the downstream effects of COVID-19 and resilience and well-being outcomes. The group of hypotheses under RQ1 used a single set of explanatory variables, with 6 outcome variables, **totalling 6 regressions**. The anticipated form of the regression model is shown below. This approach uses a cross-sectional analysis, controlling for the baseline values of the outcomes.

$$\text{Outcomes}_{it} = \beta_0 + \beta_1 \text{COVID}_{it} + \beta_2 \text{Outcomes}_{it-1} + \beta_3 \text{CTRL}_{it} + \varepsilon_{it}$$

Where:

- *Outcomes it* indicates the array of resilience and well-being outcomes for individual i at time t
- *COVID it* indicates the operationalization of the downstream effects of COVID for individual i at time t
- *Outcomes it-1* indicates the level of outcome for individual i in the previous round
- *CTRL it* indicates a set of individual controls: non-COVID shocks, labor types of family members, and demographics
- εit indicates the error term

RESEARCH QUESTION 2 (MODEL 2A, 2B, 2C): RELATIONSHIP BETWEEN RESILIENCE CAPACITIES AND RESILIENCE AND WELL-BEING OUTCOMES

This model will use multivariate analysis to explore the relationship between resilience capacities and resilience and well-being outcomes. In this model, we expect that the downstream economic effects of COVID-19 will serve as a potential confounding variable - that is, the vulnerability of a household to shock impacts may be related to their capacities, and will also influence their resilience and well-being outcomes. Essentially, we expect that more impacted households will

access and use fewer capacities than less impacted households, and will have worse outcomes. If we do not control for the downstream economic effects of COVID-19, we may incorrectly conclude that a negative relationship between a resilience capacity common among heavily impacted households and worse outcomes is the result of the capacity being less effective or even harmful. Including the downstream effects of COVID-19 as a covariate will allow us to identify the relationship between capacities and outcomes for households which experienced similar levels of shock impact.

Three main explanatory variables were used in Model 2: (a) Financial services, (b) social capital and (c) livelihood diversification.

This results in 3 models with 8 outcome variables, **totalling 16 regressions**. Model 2b did not include the seasonal crop or livestock sales outcomes. The anticipated forms of the regression model are shown below. Both approaches use a cross-sectional analysis, controlling for the baseline values of the outcomes. Panel analysis is not used, as the primary explanatory variable of interest is the resilience capacities in the previous round (before COVID-19).

Regression Model:[2]

$$Outcomes\ it = \beta 0 + \beta 1\ Capacities\ it - \beta 2\ COVID\ it + \beta 3 Outcomes\ it - 1 + \varepsilon 4 CTRLit + \varepsilon it$$

Where:

- *Outcomes it* indicates the array of resilience and well-being outcomes for individual i at time t
- *Capacities it-1* indicates the resilience capacities of individual i in the previous round
- *COVID it* indicates the operationalization of the downstream effects of COVID-19 for individual i at time t
- *Outcomes it-1* indicates the level of outcome for individual i in the previous round
- *CTRL it* indicates a set of individual controls: non-COVID shocks, labor types of family members, and demographics
- εit indicates the error term

RESEARCH QUESTIONS 3 AND 4 (MODEL 3): RELATIONSHIP BETWEEN FSP EXPOSURE AND RESILIENCE CAPACITIES

The third model used propensity-score matching to approximate a counterfactual to participation in the FSP program. As the dataset was fully composed of FSP participants, we focused on the difference in resilience capacities and outcomes between participants who attended many trainings ("high participation") and those who attended fewer ("low participation"). The program Theory of Change did not establish a standard minimum set of trainings, so we divided between the participation of the upper half and lower half of the participant population - across all three rounds, the threshold for high participation was 15 trainings.

We then used a set of Round 0 characteristics to predict high participation: household demographics (size, age, marital status of heads of household), economic status (land size, livestock ownership, income sources), age of the participant, and Health Zone. We controlled for this predicted probability of high participation, actual high participation, and the impact of COVID and non-COVID shocks:

$$Outcomes\ it = \beta 0 + \beta 1\ High\ FSPit + \beta 2\ COVID\ it + \beta 3 Non\text{-}COVID\ Shocks\ it + \beta 4 Propensity\ Score\ it + \varepsilon it$$

2 Additionally, we tested a model which allowed the relationship between capacities and outcomes to vary between participants more- and less-affected by COVID, using an interaction term. This model was not ultimately included in our analysis, due to the limited effects of COVID in the FSP target areas (addressed in Research Question 1 below) and the inferior explanatory power of the interaction models.

Where:

- *Outcomes* it indicates the array of resilience and well-being outcomes for individual i at time t
- *High F SP* it indicates whether individual i attended 15 or more FSP trainings across all rounds
- *COVID* it indicates the operationalization of the downstream effects of COVID-19 for individual i at time t
- *Non-COVID Shocks* it indicates the sum of non-COVID shocks (economic and food-related) impacting individual i across all rounds
- *Propensity Score* it indicates the predicted likelihood of high participation for individual i
- εit indicates the error term

RESULTS

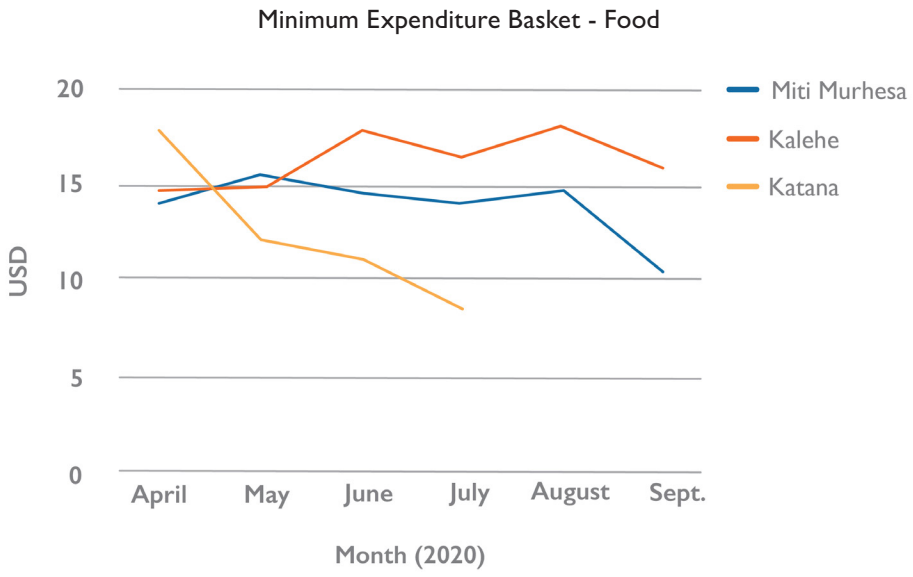
DESCRIPTIVE STATISTICS FINDINGS

DOWNSTREAM ECONOMIC EFFECTS OF COVID-19 MEASURE

To measure the downstream economic effects of COVID-19, this analysis combined individual-level reporting of crop theft (collected through the farmer-based surveys) with community-level measurements of 1) changes in food and non-food market availability, 2) average price changes in food and non-food market availability, and 3) highest price increases ("price spikes") for food and non-food market availability.

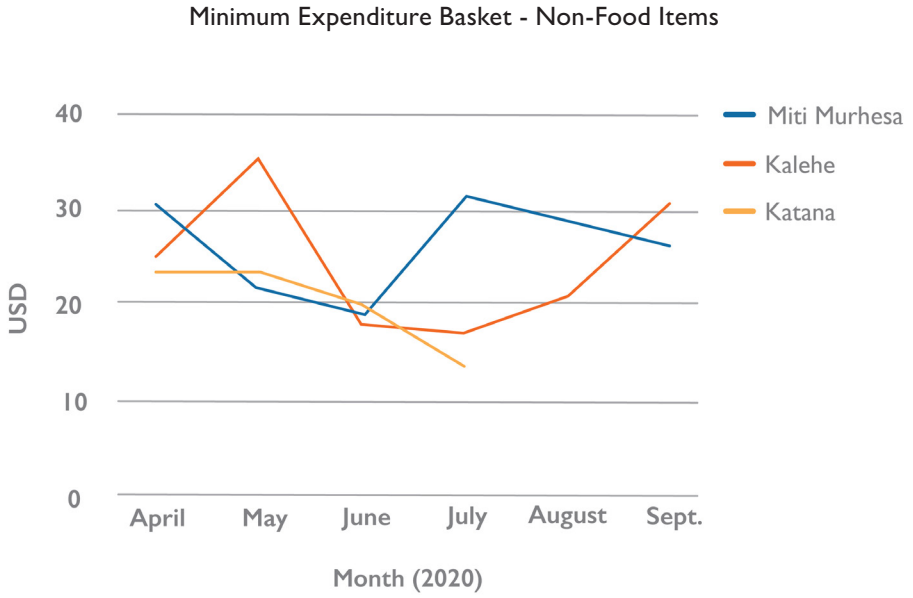
Based on data collected through the Minimum Expenditure Basket monitoring tool, this analysis shows that from April 2020 to September 2020 average food and non-food prices were fairly stable in all three Health Zones (see Table 3). We can even see in Figure 3 that overall, average food prices decreased in Kalehe and Miti Murhesa from April 2020 to September 2020 and increased slightly for Katana in June 2020 and August 2020. This is in direct opposition to what was expected to happen. It seems that overall, the markets in FSP implementation areas quickly stabilized and prices went back to normal around three months after the initial case of COVID-19 in the country. As of the publication of this report, there have been no confirmed COVID-19 cases in FSP implementation areas, which may explain why market prices have been fairly stable.

Figure 3: Average Food Prices by Health Zone from April 2020 to September 2020



Non-food prices increased more steeply for both the Kalehe and Katana Health Zones in the few months following the first case of COVID-19 in DRC, but these price increases were short lived (see Figure 4).

Figure 4: Average Non-Food Prices by Health Zone from April 2020 to September 2020



The average and highest price changes in food and non-food items from April 2020 - September 2020 are displayed below in Table 3. The highest price change (i.e., price spikes) was measured by taking the greatest change (i.e., increase) in price for the value of a bundle of food and non-food items as a whole from April 2020 to September 2020. For example, if the highest price was in May, then the analysis used the percentage change from the price at the first measurement in April to the spike in May. Table 4 shows the average and maximum decrease in food and non-food item availability from April 2020 to September 2020. The average change in food and non-food item availability was measured by calculating the percent of food and non-food items that were available in a market in April 2020 that were not available in September 2020. Maximum decrease in food and non-food item availability was measured by taking the average percent of food and non food items which were available in the market in April 2020 that were not available at later data collection points through September 2020. See Table 1 for more details on downstream effects of COVID-19 indicators.

All three Health Zones experienced greater price spikes and lack of availability in non-food versus food items (see Table 3). This is attributed to restricted movement of non-food goods across borders. In comparison, essential goods (such as food and medicine) were allowed to move across the border from other countries freely.

Table 2: Average and Highest Price Change in Food and Non-Food Items

	Miti Murhesa	Kalehe	Katana
Average Price Change in Food and Non-Food Items			
Food items	-5%	3%	14%
Non-food items	6%	13%	23%
Highest Price Increase in Food and Fon-Food Items			
Food items	44%	29%	107%
Non-food items	130%	100%	272%

Table 3: Price Increases and Item Availability from April 2020 to September 2020 by Health Zone

	Miti Murhesa	Kalehe	Katana
Average change in food and non-food item availability			
Food items	3%	0%	0%
Non-food items	20%	11%	2%
Maximum decrease in food and non-food item availability			
Food items	-14%	-3%	-12%
Non-food items	-41%	-37%	-35%

Crop theft decreased or only increased slightly from Round 1 (just before the first case of COVID-19 in DRC) to Round 2 (August/September 2020). The levels of crop theft in Round 2 were similar to the levels in Round 0 (August/September 2020), suggesting that COVID-19 did not lead to greater crop theft in the short-term. Restrictions in movement may have caused farmers to spend more time at their farm during the lockdown and movement of potential thieves may have also been tampered by the lockdown.

Table 4: Downstream Effects of COVID-19 Descriptive Statistics Results by Health Zone (Source: SFBS)

Proportion of participant that reported crop theft (pre- and post-harvest)	Round 0	Round 1	Round 2
Miti Murhesa	16%	24%	19%
Kalehe	12%	30%	18%
Katana	26%	25%	27%

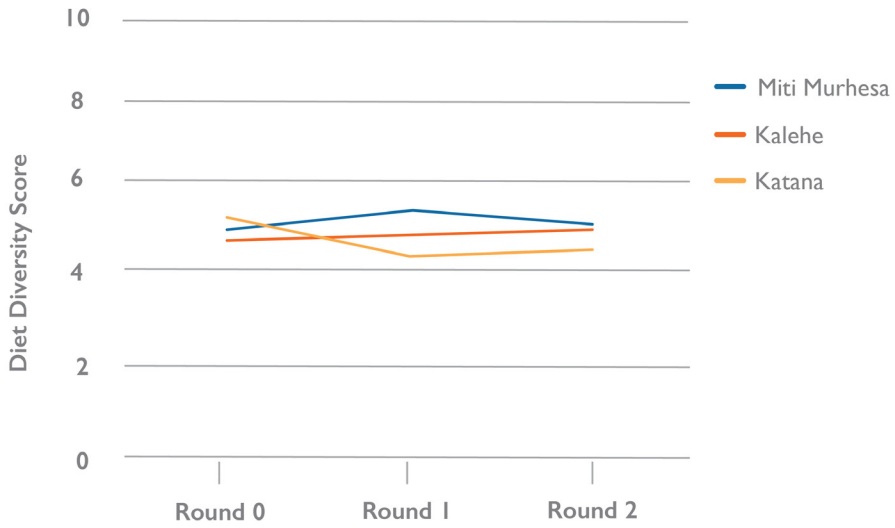
WELL-BEING AND RESILIENCE OUTCOME DESCRIPTIVE STATISTICS

Food Security

For the majority of FSP participants, food security worsened from Round 0 to Round 2. Dietary diversity decreased slightly over time with the average number of food groups consumed in a 24-hour period dropping from 5 to 4.6 and 4.7 from Round 0 to Round 2. The largest decrease in diet diversity was observed in the Katana Health Zone, whose average score decreased from 5.13 in Round 0 to 4.30 in Round 1 and did not recover in Round 2 (4.40). According to Vaitas, Coates and Maxwell (2015),[3] change in diet diversity scores seen in Katana may indicate that most household's food security is "stressed" and on the precipice of being in "crisis."

3 Vaitla, Bapu; Coates, Jennifer; and Maxwell, Daniel. 2015. Comparing Household Food Consumption Indicators to Inform Acute Food Insecurity Phase Classification. Washington, DC: FHI 360/Food and Nutrition Technical Assistance III Project (FANTA).

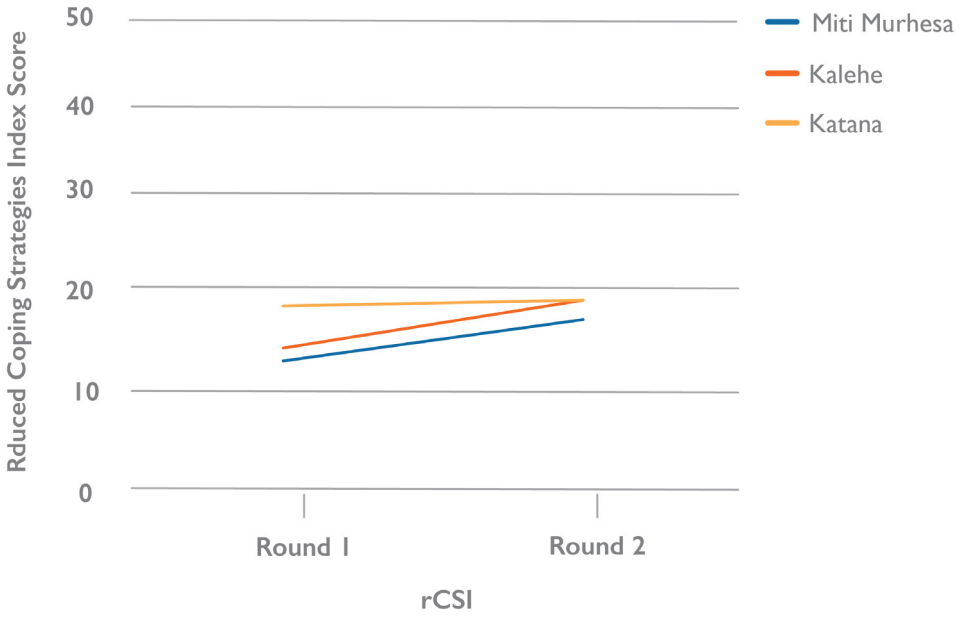
Figure 5: Average Dietary Diversity Score by Health Zone



Similarly, the average coping strategies index score increased from Round 1 to Round 2, which indicates that participants had to rely on more negative coping strategies over time to access food.[4] This increase occurred almost exclusively in the Kahele and Miti Murhesa Health Zones, increasing by 5.28 and 4.75 points (out of a possible score of 56). According to Vaitla, Coates and Maxwell (2015),[5] the average rCSI score across all three Health Zones (18.93) would indicate that "even with any humanitarian assistance, household groups have minimally adequate food consumption but are unable to afford some essential nonfood expenditures without engaging in irreversible coping strategies."

4 The Reduced coping strategies module was not included in the SFBS survey until Round 1
5 Vaitla, Bapu; Coates, Jennifer; and Maxwell, Daniel. 2015. Comparing Household Food Consumption Indicators to Inform Acute Food Insecurity Phase Classification. Washington, DC: FHI 360/Food and Nutrition Technical Assistance III Project (FANTA).

Figure 6: Average Reduced Coping Strategies Index



The average proportion of FSP participants who experienced severe food insecurity (didn't eat for the whole day in the past 7 days) was very high across all survey rounds (72%, 69% and 76% respectively) and similar across Health Zones.

Sales

Average crop sales per farmer from Round 0 to Round 2 increased slightly from Round 0 to Round 2 (from $23.7 to $25.60), which is a meaningful increase for the typical FSP participant. However, results varied substantially between Health Zones. Participants in Kalehe saw dramatic decreases in their crop sales from Round 0 to Round 2 (from $36.02 to $29.12 per farmer); whereas the other Health Zones saw their sales increase over time at similar rates. Average seasonal livestock sales increased by greater margins from Round 1 to Round 2 (from $12.10 to $20.50 per farmer), but this varied across rounds and by Health Zone. In Katana, average seasonal livestock sales decreased from $13.28 in Round 0 to $9.74 in Round 1 and then increased dramatically to $22.21 at Round 2. This pattern was very different

Figure 7: Average Seasonal Crop Sales by Health Zones

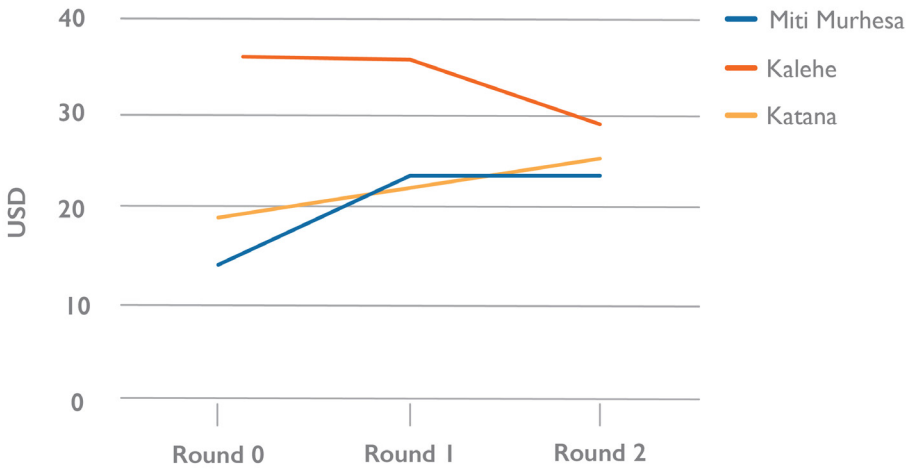
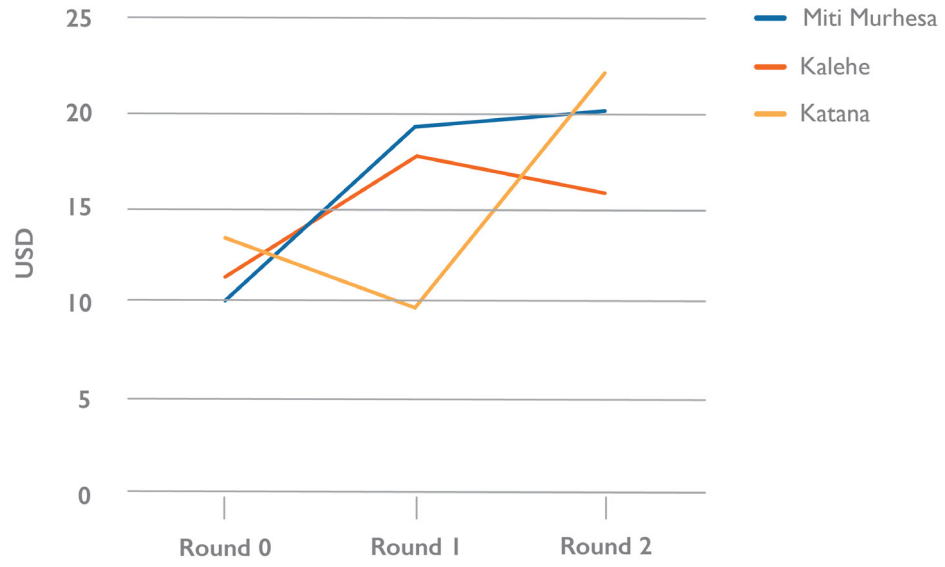


Figure 8: Average Seasonal Livestock Sales by Health Zone



from the other two Health Zones (Kahele and Miti Muhesa) where seasonal livestock sales improved from Round 0 to Round 1 and then either remained the same or decreased slightly by Round 2. One possible explanation for livestock sales decreasing in Katana at Round 1 is that farmers shifted their efforts on planting as opposed to selling livestock.

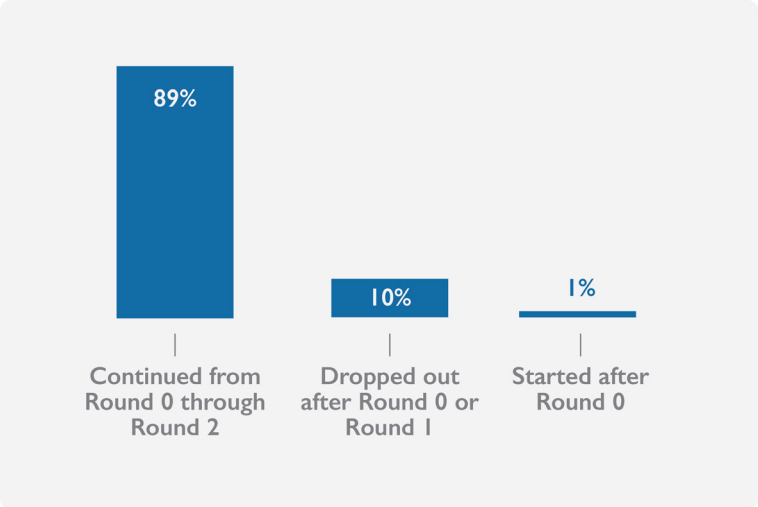
RESILIENCE CAPACITIES

This analysis focused on 6 resilience capacities: Access to financial services (savings, credit and crop and livestock insurance), levels of social capital, adoption of agricultural techniques and diversification, access to secure land tenure and access to humanitarian assistance. Overall, FSP participants increased their use of any financial service by 11.29 percentage points from Round 0 to Round 2. Most of the change was driven by increased use in savings and credit, especially in the Katana heath zone (average increase of 17 percentage points from Round 0 to Round 2). Social capital changed very little from Round 1 to Round 2 (it was not measured in Round 0). All Health Zones saw slight increases in social capital except for FSP participants in the Katana Health Zone. Adoption of agricultural techniques remained the same across all rounds for Miti Murhesa and Kalehe (around 3.5 techniques) but decreased from 4.03 to 2.95 techniques (Round 0 to Round 2) in Katana. Agricultural diversification (defined as having 4 or more income sources) among FSP participants decreased slightly across all Health Zones (average reduction of 2.5%). Access to humanitarian aid decreased for most participants from Round 0 to Round 2, with the largest decreases in Miti Murhesa (from 20% to 6%) and Katana (from 25% to 14%).

Table 5: Average Levels of Resilience Capacities per Round

	Round 0	Round 1	Round 2
Number of agricultural techniques adopted	3.8	3.5	3.3
Social Capital Index Score (out of 100)	N/A	42.4	43.2
Received humanitarian assistance in past 6 months	23.22%	17.15%	17.15%
Used any financial service in past 12 months	53.97%	56.23%	65.26%
Land ownership (any)	62.80%	49.34%	50.85%
Agriculture diversification (4 or more sources)	67.55%	64.91%	62.50%

Figure 9: Retention in FSP Training from Round 0 to Round 2



EXPOSURE TO FSP ACTIVITIES

On average, FSP participants attended 5.3 commercial and non-commercial training sessions from Round 0 to Round 2. These included: improved agricultural techniques and production, animal feed and breeding, basic numeracy and literacy skills, VSLA management, business development and skills, post-harvest handling, leadership skills, life skills, GBV awareness and gender roles in household decision-making, The majority of participants were continuously engaged in FPS training from Round 0 - Round 2.

Multivariate Regression Results

RQ1: WHAT EFFECT DO THE DOWNSTREAM IMPACTS OF THE CORONAVIRUS PANDEMIC HAVE ON FSP PARTICIPANT'S WELL-BEING OUTCOMES?

This research question sought to understand whether and how the downstream economic effects of COVID-19 impacted participants' well-being outcomes. This analysis hypothesized that individuals who experience more COVID-related shocks will have increased prevalence of moderate and severe food insecurity, decreased dietary diversity and decreased seasonal crop and livestock sales between Round 1 to Round 2 in comparison to individuals who experience fewer COVID-19 related shocks (see Table 6).

Table 6: Summary of Research Question 1 Hypotheses
*(*95% confidence level, **99% confidence level, ***99.9 confidence level)*

Economic effects of COVID-19 at **Round 2** → Change in Outcomes **Round 1 - Round 2**	**Result**
1.1 **More** economic effects of COVID-19 → **increased** prevalence of moderate and severe food insecurity from R1 to R2	FALSE
1.2 **More** economic effects of COVID-19 → **decreased** prevalence of dietary diversity from R1 to R2	FALSE
1.3 **More** economic effects of COVID-19 → **decreased** seasonal crop sales from R1 to R2	FALSE
1.4 **More** economic effects of COVID-19 → **decreased** seasonal livestock sales from R1 to R2	FALSE

The regression results did not show any statistically significant relationships between the downstream economic effects of COVID-19 and well-being outcomes. In other words, the downstream economic impacts of the coronavirus as we measure them did not seem to affect FSP participant's food security and economic outcomes. Although the immediate impact of the coronavirus pandemic was expected to affect agricultural labor opportunities, productivity and trade, this did not seem to translate into reduced well-being outcomes for FSP participants. One explanation for these results may be that FSP participants simply did not experience severe negative consequences in the immediate aftermath of the start of the coronavirus pandemic. This is supported by market price data, which shows that prices were fairly stable between April 2020 to September 2020 in the FSP implementation areas. This result also reinforces observations by field teams that COVID-19 has so far had limited impact on participant well-being over the medium run.

RQ2: WHAT FSP-PROMOTED RESILIENCE CAPACITIES ARE RELATED TO IMPROVED OUTCOMES DESPITE THE DOWNSTREAM EFFECTS OF COVID-19?

Research question 2 tested several hypotheses related to whether access and use of FSP-promoted resilience capacities at Round 0 was related to gains in well-being outcomes from Round 1 to Round 2 (see Table 7). This analysis is meant to demonstrate whether there is a temporal relationship between resilience capacities and well-being outcomes. Although the analysis is only correlational, having a temporal relationship strengthens the evidence for causality.

The analysis resulted in three positive associations that align with FSP's Theory of Change. Firstly, the analysis showed that individuals that used more improved farming techniques had lower likelihood of severe food insecurity (3 to 4 percentage points less likely to have gone a day without eating, per additional technique). An increased adoption in agricultural practices has led to an increase in yield realised for key staple crops thus cementing the food security status of FSP participant farmers.

Secondly, FSP participants with more diverse livelihood sources (more than 4) at Round 0 saw greater increases in the value of their crop sales of between $15.09 to $15.53 relative to those with less than 4 livelihood sources. This increase is quite large considering that average seasonal sales from crops only increased by $1.90 between Round 0 and Round 2. It is likely that having more livelihood sources gave farmers greater resources to invest in their crops. These farmers were also likely able to take advantage of the higher-than-average food prices in the capital and made more money at this time from selling their crops. There was also a preference for having "cash in hand" during the few chaotic months after the onset of the coronavirus pandemic so that individuals could buy other non-perishable food commodities (such as rice), which would motivate farmers to sell rather than consume their crops.

Individuals with access to any financial instrument during Round 0 had a lower Coping Strategies Index score[6] (-4.8 on the rCSI scale) from Round 1 to Round 2 in comparison to individuals who did not access financial services. This is compelling considering that the average rCSI score increased by 3.55 points from Round 1 to Round 2 (from 15.38 to 18.93). The level of participation in VSLAs is very high among FSP participants. Many VSLA members in the FSP implementation areas use loans to buy food and other household items. Although the use of loans for non-productive purposes is not the main goal of increasing access to financial services, it is an important resource for households to rely on when times are tough. Avoiding negative coping strategies to access food in the short-term could have longer term effects on nutrition and allow households to not deplete the social capital that is required to borrow food from friends or relatives.

Social capital (as measured through the bridging and bonding index), receiving humanitarian assistance in the past 6 months, and land ownership were not related to any well-being outcomes (however, the model that did not control for the downstream effects of COVID-19 showed a positive relationship).

Table 7: Summary of Research Question 2 Hypotheses
*(*95% confidence level, **99% confidence level, ***99.9 confidence level)*

Capacity at **Round 0** → Change in Outcome **Round 1 - Round 2**	**Result**
2.1 **Greater** social cohesion → **reduced** severe food insecurity	FALSE
2.2 **Greater** social cohesion → **reduced** negative coping strategies	FALSE
2.3 **Greater** social cohesion → **increased** diet diversity	FALSE
2.4 **Greater** social cohesion → **greater** confidence in future shock recovery	FALSE
2.5 **Greater**social cohesion → **greater** confidence in shock recovery now	FALSE
2.6 **Greater** agricultural techniques → **reduced** severe food insecurity	**TRUE***
2.7 **Greater** agricultural techniques → **reduced** negative coping strategies	FALSE
2.8 **Greater** agricultural techniques → **increased** diet diversity	FALSE
2.9 **Greater** agricultural techniques → **increased** seasonal crop sales	FALSE

6 The reduced Coping Strategies Index asks how often respondents have engaged in coping strategies to access food in the past 7 days. These include: relying on less preferred and less expensive foods, borrowing food or relying on help from friends or relatives, limiting portion size at mealtime, restricting consumption by adults in order for small children to eat, and reducing the number of meals eaten in a day.

2.10 **Greater** agricultural techniques → **greater** confidence in future shock recovery	FALSE
2.11 **Greater** agricultural techniques → **greater** confidence in shock recovery now	FALSE
2.12 **Greater** agricultural diversity → **reduced** severe food insecurity	FALSE
2.13 **Greater** agricultural diversity → **reduced** negative coping strategies	FALSE
2.14 **Greater** agricultural diversity → **increased** diet diversity	FALSE
2.15 **Greater** agricultural diversity → **increased** seasonal sales from crops	**TRUE***
2.16 **Greater** agricultural diversity → **greater** confidence in future shock recovery	FALSE
2.17 **Greater** agricultural diversity → **greater** confidence in shock recovery now	FALSE
2.18 **Access** to any financial service → **reduced** severe food insecurity	FALSE
2.19 **Access** to any financial service → **reduced** negative coping strategies	**TRUE****
2.20 **Access**to any financial service → **increased** diet diversity	FALSE
2.21 **Access**to any financial service → **increased** seasonal crop sales	FALSE
2.22 **Access** to any financial service → **increased** seasonal livestock sales	FALSE
2.23 **Access** to any financial service → **increased** total seasonal sales	FALSE
2.24 **Access** to any financial service → **greater** confidence in future shock recovery	FALSE
2.25 **Access** to any financial service → **greater** confidence in shock recovery now	FALSE
2.26 **Access** to secure land tenure → **reduced** severe food insecurity	FALSE
2.27 **Access** to secure land tenure → **reduced** negative coping strategies	FALSE
2.28 **Access** to secure land tenure → **increased** diet diversity	FALSE
2.29 **Access**to secure land tenure → **increased** seasonal crop sales 2	FALSE
2.30 **Access** to secure land tenure → **greater** confidence in future shock recovery	FALSE
2.31 **Access** to secure land tenure → **greater** confidence in shock recovery now	FALSE
2.32 **Access** to cash or food assistance → **reduced** severe food insecurity	FALSE

2.33 **Access** to cash or food assistance → **reduced** negative coping strategies	FALSE
2.34 **Access** to cash or food assistance → **increased** diet diversity	FALSE
2.35 **Access** to cash or food assistance → **greater** confidence in future shock recovery	FALSE
2.36 **Access** to cash or food assistance → **greater** confidence in shock recovery now	FALSE

RQ3: HOW IS EXPOSURE TO FSP (HIGH VERSUS LOW) RELATED TO ACCESS TO AND USE OF FSP-PROMOTED CAPACITIES, DESPITE THE DOWNSTREAM ECONOMIC EFFECTS OF COVID-19?

Research question 3 sought to answer whether more FSP training was related to improved access and use of FSP-promoted resilience capacities. The multivariate analysis showed that participants who attended more than 15 FSP trainings throughout the study period (August/September 2019 - August/September 2020) were 13 percentage points more likely to gain or maintain access to any financial instrument from Round 1 to Round 2. However, this result was not statistically significant using the propensity score matching analysis approach, suggesting the relationship may be driven by unobservable characteristics that make participants more likely to both attend FSP trainings and more likely to gain or maintain access to financial instruments. This could include things like wealth/socioeconomic status, which was not measured in the SFBS.

On average, individuals who attended more than 15 trainings practiced more agricultural techniques during the 2020 Season B, estimated between 0.55 techniques (using the propensity score matching approach) and 0.77 techniques (using the multivariate regression approach). Each training session promoted a unique and diverse set of targeted technologies. In most instances, having a larger set of technologies to choose from (by attending more training) increases the chance that participants will adopt at least one technology relevant to their context.

Table 8: Summary of Research Question 3 Hypotheses
*(*95% confidence level, **99% confidence level, ***99.9 confidence level)*

High FSP exposure (more than 15 trainings) during **Round 0 - Round 2** → Change in Capacity **Round 1 - Round 2**	**Result**
3.1 Participating in **greater** training → **access** to any financial service	**TRUE***
3.2 Participating in **greater** training → **adopted** any agricultural technique	**TRUE*****
3.3 Participating in **greater** training → **greater** agricultural diversification	FALSE
3.4 Participating in **greater** training → **greater** spousal agricultural diversification	FALSE

RQ3RQ 4: HOW IS EXPOSURE TO FSP (HIGH VERSUS LOW) RELATED TO FOOD SECURITY, AGRICULTURE AND RESILIENCE OUTCOMES OVER TIME (FROM SEASON A TO B), DESPITE THE DOWNSTREAM EFFECTS OF COVID-19?

Research question 4 focused on testing the relationship between high participation in FSP with changes in participant's well-being outcomes (from Round 1 to Round 2). The analysis found no statistically significant associations between attending more FSP training and well-being outcomes. One possible explanation for this may be that the positive impact from the training had not occurred yet by the time the Round 2 data was collected. The well-being outcomes

were measured at Round 1 and Round 2. Because of this, we included training from Round 0, Round 1 and Round 2. However, it is possible that receiving training during the 2020 Round 2 would not have resulted in the behavior change that would affect short-term well-being outcomes or the impact of the behavior change would not have affected some of the longer-term outcomes yet.

We conducted a follow-up analysis looking solely at the impact of training at Round 0 on well-being outcomes at Round 1 and 2 to help solve this temporality issue. This analysis compared participants who attended 5 or more trainings at Round 0 to those who attended 4 or fewer. It yielded two further relationships: first, those who attended more than 5 trainings at Round 0 were 13.1 (PSM) and 14.6 (multivariate) percentage points less likely to have experienced severe food insecurity between Round 1 and Round 2. Additionally, participants with high attendance at Round 0 had a relative increase of $8.88 in livestock sales between Round 1 and Round 2, though this result was only statistically significant in the PSM model.

Table 9: Summary of Research Question 4 Hypotheses
*(*95% confidence level, **99% confidence level, ***99.9 confidence level)*

High FSP exposure (more than 15 trainings) during **Round 0 - Round 2** → Change in Capacity **Round 1 - Round 2**	**Result**
4.1 Participating in **greater** training → **reduced** severe food insecurity	FALSE◊
4.2 Participating in **greater** training → **reduced**negative coping strategies	FALSE
4.3 Participating in **greater** training → **increased** diet diversity	FALSE
4.4 Participating in **greater** training → **increased** seasonal crop sales	FALSE ◊
4.5 Participating in **greater** training → **increased** seasonal livestock sales	FALSE
4.6 Participating in **greater** training → **increased** total seasonal sales	FALSE

◊ This hypothesis showed positive results using the analysis of trainings at Round 0 only.

CONCLUSION

IMPLICATIONS FOR FUTURE RESEARCH

This analysis showed some promising results around three types of resilience capacities; however, the majority of results were null. One reason for this may be because the SFBS sampling frame was not designed to answer some of this study's research questions. Namely, whether being exposed to high versus low levels of FSP training resulted in greater outcomes. There are clearly limitations to including a quasi-experimental design after the sampling frame has already been determined. Having a more nuanced measure of FSP exposure may improve the program's ability to understand whether participation in FSP improved outcomes in future analyses. This could include being able to evaluate the quality of training and engagement in other interventions besides training. Additionally, more specific research questions around the temporal relationship between FSP trainings and expected outcomes could be examined to assess whether trainings led to short-term changes which diminished over time, or accumulated attendance gradually led to behavioral changes.

Additionally, while the anticipated measure of the downstream economic impacts of COVID-19 did not prove to heavily impact FSP participants, the analysis proposed several possible relationships between specific types of COVID-19

impacts (such as steep but short-lived price spikes, and long-lasting price fluctuations) and resilience outcomes. Further studies could test and verify or refute these pathways for measuring complex and communal shocks such as COVID-19. It is also possible that there were no statistically significant associations between attending more FSP training and well-being outcomes because the positive impact from the training had not occurred by Round 2. This analysis could be run again once more rounds of data are available.

IMPLICATIONS FOR PROGRAMMING

This report highlights the need for FSP to collect more targeted data about the quality of each individual training session in order to better attribute project training or intensity with impact. This data collection can be routine and feed back into iterative design improvements of future training by staff. This may also help the project prioritize approaches by shedding any redundant or ineffective training in favor of more targeted efforts.

Following the evident benefits of VSLA participation in reducing the effect of negative food coping strategies, FSP will aim to scale out sensitization on VSLA formation. FSP will aim at aiding and abetting the evolution of VSLAs into much more business oriented financial hubs. Furthermore, FSP will embed income generating activities (IGA) options into its existing curriculum to broaden current livelihood options and not just limit them to agricultural activities.

APPENDICES

APPENDIX 1: RESULTS TABLES

Table 10: Demographic Descriptive Statistics Results

Variable	Response	Mean
Participant Age	Youth (>34)	41.4%
	Non-youth (<35)	58.7%
Household Type	Female participant without partner	22.5%
	Male participant without partner	4.5%
	Female participant with partner	50.4%
	Male participant with partner	22.6%
Completed any level of education	Yes	53.3%
Household size	Number	7.8
Health Zone	Miti Murhesa	17.8%
	Kalehe	56.0%
	Katana	26.2%

Table 11: Wellbeing Outcomes, Resilience Capacities and Control Variable Definitions

Variable	Description
Wellbeing Outcomes	
Dietary diversity	The number of food groups consumed by a household over a 24-hour period
Severe food insecurity (didn't eat for whole day) in past 7 days	Prevalence of individuals who responded that they didn't eat for the whole day at any point over the past 7-days. Question comes from the Food Insecurity Experience Scale (FIES).

Reduced Coping Strategies Index (rCSI)	The reduced Coping Strategies Index asks how often respondents have engaged in coping strategies to access food in the past 7 days. These include: relying on less preferred and less expensive foods, borrowing food or relying on help from friends or relatives, limiting portion size at mealtime, restricting consumption by adults in order for small children to eat, and reducing the number of meals eaten in a day.
Seasonal crop sales	Value (USD) of seasonal sales from crops per farmer, per season
Seasonal livestock sales	Value (USD) of seasonal sales from livestock per farmer, per season
Total sales (agricultural and livestock)	Value (USD) of seasonal sales from crops and livestock per farmer, per season
Ability to meet food needs has returned	Proportion of participants who responded "slightly better or much better than before the shock" to the question "to what extent has your ability to meet food needs returned to pre-shock levels?"
Ability to meet food needs in the future	Proportion of participants who responded "slightly better or much better than before the shock" to the question, "given this shock, to what extent do you think you will be able to meet your dietary needs over the next 6 months?"
Resilience Capacities	
Use of cash savings from VSLAs in the past 12 months	Proportion of participants who responded "Less than half, about half, more than half, or all savings" to the question " how much of your savings did you have to withdraw in the last season?"
Use of cash loans from VSLAs in the past 12 months	Proportion of participants who responded "yes" to the question "Have you taken a credit, in cash or in kind, from any of these institutions in the last 6 months?"
Use of any financial service (savings, loans, insurance) in the past 12 months	Proportion of respondents who took out any savings (see question above), credit (see question above) or purchased farm insurance
Social Capital Index (0-100 scale)	Scale of the types of sources within the respondents' community and outside their community who can support the respondent during times of stress, and rely on the respondent for support. Normalized to 0 - 100 points.

Received humanitarian assistance in past 6 months	Proportion of participants who responded "yes" to the question "have you or your household received any food or cash assistance in the last six months?"
Land ownership (Any)	Proportion of participants who responded "customary title of ownership, cadastral title of ownership, or donation" to the question "What is the land access modality for your field(s)?
Participant Agriculture diversification (4 or more sources)	Number of agricultural livelihood sources
Partner Agriculture diversification (4 or more sources)	Number of improved farming techniques adopted on the field
Control Variables	
Male participant with and without partner	Male participant who is not married or living with his partner
Female participant with and without partner	Female participant who is not married or living with her partner
Age	Age category of respondent:15 - 19, 20 - 24, 25 - 34, 35 - 45, and 45+
Completed any level of education	Participant completed any level of education
Household size	Number of people living in a household
Ratio of respondent's surface planted to partner's surface planted	Ratio of the total surface area planted by the respondent to the total surface area planted by their partner
Total small animals produced	Small animals include: rabbits, chickens, guinea pigs, and ducks
Total large animals produced	Large animals include: cows, pigs and goats
Number of paid individuals (of participant and partner)	Count of people (of participant and partner) who had been paid in cash for work in the past 12 months
Accessed savings past 12 months	Portion of respondents at R0 who had used a portion of their savings from a VSLA in the past 6 months
Received humanitarian assistance in past 6 months	Proportion of participants who responded "yes" to the question "have you or your household received any food or cash assistance in the last six months?"
Wellbeing outcome levels at R0	Wellbeing outcomes include: dietary diversity, severe food insecurity, seasonal crop sales, seasonal livestock sales, and total sales. rCSI was not included as no values were captured at R0.
Downstream effect of COVID-19 measure	See Table 1 in main body of the report

APPENDIX 2: PCA ANALYSIS

PCA was conducted for the downstream effect of COVID-19 variable to look for related groupings that moved together. This yielded the following factor loadings, with higher numbers indicating greater contribution to that component. Only components with an eigenvalue greater than 1 are included.

Table 12: Principal Component Analysis Results

Variable	Component 1	Component 2
Maximum price increase (%) - MEB food items	0.3556	0.3446
Maximum price increase (%) - MEB non food items	0.3636	0.3119
Average price change (%) - MEB food items	0.3978	-0.0161
Average price change (%) - MEB non food items	0.3979	0.0101
Maximum item count decrease (%) - MEB food items	-0.0028	-0.7687
Maximum item count decrease (%) - MEB non food items	0.3856	-0.1899
Average item count change (%) - MEB food items	-0.3439	0.387
Average item count change (%) - MEB non food items	-0.3959	0.0768
Shock 7: Crop theft (pre- and post-harvest)	0.0310	0.0310

Our interpretation of these results is:

A. Crop theft is not closely related to changes in price and availability of products in the market

B. Food unavailability is distinct from price changes and non-food unavailability, and is likely the most acute form of market shock

C. Price changes (both spikes and average changes) are related, and as a group are related to non-food item unavailability.

APPENDIX 3*

**See Complementary Document for Appendix 3.*

RESILIENCE EVALUATION, ANALYSIS AND LEARNING

The Resilience Evaluation, Analysis and Learning (REAL) Associate Award is a consortium-led effort funded by the USAID Center for Resilience. It was established to respond to growing demand among USAID Missions, host governments, implementing organizations, and other key stakeholders for rigorous, yet practical, monitoring, evaluation, strategic analysis, and capacity building support.

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