The Food, Agriculture and Natural Resources Policy Analysis Network (FANRPAN) and the International Livestock Research Institute (ILRI) are implementing the project "Improving Dietary and Health Data for Decision-Making in Agriculture and Nutrition Actions in Africa" with funding from the International Development Research Centre (IDRC). The project will be implemented in Kenya and two other countries in East Africa over a four-year period from 2018 to 2022. The overall objective of the project is to develop, evaluate and introduce cost-efficient and scalable solutions for improving the measurement of dietary intake and health indicators to track nutrition and health outcomes and their progress at community and national levels.

The Problem: Malnutrition has direct consequences on child health and long term cognitive and physical development (Barker, 1998; Alderman, Hoddinott, and Kinsey, 2006; Black et al, 2008; Victoria et al, 2008; Almond and Currie, 2011). Globally, 155 million children under five are stunted and 52 million are wasted, 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 & Bank, 2015).

More and more, humanitarian, development, and government organizations are focusing on nutrition as a primary objective, as 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 for collecting nutrition data are inadequate for tracking impacts in the face of heterogeneous and fast-moving confounding factors. Low-frequency data can seriously misrepresent the nature of shocks, coping strategies, and the 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 nutrition data are often of little direct use to households themselves.

Research Solution: We propose to address this information gap by developing and building capacity around an information and communications technology based (ICT-based) platform for collecting and disseminating high-frequency, high-resolution consumption and young child health data directly from and to households. The key innovation of this platform is combining the accuracy and frequency of recording events in near-real time with the low-cost, ease, and support of ICT. We will develop a system

by which households collect and submit their own consumption and child health data directly, avoiding the scheduling, delays and costs related to third party enumerators, through a mobile-phone platform that does not require literacy and offers innovative reporting processes that can capture types of data that were previously very difficult or impractical to collect. Furthermore, children's clinical signs and symptoms will be collected to assess morbidity levels—incidences of diarrhea and fever will be recorded by the mother/caregiver to give indications of a potential or actual disease—that can have implications for nutritional status. Analytic tools, including image capture and classification software, cross validation through repeated and neighbouring observations, and simplified data collection protocols that focus on critical food types, such as animal sourced food, will be used to ensure that the data collected by households are accurate.

These processes will reduce the burden that comparative surveys (e.g. paper-based consumption journals, socio-economic profiling) place on the household, while improving the data available for tracking and improving interventions. Furthermore, the application will provide households with dashboards of information on their children's nutrition status, improving their own capacity to make responsible nutrition decisions. This is expected to motivate them to improve on their health and nutrition-related behaviours.

Research Objectives:
1. The primary objective of this initial pilot stage is to develop and test cost effective, scalable technologies to improve the collection of high resolution (individual-level) dietary, nutrition and health data.
2. The second objective of this pilot is to strengthen country-, regional and household level capacity to use tools and data, to make agriculture, nutrition and health policy and practice decisions.
3. The third research objective is to create awareness through communication and policy advocacy of the

resulting insights in the technology and methodology to policy makers and related stakeholders.

Implementation and Scale: While we propose developing and piloting the platform in Kenya, where our team has the most experience, the platform will be scalable, in that moving to new regions and populations may require some recalibration, but we have selected outcome measurements—consumption, child MUAC and morbidity—that already have a long history of use internationally so that within a specific region or context, there already exists a history of data with which to benchmark. And, although households will need access to smart phones, which will be provided by the project, the low and decreasing cost of durable devices (<USD80) and high market penetration of mobile technology make this requirement tenable. Furthermore, we will build the application using offline-first protocols, meaning that functionality does not require mobile connectivity at all, rather, data will be stored on the device until the device enters a region with connectivity, for example, during trips to the market.

Potential for Impact: High profile events, such as the formation of the Scaling Up Nutrition movement and the UN Decade of Action on Nutrition, reflect an upsurge in interest and commitment to reducingmalnutrition. This momentum, however, has yet to be fully matched by a collective capacity to evaluate the impact of interventions intended to reduce malnutrition, monitor for risk of nutrition related humanitarian disasters, or for nations to track their own progress towards their nutrition goals. The Global Nutrition Report of 2014 observed that, nutrition monitoring is expensive and laborious and, therefore, often non-existent in resource-poor countries. The report further noted that, traditional monitoring systems are also constrained by time-consuming and error-prone paper-based data collection, followed by manual data entry. Consequently, monitoring of nutrition in real time to allow a rapid response to nutritional crises is frequently impossible.

The value of this work is that it has the potential to reduce the cost of each data point so dramatically that households, government agencies, aid organizations, and researchers will be able to affordably track changes within and across households at higher frequency and more expansively that ever before. Once developed, the proposed platform will reduce the need for home visits by enumerators and technicians, one of the most expensive parts of collecting child health and nutrition data in remote regions, and will complement existing surveillance and data collection systems within government sectors. Accompanying awareness and capacity development on the tool, and how to employ such health and nutrition data provide the channel for impacts at scale.

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