

Project Title: Improving Dietary and Health Data for Decision-Making in Agriculture and Nutrition Actions in Africa

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Research Organizations involved in the study:

Food Agriculture and Policy Analysis Network (FANRPAN) and International Livestock Research Institute (ILRI)

Location of Study: Nairobi and Samburu County, Kenya

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1. Executive summary:

Child (mal)nutrition is one of the most commonly used indicators for tracking progress towards attainment of Sustainable Development Goals (SDGs) and the impacts of development interventions. Unfortunately, the current methods for collecting child nutrition indicators require considerable training, are slow and expensive to collect data accurately. In this project, we will develop and test a mobile-based platform by which households can easily collect, submit, and access information on their children's nutritional status in near-real time and at extremely low cost.

The project has four main components. The first component is to develop the initial tool. The second component is to improve the tool through a pilot and use the lessons—participant feedback and data quality—from the pilot to improve the tool. The third component is to implement the updated tool in multiple locations to assess its value for meeting our objectives. The fourth component is to create awareness of our findings and build capacity on how to use the tool and related data.

This report covers the first 12 months of the project, which were focused on the first component—tool development. To this end, we have worked with a mobile application development firm, researchers, and local stakeholders in the nutrition and humanitarian space to develop, test and improve a prototype tool. This effort was launched with an inception meeting in Nairobi in November 2018. The subsequent tool prototype was tested in Samburu County in northern Kenya in July and August 2019. While we continue to learn from the data and participants' feedback, that test showed that our target population—mostly illiterate and innumerate pastoral women with little smartphone experience—was able and willing to complete the survey tasks. We are now working with the developer to improve the tool in response to this recent experience.

2. The research problem:

Malnutrition has direct consequences on child health and long term cognitive and physical development (Barker 1998; Alderman et al. 2006; Black et al. 2008; Victoria et al. 2008; Almond and Currie 2011). Globally, 155 million children under five are stunted, 52 million are wasted, both symptoms of malnutrition, while 2 million people lack important micronutrients such as iron and Vitamin A (Global Nutrition Report 2017). More than one third of stunted children live in Africa, and Sub-Saharan Africa (SSA) is the only region in the world to have experienced an increase in child stunting rates over the last two decades (UNICEF and Bank, 2015).

More and more, humanitarian, development, and government organizations are focusing on nutrition as a primary objective, as is illustrated by the Sustainable Development Goal Target 2.2. At the same time, accurate and reliable information on nutrition and health is severely lacking. There are few public databases available, and standard forms of primary data collection are extremely costly, especially in remote regions of SSA where it is most needed and lacking. In addition, the common methods of collecting nutrition data are inadequate for tracking impacts in the face of heterogeneous, fast-moving, and difficult-to-observe confounding factors. Low-frequency data can seriously misrepresent the nature of shocks, coping strategies, and the food and nutrition security status of households—with implications for how practitioners and policy makers judge the impact of interventions aimed at improving

household welfare. Furthermore, commonly collected household consumption and young child health data are often of little direct use to households themselves.

The overall objective of this project is to develop an efficient solution to measure indicators that track nutrition and health outcomes and the progress at community and national levels.

Importantly, there has been no change to the objectives of the study or of the activities for this reporting period.

3. Progress towards milestones:

The status of milestones for the first 12 months are summarized in Table 1. Details are described in the ensuing narrative.

Table 1. Status of project milestones

Activities	Milestones	Reporting indicators and comments	Status in August 2019
Months 1 – 12			
Project setup	Inception meeting for primary partners and stakeholders convened	Inception meeting report, with detailed workplan	Inception meeting held in Nairobi, 1-2 November 2018
	Collaborative research agreement between FANRPAN and ILRI, with detailed management structures and procedures, executed	Signed contract between FANRPAN and ILRI	Agreement signed February 19, 2019, five and half months after project start.
	Ethics approval secured from ILRI's Research Ethics Board (IREC) and relevant national research review boards	Signed approvals from review boards	Project presented to and approved by Ministry of Health's Technical Working Group on Nutrition Research in Kenya; Ethics approval for tool testing granted by ILRI's ethics committee (IREC, Annex 7) and Kenya's National Commission for Science, Technology and Innovation (NOCASTI, Annex 8).
Objective 1	Smartphone application development firm identified and contracted	Contract between FANRPAN and application development firm executed	Contract between FANRPAN and MangoLogic (https://www.mangologic.com/), a mobile application development firm, was signed February 6, 2019.

Activities	Milestones	Reporting indicators and comments	Status in August 2019
	Hardware required for pilot purchased	Hardware delivered and invoices and receipts submitted	Three smartphone makes and models were purchased and tested for their functionality related to this project and cost, followed by purchase of 10 smartphones and solar chargers for use in the pre-pilot tests
	Pre-pilot and iterated data collection protocols and the application developed	Alpha and Beta version of the data collection tool developed Field report on pre-pilot and improvements to the platform included in 1st Technical Interim Report	A prototype application for caregivers was developed and tested internally in June 2019 Field report on pre-pilot conducted in July-August 2019 and the necessary improvements prepared and submitted with this report
Objective 2	Relevance of the application shared with potential users (within the pilot country and beyond)	Letters of interest from key potential users (e.g. research and development organizations) and governments	Relevance of the application has been shared with Government of Kenya and UNICEF as potential users and they have agreed to serve on the project advisory committee

3.1 Project set-up:

The grant between IDRC and FARNPAN came into effect on September 1, 2018. The inception workshop took place in Nairobi, 1-2 November 2018. It was attended by project primary partners and multiple stakeholders and was deemed a success (see Annex 1).

The collaborative research agreement between FANRPAN and ILRI was signed February 19, 2019 (Annex 2), almost four months behind schedule. This delayed the start of most activities subsequently.

We have successfully recruited a diverse external advisory committee, which held its first meeting in June 2019. The members of the advisory committee are as follows:

- John Hoddinott, H.E. Babcock Professor of Food & Nutrition Economics and Policy, Cornell University;
- Vivian Hoffman, Research Fellow at IFPRI;
- Elizabeth Wangui Kamau, Senior Lecturer and Chair of Department at the Department of Human Nutrition, Egerton University;
- Edward Kutondo, Nutrition Officer in the Program of Monitoring and Evaluation & Nutrition Information Systems at UNICEF;
- Lucy Maina, Nutrition Information Officer at UNICEF and has been with the Ministry of Health here in Kenya for many years.

ILRI hosted Annie Wesley and Jemimah Njuki (IDRC) for a half-day project update in July 2019.

3.2 Objective 1 activities:

The contract between FANRPAN and MangoLogic (<https://www.mangologic.com/>), a mobile application development firm, was signed February 6, 2019 (Annex 3), a week behind schedule. At least three smartphone makes and models were purchased and tested for their functionality related to this project and cost, followed by purchase of the most suitable handsets and solar chargers for use in the pre-pilot tests.

A prototype application (Alpha version) (Annex 4) for Community Health Volunteers (CHVs) was developed and tested internally in May 2019, while the prototype application (Alpha version) (Annex 5) for caregivers was developed and tested internally in June 2019. Both prototypes were tested with their respective populations in Samburu County during July and August 2019 (see pre-pilot field report Annex 6).

3.3 Objective 2 activities:

The relevance of the application to potential users has been shared with the Government of Kenya and UNICEF as potential users and they have agreed to serve on the project advisory committee (see Section 3.1).

4. Synthesis of research results to date:

Research Objective 1. Develop and test cost-effective, scalable technologies to improve the collection of high-resolution (individual-level) dietary, nutrition and health data.

In July and August of 2019, the newly developed tools were tested with caregivers and CHVs in Samburu County, Kenya. During that period, 4 CHVs were trained on and tested the CHV tool and 8 caregivers were trained on and tested the caregiver tool. In both cases, participants tested the tools in the classroom and outside the classroom (i.e., at home). In total, the CHVs submitted a total of 41 contributions (registrations and updates) and caregivers submitted a total of 177 updates.

The results were promising. Both CHVs and caregivers responded to the process and tools positively. At the same time, the process elicited a great deal of feedback on how to improve each of the tools and identified a few software bugs. The development team is now in the process of updating the applications and tools to reflect those suggestions. While little emphasis is given to the data submitted, because some of it was done in the classroom under supervision, while others were collected at home just as the caregivers were experimenting with the tools, the data are generally consistent with expectations; both mid-upper arm circumference (MUAC) and dietary diversity scores were within reason.

During the pre-pilot test, researchers made an effort to address the gender dimensions of use and access to the smartphone by engaging both caregivers and male heads of households. Specifically, the (male) spouses of the caregivers were invited to the first day of training. During that first day, the project was described and the spouses were invited to ask questions and express their opinions of the work. The main objective of this was to ensure that the caregivers faced a supportive environment for participating in the project and to address any concerns that the spouses might have had. Within this small sample, the spouses were all very supportive. We will use the same approach during the larger implementation.

More details on the pilot are found in the Pre-pilot field report, which is provided in Annex 6.

Research Objective 2. Strengthen country-, regional- and household-level capacity to use project-generated tools and data, to make data-driven agriculture, nutrition and health policy and practice decisions at each respective level.

Our current activities are focusing on tool development and research objective 1. Once the tool has been shown to produce useful information, we will then promote it and provide training on its use.

Research Objective 3. To create awareness through communication and policy advocacy of the resulting insights as well as the achieved advancements in technology and methodology to policy makers and related stakeholders.

Our current activities are focused on tool development and research objective 1. Once the tool has been shown to produce useful information and has been field-tested at scale, we will then promote it, including through policy briefs and advocacy to a wider audience.

To date, the following project outputs have been achieved:

4.1 Reports:

- Inception workshop report (Annex 1)
- Project summary
https://docs.wixstatic.com/ugd/2912d8_354813be9fc1489189cd319839ae3f31.pdf
- Report on Pre-Pilot (see Annex 6).

4.2 Websites:

- <https://www.drylandinnovations.com/healthandnutritiondata>

4.3 Mentions and blogs:

- A new project promises to generate better dietary and health data for agriculture and nutrition interventions in Africa, August 15, 2018.
 - <https://www.cgiar.org/news-events/news/new-project-promises-generate-better-dietary-health-data-agriculture-nutrition-interventions-africa/>
 - <https://news.ilri.org/2018/11/15/a-new-project-promises-to-generate-better-dietary-and-health-data-for-agriculture-and-nutrition-interventions-in-africa/>

4.4 Trainings

- 8 caregivers and 4 CHV were trained on how to use their respective data collection tools. Among other activities, this included how to use a smartphone, how to classify foods into food categories, what dietary diversity is and why it matters, how to collect MUAC from their children, and what to do if their child's MUAC falls below 11.5 cm.

4.5 Tools

- Alpha version of the CHV tool (Annex 4)
- Alpha version of the caregiver tool (Annex 5)

5. Synthesis towards AFS themes:

This project is aimed at improving the nutrition of rural households, especially for women and children, by developing and testing a cost-effective smartphone-based application to improve

the collection of high-resolution (individual-level) and near-time dietary, nutrition and health data. The tool will provide an alternative to traditional data collection approaches based on field enumerators and help in filling the gaps in data caused by seasonal changes. The application of this tool will help to make data-driven agriculture, nutrition and health policies and decisions to support nutrition-sensitive food and agriculture systems.

6. Project implementation and management:

All milestones in the proposal were achieved, except the procurement of smartphones for the bigger group of care-givers and development of the Beta version of the data collection tool. The main reason for missing the Beta version milestone was that the collaborative research agreement between FANRPAN and ILRI was executed five months after project start. This delay meant that all activities that depended on the agreement (disbursement of funds to ILRI, application for ethical clearance to the ILRI Ethics Board and field activities) could not start on time.

A decision was made to test several makes and specifications of smartphones and solar chargers before deciding to buy all 200 sets at once. This was a tactical decision to ensure that the phones would be able to accommodate the application. As a result, the phones will be procured in time for testing the tool with a larger group of care-givers in October 2019.

6.1 Workplan for the next 12 months

The project workplan for the next 12 months is summarized in Table 2. The workplan is designed to ensure that all originally planned milestones are on schedule by the end of Year 2.

Table 2. Workplan and milestones for Year 2 of project

Activities	Milestones	Reporting indicators and comments	Timeframe (start-completion)
Objective 1	Identify, contract and train 200 participating (data collecting) households and community health volunteers (CHVs) for conventional data collection	Lists of participating households enrolled and trained Training reports for CHVs	October-November, 2019
	Develop front-end mobile application that is designed to be user-friendly and operable	User friendly data collection application	August - October, 2019
	Develop back end-web system that serves as a database and dashboard and platform developed	Database, dashboard and platform set-up for data analysis, monitoring and evaluation and dissemination of information to web-users	September - February, 2019
	Data dissemination platform launched	Data accessible to and useable by contributors via smartphones	September - February, 2019

Activities	Milestones	Reporting indicators and comments	Timeframe (start-completion)
	Participant and data user feedback collected	Feedback used to improve data collection and dissemination platform	September - February, 2019
	Machine trained learning algorithms using the data points and associated photos developed	Results generated from the algorithms	February - August, 2020
	Application updated to improve data quality and user experiences	Feedback and initial data quality analysis used to improve application	August - October, 2020
	Initial data quality analysis conducted	Results and recommendations	May - August, 2020
Objective 2	A method provided for households to track their own consumption and child health indicators against benchmarks	Information successfully delivered to contributors	
	Cost efficiency of the developed tool and platform tested against other conventional collection methods	Cost-efficiency study report	May - August, 2020
	Capacities developed in pilot country at national, sub-national and household levels ¹	Training materials and training workshop reports	May - August, 2020
Objective 3	Outreach to practitioners and the scientific community	Tool use manual developed and shared Preliminary findings shared at scientific conferences	May - August, 2020
	Reflection and learning workshop convened	Reflection and lessons learned report prepared and shared	May - August, 2020

Using the savings from the tool development budget, the project will recruit an MSc student (Nutrition) to provide research support in the second and third years. The two main objectives of including a student are to (i) grow the capacity of the student and (ii) complement the capacities of the existing team. To this end, the student will support in the full range of activities taking place through this project, but their focus will be on ensuring that the implementation design is sound and adhered to, data analysis, and manuscript writing, all of which align well with the objectives of most nutrition-related post-graduate programmes. Having a member of the team that is focused on the research improves the likelihood that the project lives up to its research potential.

¹ Capacities will be built through: (i) development of training tools and materials; (ii) targeted trainings of engaged CHVs and household on diets and health data collection; (iii) formation of strategic partnerships; and (iv) establishment of communities of practice at different levels to enhance the use of the tool and engagements with government ministries of Agriculture, Health, Education and other key development actors (i.e., UNICEF, WFP and FAO).

6.2 Financial and administrative issues/challenges:

The main challenges encountered were administrative in nature as it took longer than was anticipated to get the collaborative research agreement between FANRPAN and ILRI to be fully executed. As a result, most of the activities are behind schedule and this has slowed down the disbursement process considerably, leading to the reported budget underperformance during the period. We expect an improved position in the subsequent reporting as the pre-testing of the tool has been completed and is ready for wider testing. The cost of research materials has slightly varied due to the change in specifications and the impact of exchange rate fluctuations. The budget is being monitored regularly to avert any budget overruns and to ensure all financial milestones are achieved

The main change to the budget has been the reallocation of the savings of USD37,185 from the app developer to field visit by the tool developer team (USD9,000) to assess how the app works in the field and the MSc student support (USD28,185). These changes have been captured in the budget reforecast for Year 2.

6.3 Research partnerships:

The first year of the project has focused on launching the project and tool development. We hope to identify research partners now that we have developed a basic proof of concept.

6.4 Governance:

ILRI and FANRPAN continue to collaborate well together and to communicate frequently on the workplan and implementation. In addition, the external advisory board has and will continue to meet every 6 months. The board members provide feedback on the research design and tools being developed.

6.5 Research ethics:

ILRI presented the project to the Ministry of Health's Technical Working Group on Nutrition Research in Kenya in October 2018, a first and necessary step to receiving ethics approval for nutrition research in Kenya. Ethics approval for the tool testing was granted by ILRI's ethics committee ([IREC, Annex 7](#)) and Kenya's National Commission for Science, Technology and Innovation ([NOCASTI, Annex 8](#)), the national body that approves all Scientific research in Kenya. Acting on the recommendation of the ILRI IREC Board to initially submit for an approval of the pre-pilot phase, we are now submitting the amendment for the main pilot activities that will take place over the next 12 months, to cater for the changes between the pre-pilot testing and the pilot.

7. Challenges encountered/actions taken:

Delays in contracting between FANRPAN and ILRI resulted in tool development starting about four months behind schedule. We continue to be about four months behind schedule but hope to make that up by shortening the period between the pilot and scaling activities (late year 2/early year 3).

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