

TOWARDS NEAR REAL-TIME FOOD SECURITY MONITORING

LESSONS FROM A CITIZEN-SCIENCE APPROACH IN KENYA

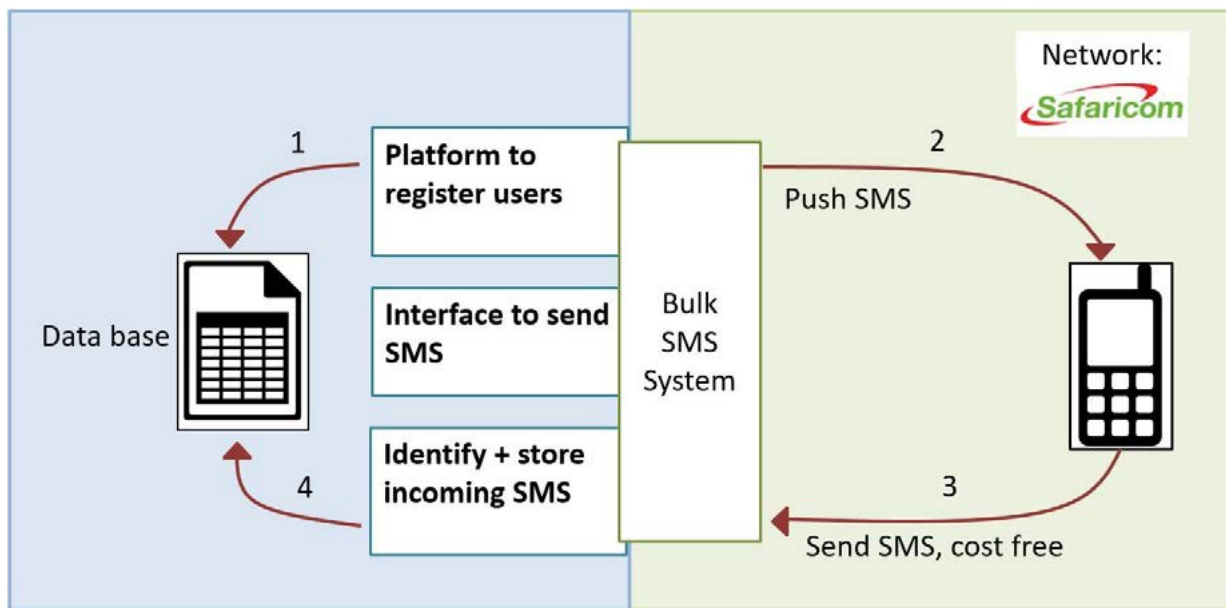


Figure 1: Technical Setup and Sequence of the SMS System.

Early warning and monitoring systems are an important pillar in the context of humanitarian emergencies, disaster risk reduction and food security. They enable the timely detection and continuous monitoring of crises and the triggering and shaping of the humanitarian emergency response. Over the last two decades, advances in information and communication technology, in particular increasing mobile- and smartphone ownership across developing countries, have paved the way for the inclusion of the population itself into monitoring processes.

The Role of the At-Risk Population

In that context, participatory citizen-science approaches, i.e. approaches drawing, among other things, on observations from the local population itself, have gained considerable interest, as they are associated with many advantages. For instance, the food security status of a community can be accessed via a local's daily routine, when purchasing food from the market, when harvesting or when fetching prices for livestock and crops, **allowing for instantaneous data collection.**

- Tapping into this information stream could provide valuable near real-time and spatially disaggregated signals for situation monitoring, ultimately **equipping the population at-risk with a direct communication channel to monitoring systems.**
- This contributes to: insulating data collection against crises and breakdown, as information flows without the need of a third party; enhancing the democratization of information, as affected individuals are provided both a platform and voice that allows for their perspective to be heard; potentially **mitigating the lack of timely, reliable, high-quality and spatially disaggregated data** still observed across developing countries.
- Timely and geographically disaggregated information can contribute to indicating crises at an early stage of development, to triggering early intervention before crises become emergencies and vice versa to identifying decreasing risk levels.
- This policy brief summarizes insights from research at ZEF conducted in Kenya which investigated the potential of **citizens' assessments for continuous, near real-time food security monitoring.** This pilot study

was based on a SMS system that enabled the collection of snap-shot assessments of representatives of the local at-risk populations.

SMS System: A Direct, Cost-Effective Information Channel

When implementing a direct communication channel to the at-risk population, a simple, accessible and cost-effective system is required that **taps into the existing technological infrastructure**, i.e. a system that caters to the devices the local population currently uses. A system that is

- able to reach people where they are without any further investments into devices.
- allows for rapid, near real-time assessments.
- potentially easy to scale-up.

The SMS-System employed in this study, which was implemented by ZEF in cooperation with a Kenyan IT Start Up, automatically pushes SMS to registered participants, manually or at pre-defined intervals as well as **at marginally low costs**, i.e. 0.8 US\$ per SMS. Participants, on the other hand, send their answer-SMS to a specified short code, free of charge. The system operates on Safaricom, Kenya's largest mobile network provider with the widest network coverage and, hence, ensures the reach-ability of participants. The SMS-system allows to collect assessments in near real-time, i.e the system introduces a **processing delay of less than 1 minute between observation and data output**.

The Context: Kenya

The pilot study was rolled out in Kenya, whereas of 2016, 81% of the population had a mobile cellular subscription, while between 5% and 20% of Kenya's population, that is 2.5 to 4.9 million people, is estimated to be acutely food insecure.

In recent years, Kenya has been exposed to a combination of slow-onset and sudden-onset disasters. In 2016 and 2017, Kenya, as all countries located in the Horn of Africa, experienced a prolonged and severe drought. This drought triggered large scale food insecurity and left many people across Kenya in need of (food) assistance. In the first quarter of 2018, the situation, however, changed swiftly, after the long rains set in and brought above average rainfall, causing severe flooding across many parts of Kenya, with the South-East of the country being most affected.

Pilot Study: Design

The pilot study was rolled out **in cooperation with Welthungerhilfe**, a large German NGO and **Kenya's**

• **National Drought Management Authority (NDMA)**.
• Both cooperation partners have an interest in near real-time food security monitoring, as they tackle food security emergencies on the ground. Both partners advised on the technical design of this study.

• The pilot was implemented in four Kenyan counties, these are **Kajiado, Makueni, Kitui and Tana River**.
• 29 participants from the local population took part in the study and provided their assessments over a period eight months, from January to August 2018.
• Six participants are located in Kajiado, seven participants in Makueni and Tana River and nine participants in Kitui. Push-SMS, requesting an assessment, were sent every two weeks and participants could directly communicate with the system at any point during the study period, free of charge. All participants were recruited by NDMA and belonged to their network of enumerators.

• The objective of study was twofold: (1) to engage representatives of the at-risk population in a direct classification of their communities' food security situation and (2) to continuously monitor the food security situation over a longer time period and gather information that is being provided by the same individuals.

• The snap-shot assessments were collected based on a pre-defined, short questionnaire and asked **participants to directly classify their communities' food security situation, based on 2 questions**:

- Question 1: How is the food availability on the local market?
- Question 2: How is the local food security situation?

• Question 1 groups the food availability on the local market into 3 categories: readily available, somewhat available or at high prices; not available or at very high prices. Question 2 is based on the 5 step Integrated Phase Classification (IPC) for food security (phase 1: no food insecurity, phase 2: stressed, phase 3: crisis, phase 4: emergency, phase 5: famine). Participants replied by sending their coded answers free of charge.

• The collected assessments were validated against the food consumption score and reduced coping strategy index observed at the respective location, in a model that also includes market prices for maize and livestock and above and precipitation.

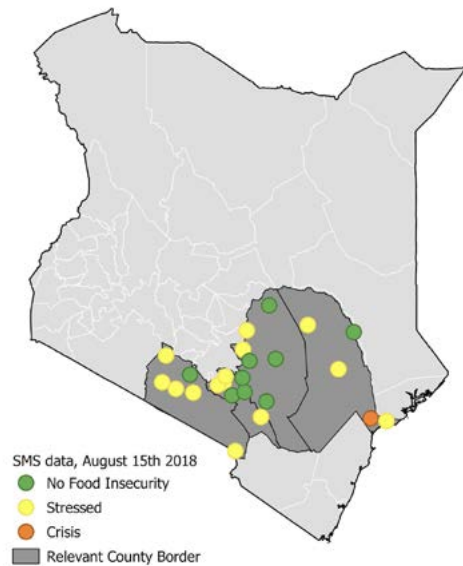
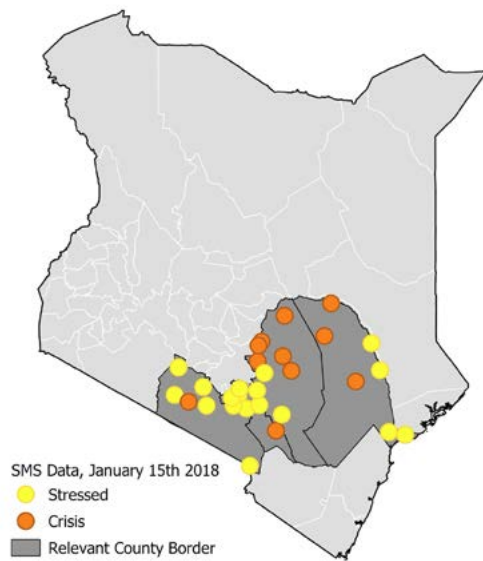


Figure 2: Assessments obtained on 15/01/2018 and 15/08/2018 indicate that the food security situation improved throughout the year

Key findings: Bottom-up food security assessments

Across multiple specifications, the results confirm that the **gathered food security assessments are in line with existing indicators**. More specifically, an increase in the food consumption score is associated with an increase in food availability on the local market and an improvement in the food security classification. Similarly, an increase in the reduced coping strategy index is associated with a decrease in food availability on the local market and deterioration of the food security classification. The results indicate that local knowledge holders provided valid assessments of their communities' food security situation.

Lessons Learned

The objective of this pilot study was to obtain near real-time information, elicit on-demand, fast situation assessments; and to understand whether the local population could contribute to and be integrated into the monitoring process as a complimentary source for existing data collection efforts. This could address some of the challenges currently faced by monitoring systems, e.g. irregularity of reports, or time consuming and costly classification processes, by offering **continuous and less costly monitoring**.

The system performed well from a technological point of view. The information arrived in near real-time and could directly be accessed and processed, allowing for the **instantaneous mapping of risks**.

Even though this pilot used a mobile system specifically for food security assessments, this form of near real-time

information gathering **could be used across a large variety of disciplines. It can easily be scaled up, is cost-effective and has the potential to provide practitioners with near real-time information and situation snap-shots.**

Policy recommendations

- Prioritize investing in cost-effective technologies that enable instantaneous snapshot assessments and mapping of risks
- Collaborate with local tech Start Ups that facilitate innovative technologies tailored to the local environment
- Continue investigating measures that contribute to the democratization of information, e.g. through direct communication channels with the at-risk population
- Explore use of SMS systems for near real-time data collection beyond food security monitoring

IMPRINT:

This policy brief is based on: Weber, Regine (2020), Food Security Monitoring for Developing Countries in the Age of Big Data, Doctoral Dissertation, Agricultural Faculty, University of Bonn.

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