USAID-FEED THE FUTURE SUSTAINABLE INTENSIFICATION IN AFRICA

MONITORING AND EVALUATION REPORT

(October 2018 – September 2019)

April 20, 2020

INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE
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The U.S. Government's Global Hunger & Food Security Initiative

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The Africa Research in Sustainable Intensification for the Next Generation (Africa RISING) program comprises three research-for-development projects supported by the United States Agency for International Development as part of the U.S. government's Feed the Future initiative.

Through action research and development partnerships, Africa RISING will create opportunities for smallholder farm households to move out of hunger and poverty through sustainably intensified farming systems that improve food, nutrition, and income security, particularly for women and children, and conserve or enhance the natural resource base.

The three regional projects are led by the International Institute of Tropical Agriculture (in West Africa and East and Southern Africa) and the International Livestock Research Institute (in the Ethiopian Highlands). The International Food Policy Research Institute leads the program's monitoring, evaluation and impact assessment. http://africa-rising.net/

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Acknowledgments

This report was prepared by Arkadeep Bandyopadhyay, with input from IFPRI M&E team that includes Beliyou Haile, Carlo Azzarri, Adam Komarek, Jawoo Koo, and Benedict Ebito Boyubie (IITA, West Africa M&E officer). The M&E team also acknowledges helpful discussions and inputs from various Africa RISING partners. Ivy Romero provided excellent assistance in various aspects of the planning, management and administration of the M&E project.

Executive Summary

Africa Research in Sustainable Intensification for the Next Generation (Africa RISING--AR) is a research-for-development program designed to pilot potential interventions for sustainable intensification of mixed crop-tree-livestock systems and provide data and information that will lead to the better design of development projects. The program comprises three linked projects covering West Africa (WA: Ghana and Mali), East and Southern Africa (ESA: Malawi, Tanzania and Zambia) and Ethiopian Highlands (EH). The WA and ESA projects are led by the International Institute of Tropical Agriculture (IITA) while the EH project is led by the International Livestock Research Institute (ILRI). The primary hypothesis of AR is that sustainable intensification of mixed crop-tree-livestock systems leads to increased whole farm productivity, which in turn leads to better development outcomes, including improved food and nutrition security. The monitoring and evaluation (M&E) of the three regional projects is led by the International Food Policy Research Institute (IFPRI), with Wageningen University leading farming systems modeling efforts. A communications project is also part of the program, also led by IITA.

During Phase I of the program (2012– 2016), the focus has mostly been on a demand-driven approach to identify scalable entry points for sustainable intensification (SI) of key farming systems across program countries. While most of the analyses during Phase I has been at the household-level, researches have also examined the role of enabling environment for SI including markets institutions and policies. During Phase II of the program (2017 – 2021), the goal is to reach an estimated 25,000 households for testing alternative SI technologies and management practices. In addition, there will be a significant effort to scale up successful SI options identified in Phase I to over 1 million households, working with development partners and taking advantage of the partnerships and stock of knowledge created in Phase I.

During fiscal year 2018-2019 (FY19, henceforth), monitoring activities undertaken by the team have included: management of program-generated data through Harvard University-managed data repository platform (Dataverse) and ; aggregation and validation of FtF indicators for FY19; In addition, a follow-up data was collected from Malawi, while baseline data from Ghana has been analysed to examine interactions between market integration, technology adoption, food security, and poverty.

1. Introduction

The primary hypothesis of Africa RISING is that sustainable intensification of mixed crop-tree-livestock systems leads to increased whole farm productivity, which in turn impacts development outcomes (improved welfare) such as improved livelihoods (income, assets, resilience capacity, etc.) and better food and nutrition security for those who depend on these systems. It is further hypothesized that a combination of relevant interventions is more likely to increase whole farm productivity than single interventions.

Phase I of the program (2012-2016), has been focused on diagnostic studies, partnership building, action research, development of multi-stakeholder platforms, and testing of various baskets of innovations for sustainable intensification of core farming system in selected communities.[1] It was anticipated that Phase II (2017-2021) would focus on the scaling up (and out) of successful SI innovations identified during Phase I, in partnership with relevant development partners. This report summarizes the main activities undertaken by M&E team during FY19 (Section 2) and outlines planned activities for FY20 (Section 3).

[1] Definition of community varies across country, depending on the local administrative, institutional, and geographical arrangements.

2. M&E and Research Activities Undertaken in Fiscal Year 2019

The following are the main M&E-related activities conducted in Fiscal Year 2019, in addition to various program- and project-level meetings attended by the team members.

2.1. Management of program-generated agro-economic data

The team continued to manage program-generated data through Dataverse (https://dataverse.harvard.edu/dataverse/AfricaRISING). With the introduction of a Google form to manage data requests, data owners[2] are now able to access relevant information regarding the identity of the requestor. Every time a new request is submitted, an email is sent out to the relevant dataset owner informing him/her of the request. Data owners are instructed to reply to the email request expressing their decision to grant or reject access. Upon receiving confirmation, the M&E team then assigns the requestor permission to access the dataset. Between October 2018 and September 2019, the team received requests from eight unique individuals, and with the growing number of datasets on the Africa RISING Dataverse every year, we expect the number of requests received to increase substantially in the coming year.

In 2019, the team received 54 new datasets to be uploaded onto Dataverse. Out of the total submissions, 10 have been successfully uploaded and we expect an additional 15 to be uploaded by mid-April 2020. Our team is working extensively with the data owners to prepare the files of the remaining datasets for upload. Delays in upload are usually due to incorrect/incomplete metadata or the presence of personally identifiable information (PII), both of which are required to be rectified by the data owners, as the IFPRI Dataverse team cannot change or modify received datasets. Since Africa RISING Baseline Evaluation Surveys (ARBES) from Ghana, Ethiopia, Malawi, Mali are completely open access, they were linked to the USAID's Development Data Library (DDL). ARBES data files and supporting documentation were shared with data quality review team at USAID to check for PII before final uploading on the publicly accessible DDL.

[2] Throughout this document we will refer to data owners (or producers) as researchers who collect data on the field. However, we are aware that this definition neglects the fact that data owners/producers are ultimately the farmers from whom these data are collected. The reason of our definition is because we would like to avoid the confusion between data owners/producers and data providers, since these two groups could be potentially very different: while the former could only collect the data, the latter could only distribute them using different means (media equipment, electronic storage, physical material, online repositories). Of course, the two groups could also be owners and providers at the same time, such as the case of the IFPRI M&E team.

2.2. Beneficiary and technology tracking tool (BTTT) update

Working with data managers based in West Africa, the Beneficiary and Technology Tracking Tool has been populated and updated for Ghana. While new communities were not added since 2014, the program was expanded significantly to reach a larger number of households.

2.3. FtF indicators data reporting

As part of the yearly reporting of targets achieved, the M&E team worked extensively with data managers based in East and Southern as well as West Africa to compile the relevant information from AR researchers. FtF data received by the teams were harmonized, verified, aggregated, and subsequently uploaded to the USAID FtF Monitoring Systems (FtFMS).

2.4. Malawi Africa RISING Follow-up Evaluation Survey

With the goal of evaluating the effects of Africa RISING sustainable intensification technologies, the Malawi follow-up survey was undertaken between late September and October 2019 to collect follow-up data from households who were interviewed at baseline in 2013. The baseline survey covered Dedza and Ntcheu districts, spanning six Extension Planning Areas (EPAs) and 54 villages. The survey included three groups – AR beneficiaries, non-beneficiaries (households in AR villages who did not participate in AR at baseline) and control (households who reside in non-AR targeted villages). Out of the 1,149 households interviewed at baseline, 1,037 were successfully retraced and re-interviewed. The follow-up questionnaire kept the same structure of the baseline questionnaire with fewer modules and questions, but with an additional technology adoption module to collect detailed information about various AR technologies, such as intercropping with legumes, application of chemical and organic fertilizers, crop rotation, and tied ridges.

Households were probed about adoption of different technologies and their level of satisfaction with them. As summarized in Table 1, crop rotation, legume intercropping, and application of organic fertilizer were identified as the most beneficial by a substantial share of households (51%, 46%, and 35%, respectively).

Table 1: Perceptions about AR technologies

Technologies		Perceived to be most beneficial	Perceived to be least beneficial
1	Intercropping without legumes	18.2%	41.7%
2	Intercropping with legumes	45.9%	13.6%
3	Chemical fertilizer	18.6%	7.9%
4	Organic fertilizer	34.7%	14.5%
5	Crop rotation	50.8%	14.0%
6	Tied ridges	6.2%	24.8%

2.5. Market integration, agriculture, food security and poverty in Ghana

Given the high rates of poverty and malnutrition in Northern Ghana, we explored the role of input and output market integration on technology adoption, food security, and poverty using the 2014 baseline ARBES data from Ghana. The *ex-ante* hypothesis of this analysis was that as households improve their market integration level -that is their participation in the output market- by selling an increasing proportion of their produce, they would also increase their income that, in turn, consequently improve their nutritional status. While we did find some evidence to support the idea that household welfare was positively correlated with market integration, the link between the latter and food security was not very clear. We could not fully support our theoretical prediction and would thus recommend examining the role of other welfare-enhancing avenues, such as improving public infrastructure, education, and other sectors, as effective rural poverty-coping strategies.

Some key findings include:

- The dietary energy intake of about 58% of surveyed households was less than the minimum dietary energy requirement (Table 2)

Table 2: Household Food Insecurity

Food insecure?	Freq (N)	%
No	545	42
Yes	739	58

- About half the sample falls below the $1.9/day poverty line, with Upper West and Upper East regions showing, respectively, the highest and lowest poverty rates (Table 3).

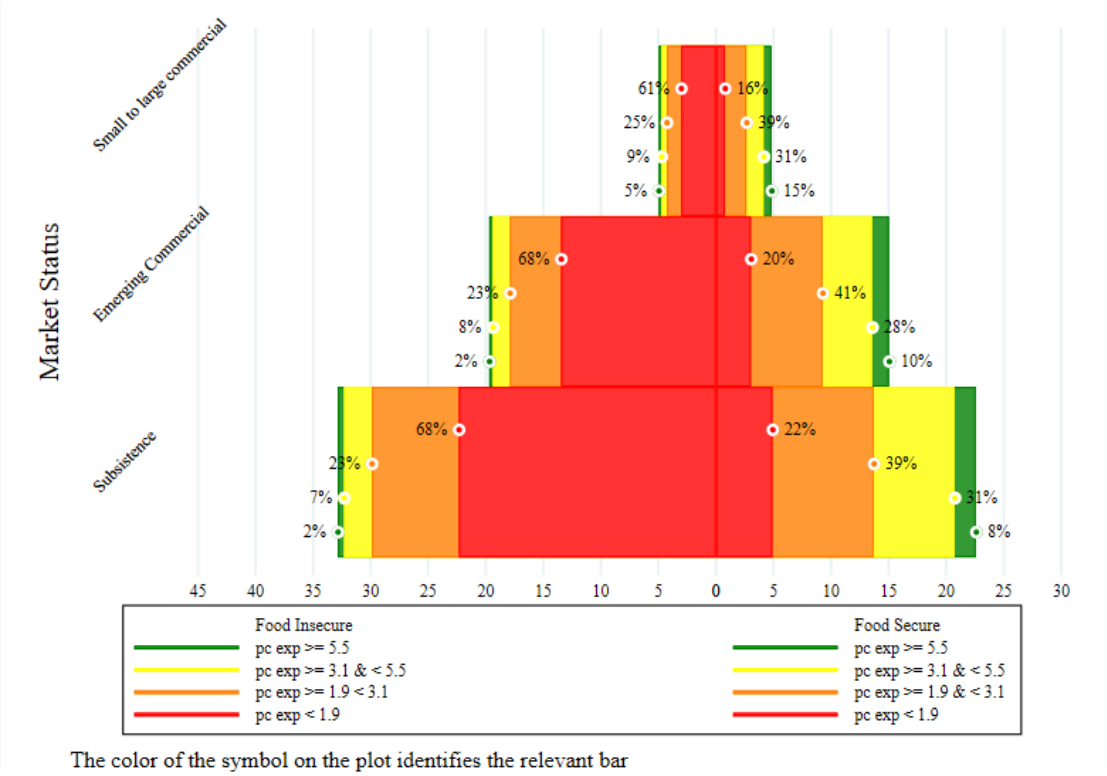
Table 3: Household Poverty

Threshold	All (%)	Northern (%)	Upper East	Upper West
< 1.9	48	46	29	58.6
>= 1.9 & < 3.1	30	33	31	25.7
>= 3.1 & < 5.5	17	14	32	13.7
>= 5.5	5	6	8	2

Note: Thresholds are expressed in international purchasing power parity (PPP) dollars, with a conversion factor computed as average of the 2013 and 2014 PPP conversion factors.

- The majority of food insecure households is also poor (less than $1.9), irrespective of the level of market integration (Figure 1).
- The share of poor (less than $1.9) households marginally declines with higher market integration, regardless of food security status. For example, for food secure households the share of the poor declines from 22% to 20% to 16%, respectively, for subsistence, emerging commercial, and small to large commercial producers.
- Food insecurity marginally decreases with output market integration. About 59% of subsistence producers are food insecure, as opposed to 57% and 51% of emerging commercial, and small to large commercial, respectively.

Figure 1: Poverty, food insecurity, and output market integration[3]



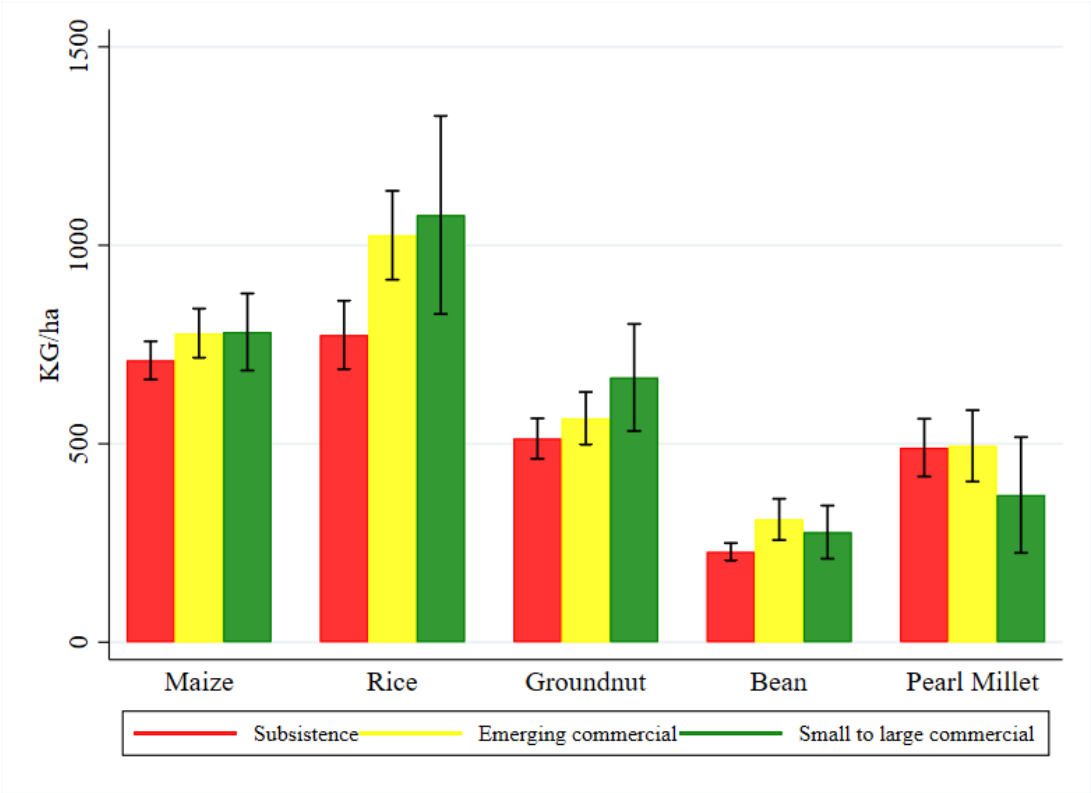
Note: the portion of the x-axis to the left of zero reports the shares of food insecure households, while the part to the right of zero displays the shares of food secure households; the bottom bar represents the share of subsistence producers, the middle bar represents the share of emerging commercial producers, and the top bar represents the shares of small to large commercial producers. The width of the bar represents the share of households falling in each poverty category for that specific market group-food security status combination out of the *total* number of households in the sample. Different colors represent different poverty level: red=expenditure per capita per day (pc_exp) < $1.9; orange = $1.9 < pc_exp < $3.1; yellow = $3.1 < pc_exp < $5.5; green = pc_exp > $5.5. All the shares of households with varying poverty level sum up to 100%.

- Application of manure increases with the level of input market integration (proxied here by the share of seeds purchased), while households with the highest output market integration (based on land size and share of agricultural output sold) are less likely to apply manure.
- Use of improved seeds increases with market integration, although the relationship appears to be non-linear.
- Acquisition of seeds from non-ag sources -such as cooperatives, extension services, NGOs, research institutes, seed companies- increases with market integration.

[3] For consistency reason, we kept the naming of the three types of market integration in the resilience conceptual framework shared by Dr. J. Glover.

- Use of hand hoe decreases with market integration, suggesting adoption of more complex agricultural practices for active market participants.
- Similarly, also the practice of drying crops on the ground is negatively correlated with market integration.
- No significant variation by market integration seems to exist for the following practices: storing crops in sacks/bags; use of disc/moldboard, and ploughing/contour ploughing.
- Finally, it seems that average yields tend to increase with the level of output market integration for rice and beans only, with yield differences not being statistically significant for the other crops (Figure 2).

Figure 2: Yield of common crops by output market integration



2.6. Research on linkages between production diversity and dietary diversity

In collaboration with IITA and other non-AR researchers, the M&E team published a paper examining the benefits of production diversity in Ghana.[4] They found that most species of crops are produced for both self-consumption and market sales, with the value of species used for self-consumption being on average 55% higher than that of crop sales. Crop diversity was positively associated with self-consumption of food crops along with cash-income from crops sold and, hence, diversification appeared to be more beneficial than specialization amongst households in northern Ghana.

2.7. Staffing

A new Research Analyst joined the M&E team in November 2018. Additionally, the team is working with IITA to replace the ESA data manager position following the region's M&E officer/data manager.

[4] Bellon M. R., Kotu B. H., Azzarri C., Caracciolo F. (2020). "To diversify or not to diversify: that is the question. Pursuing agricultural development for smallholder farmers in marginal areas of Ghana", *World Development*, 125, 104682, https://doi.org/10.1016/j.worlddev.2019.104682.

3. M&E and Research Activities Planned for Fiscal Year 2019 (FY19)

3.1 Management of program-generated agro-economic data

The team will continue to manage program-generated data through Dataverse. Taking advantage of the new Google-based system for submitting and monitoring data requests, and with the support of the M&E officers/data managers, the team will help facilitate a more efficient tracking of data requests. As currently restricted AR datasets become open, the team will link them to USAID's DDL. According to the program Data Management Plan, datasets uploaded on Dataverse that are part of a multiyear experiment will remain restricted until the experiment comes to an end. Therefore, only open datasets will be linked to the USAID-DDL.

3.2 Processing of FtF Indicators data

Working with AR researchers, the team will compile, validate, aggregate, and submit FtF data for FY2019 for submission through the FtFMS. The team is currently updating the Project Mapping and Monitoring Tool (PMMT)[5] to allow researchers and local M&E officers create FtF data reports online for subsequent processing and aggregation by the M&E team. The PMMT will reduce data inconsistencies that arise when researchers submit FtF indicator values using spreadsheets, as the tool has now embedded consistency checks that will alert researchers in case of inconsistent or incomplete data submission.

3.3 Expanding the analyses of linkages between market integration and resilience

Based on the feedback received from USAID on the Ghana analysis, the team will examine linkages between market integration, agriculture, poverty, and food security using baseline data from other AR countries, starting with Mali. The cross-country analysis will generate evidence spanning different agro-ecologies and farming systems regarding the contribution of market integration to agricultural production and economic development.

3.4 Ex post evaluation of Africa RISING innovations

The team will clean and analyze the 2019 Malawi follow-up survey data, in conjunction with the baseline data, to examine long-terms and heterogenous effects of the AR program. Panel data analysis will allow to control for time-invariant unmeasured or unobserved confounding factors that may affect technology adoption and subsequent outputs and outcomes of interest. Given the detailed data the team has collected,

[5] Accessible here http://ec2-52-28-8-69.eu-central-1.compute.amazonaws.com/africarising-data-reports/

impact will be assessed on a large number of indicators including technology adoption, yields, soil characteristics, household consumption expenditure, and dietary diversity, as well as nutrition of women and children.

3.5 Ex ante evaluation of Africa RISING innovations

In collaboration with colleagues based in West Africa, the team has initiated a research on the trade-offs and opportunities associated with maize leaf stripping at both the field-scale and whole-farm scale. This analysis includes examining the trade-off between maize grain production and livestock feed available based on agronomic trial data from about 90 farmers in three regions of Ghana in two seasons. Crop simulation modelling will also be conducted to examine the effect of changes in maize planting and leaf stripping dates on maize grain and leaf production. We will couple agronomic trials data and crop simulations with farm household surveys from Ghana ARBES, and we will use a livestock production model (most likely LIVSIM) to identify the effect of changes in livestock feed (associated with leaf stripping) on livestock production. We plan to match household survey to agronomic trial data so that our model can simulate the effect of leaf stripping on whole-farm productivity and profitability at scale -from field to farm scale-. The simulation will take advantage of the detailed characteristics of farming households such as crop area planted, number of animals- from the household survey.

3.6 Implementation of Ghana Follow-up survey

The M&E team plans to implement Africa RISING Follow-up Evaluation Survey (ARFES) in Ghana between May and June 2020. The team has already started communicating with AR colleagues based in West Africa to populate beneficiary databases and compile a list of Africa RISING technologies. Follow-up data will allow the team to analyze effects on medium- to long-term economic and development outcomes using panel data techniques.

3.7 Staffing

The team will work with IITA and ILRI to fill the local M&E officer/data manager positions.