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FAMINE EARLY WARNING SYSTEMS NETWORK TECHNOLOGY SUPPORT CONTRACT (FEWS NET TSC)

FISCAL YEAR 2014 ANNUAL REPORT

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I. OVERVIEW

According to the original project document, the objective of the FEWS NET Technology Support Contract (TSC) is “to identify and implement new technologies to enhance intra-team early warning collaboration, analysis, and dissemination capabilities, and to expand a FEWS NET activity-wide ability to gather new and greater quantities of food security information and data, through the application and use of new information technologies for early warning.”

TSC Project activities were defined according to three types of deliverable products for FEWS NET:

- Technology consultation - Informing USAID and FIT members about new technologies and tools that may help them to improve their work processes and products;
- Preparation of tool development initiative implementation deliverables; and
- Carrying-out pilot tool implementations: Testing and evaluating their feasibility and value for broader FEWS NET implementation.

The expansion of a number of tool development activities and pilots initiated in FY2013 led to a significant re-structuring of the TSC Project in FY2014. In FY2014, the emphasis of project activities focused less on the production of a large number of tool development deliverables and more on the implementation of a smaller number of somewhat complex and management-intensive pilot activities. While still operating within the overall objectives of the project, the development of the FEWS NET Data Warehouse application became the primary focus of the TSC Project in FY2014. At the same time, the TSC Project was still able to develop significant new tool implementation deliverables and consult on a range of key issues related to innovations in early warning and food security analysis.

Key achievements in FY2014 include:

- Development and rollout of the FEWS NET Data Warehouse for Price Data in the FEWS NET countries of East Africa—an important new tool for data management and analysis that allows for easy online and offline data access. In addition to software development, Kimetrica also provided training for FEWS NET markets and trade staff in Africa, developed full software documentation, created an online helpdesk support capacity, and developed a new deliverable for the expansion of the data warehouse to cover other essential early warning-related data sets.
- Rollout of a new beta version of Population Explorer, with a subsequent training of FEWS NET staff in Washington, DC. Enhancements include improvements to Population Explorer’s basic algorithms to enable the more rapid and accurate creation of population estimates using this online analytical tool. Kimetrica also produced a detailed

evaluation of necessary new features to be included in future versions of the application to improve its usefulness to FEWS NET analysts.

- Development of a deliverable to design a new and straightforward methodology to estimate both climate resilience and climate vulnerability indices by combining microeconomic data with climate data, using Ethiopia as an initial case study. This implementation deliverable was also approved in early FY2015.
- Kimetrica also commissioned a series of background papers to assess various aspect of market analysis for early warning purposes, as well as opportunities for monitoring food security conditions in hard to reach, conflict-affected areas in Africa. Kimetrica also provided consultations on a range of issues related to the use of mobile technology in food security monitoring, crowd-sourcing the location of locust swarms in Madagascar, among others.

II. EMERGENCY MONITORING IN RAPID-ONSET, INACCESSIBLE, AND DATA-POOR CONTEXTS

A. REMOTE MONITORING (A)

Kimetrica also implemented a food security monitoring activity between April 2013 and May 2014 with administrative support from a local NGO. The monitoring activity was comprised of qualitative information from key informant interviews covering 17 areas, with market price monitoring in 17 markets, and rainfall data collection in three locations. The project was originally designed to produce separate and independent monthly reports to USAID, so that decision-makers could discern the different sources of information. However, early in the project, USAID requested that Kimetrica's reports be more integrated into FEWS NET IQC reporting. As a result, Kimetrica doubled its monthly reporting, producing a monthly alert report at the third week of each month to be integrated into FEWS NET IQC reporting, as well as the contractually obligated independent monthly report.

Although originally intended to be a 10-month activity, with reporting from May 2013 through February 2014, evidence of drought in early 2014 led the TSC Project to allocate some of its own resources to extend the monitoring for two months, through April 2014. This extension also allowed for the orderly shutdown of the project after delayed notification that additional funding would not be forthcoming. In all, Kimetrica produced 12 independent monthly reports and nine monthly alerts to supplement the FEWS NET IQC project's reporting. In addition, Kimetrica produced a report on Kimetrica's efforts to calculate conversion rates from local measurements to standard units of measure for use in reporting price data, information that was not previously available through FEWS NET monitoring efforts. In producing all of these outputs, Kimetrica exceeded all project expectations elaborated in its original contract and was fully responsive to the change in donor requirements elaborated at mid-project.

After one year of implementation, Kimetrica contracted an independent, external evaluator to review the project in March/April 2014. This particular evaluator has more than 20 years of experience working on humanitarian issues. The report involved three main components: (1) a desk review of project documentation, including monthly reports and the primary data collection instruments; (2) consultation with participants in the Remote Monitoring Activity and its FEWS NET partners; and (3) a write-up of recommendations, including a revised food security monitoring form.

Key findings from the evaluation include the following:

- The monthly alerts and food security monthly reports are both of a high quality (particularly given the constraints of the context) and capture a level of detail and understanding of context that is impressive.
- The quality of the food security alerts and food security monthly reports themselves are evidence of a good quality information system and reflect a high level of local knowledge and interpretation.
- The sources of information are appropriate in terms of perspective/coverage on key issues, credibility, location, and others. In addition, the integrity of the data collection and documentation process appears sound and subject to a variety of checks and balances.
- The data collection instrument is, generally speaking, comprehensive, reflecting a range of macro, market and household-related indicators.

B. REMOTE MONITORING (B)

This activity was developed in response to the need for more detailed information on food security conditions in areas not easily accessible to existing early warning and food security monitoring efforts. The activity has proven crucial as a source of information for humanitarian policy makers and has been credited by local partners for providing the impetus for continued humanitarian support. Although operating on a no-cost extension since January 2014, the remote monitoring activity produced a total of 18 food security monitoring reports in FY2014. Monitoring operations were suspended by Kimetrica's partner in July 2014, but resumed again in early FY2015.

In early FY2014, Kimetrica undertook a process of revision, re-alignment and re-organization of the remote monitoring activity in order to improve the quality of information and reporting on food security conditions:

- A complete overhaul of its various data analysis protocols, combining individual monthly data sets into a master data file to be used in the creation of time series analysis each month, and converting the data analysis process from STATA to SPSS to ensure greater accuracy, consistency and ease of interpretation of results.
- Recruitment of a new team of data analysts as well as food security analysts to process and produce its monthly reports.
- A thorough review of the Household Hunger Scale indicator and the Food Consumption Score indicator to assess the compatibility of food insecurity estimates using each measure and develop an approach that could integrate information from each indicator into reporting. Following this investigation—given large inconsistencies in results across each indicator and the relative lack of independent evaluation of the validity of the FCS indicator overall—the FCS indicator was excluded from subsequent reports.
- A detailed review of the reporting format and recommendations for revisions.

Throughout FY2014, Kimetrica was engaged in prolonged negotiations with its partner regarding necessary revisions to the monitoring methodology and a coordinated approach to obtaining renewed funding for the activity. In parallel to those negotiations, Kimetrica undertook a series of activities to explore a range of options for alternative approaches to monitoring, including:

- Exploration of the use of high-resolution remote sensing data to identify damage to settlements, infrastructure and crops;
- Discussion of the use of a Pictorial Evaluation Tool (PET) approach to crop harvest assessments; and
- An in-depth review of the survey instruments and a re-draft of the instruments.

C. MOBILE TECHNOLOGY

Kimetrica also explored a number of other initiatives regarding the use of mobile technology to collect data in inaccessible and data-poor contexts:

- Kimetrica engaged in a number of consultations to examine the use of phone surveys, including the Geo-Poll service, in emergency contexts. These consultations raised a number of concerns regarding the potentially quite large sampling bias involved in the use of phone surveys in Africa. These consultations also provided an outline of possible methods—the use of respondent-driven “snowball” sampling and the use of auxiliary data to adjust sample weights—to overcome those sampling biases. Follow-up on these issues will comprise an important priority for the TSC Project in FY2015.

- Kimetrica also explored the use mobile technology as a basis for crowd-sourcing the location of locust swarms in Madagascar to support eradication efforts and prepared a draft deliverable with the NGO Human Network International. Although the approach was determined by experts within OFDA and FAO to be viable, it was determined that the TSC Project should not engage in implementation.

III. DATA MANAGEMENT AND ANALYTICAL SYSTEMS FOR ENHANCED DECISION SUPPORT

A. FEWS NET DATA WAREHOUSE

Designed by Kimetrica in collaboration with the FEWS NET Markets and Trade Advisor from Chemonics International, the FEWS NET Data Warehouse (FDW) is an online information tool that provides a framework for enhanced data management and accessibility for the key data sets routinely used in the FEWS NET IQC Project’s food security and early warning analysis. Currently, FEWS NET has integrated its extensive market price data set into the FDW. Other data sets to be added include: (a) crop and livestock production statistics, (b) statistics on the cross-border trade of agricultural commodities, (c) FEWS NET base maps and other spatial data sets, (d) data on nutritional status, (e) emergency needs estimates, and (f) population statistics for each FEWS NET country.

The FDW provides FEWS NET users with both online, and—through easy data downloading capabilities—offline access to all of the FEWS NET price data and, eventually, to the complete FEWS NET data set. Built-in analytical tools allow for automated routine analyses and enable tabular and graphical data visualizations. The FDW also provides the capacity to import data from key external sources into the FDW itself, to be integrated with FEWS NET’s own data to further enhance food security analysis capabilities. Through common metadata and geospatial references, the FDW database structure will eventually allow FEWS NET to more readily integrate all of its key datasets into a rigorous, multi- dimensional analysis of food security conditions in FEWS NET countries.

Phase 1 of FDW development was initiated in late FY2013 and, again, focused primarily on price data (FDW-P). During FY2014, Kimetrica completed 10 month-long software development sprints, providing the following functionality:

- Routine entry of both weekly and monthly price data, either through a manual online interface, or via spreadsheet uploads from user desktops;
- Built-in quality control measures and a formalized administrative review process to ensure data quality;

- A secure online data environment to ensure against data loss and to protect the data from inadvertent changes;
 - Creation and analysis of user-defined price data sets that can incorporate data from multiple commodities, markets and countries;
 - Easy online data visualization in tabular and graphical formats; and
 - Multiple options for downloading data for offline use, either into a standard csv file or— via a unique URL link for each user-defined data set—to a spreadsheet that updates automatically whenever internet access is available.
- In addition to improved control, data management and data access, the FDW-P also currently provides the following analytical capabilities:
- Automated conversion of prices to standard units and currencies, as selected by the user;
 - Calculation of user-defined price ratios (for terms of trade analysis);
 - Calculation of user-defined weighted and un-weighted price indices;
 - Conversion from nominal to real price series using integrated CPI data.

Given the current functionality, the FDW-P is expected to simplify the workflow of FEWS NET Markets and Trade Analysts, automate routine analytical tasks and reporting, and expand data access across countries. As a result, FEWS NET analysts will have more time to conduct in-depth analysis of market and trade issues.

In addition, as part of the development process, Kimetrica addressed a number of unforeseen issues that were deemed integral to the successful implementation of the FDW. These additional requirements involved significant programming time and included the following features:

1. Integration of country price data series not contained in the original Home Office price data set, but which were determined to be crucial to the analytical functions of national market and trade teams;
2. Re-definition of a range of price data series to distinguish locally-produced versus imported commodities;
3. The addition of an additional refreshable spreadsheet format as a download option from the system;

4. Inclusion of the capacity to enter weekly price data series, in addition to monthly price data, as well as the capacity to aggregate weekly prices into monthly averages; and
5. Creation of individual workspaces for each user to allow for the better management of users' analytical work within the system.

In addition to the development of a broad range of functionality for the FDW application, Kimetrica also produced a detailed user manual and other software documentation designed to assist FEWS NET users in integrating the FDW into their work flow. Kimetrica also developed training materials and participated in a training program of the FDW for FEWS NET markets and trade staff from the East Africa region, which was held in Arusha, Tanzania, in May 2014. With the rollout of the FDW in East Africa, Kimetrica established an FDW help desk, based in Nairobi, to assist FEWS NET staff in resolving any difficulties in using the FDW system. Late in FY2014, Kimetrica also began the process of revising these training materials to incorporate new functionality to support the roll out of the FDW in the remaining FEWS NET regions, a process that began in early FY2015. Finally, in anticipation of the FDW rollout and the handover of basic system management to the FEWS NET IQC project team from Chemonics, Kimetrica also produced a "roadmap" document that elaborated expected management requirements and staffing needs for the system.

Based on the success of the activity, in July 2014, Kimetrica submitted a deliverable for an extension of FDW development efforts to integrate the following data sets into the FDW system: (a) crop and livestock production statistics, (b) statistics on the cross-border trade of agricultural commodities, (c) FEWS NET base maps and other spatial data sets, (d) data on nutritional status, (e) emergency needs estimates, and (f) population statistics for each FEWS NET country. The deliverable was approved in early FY2015 and work on these additional elements of the system commenced immediately thereafter.

B. POPULATION EXPLORER

Population Explorer is a web-based population estimation tool that allows analysts to access population estimates from the LandScan data set at a resolution of 1km-square. Areas of interest can be delineated and populations within those areas can be estimated by overlaying digitized maps of an affected area or by drawing freehand shapes around the affected area. Population Explorer also has a range of other capabilities to support early warning, contingency planning, and emergency needs assessments.

Continued development of the Population Explorer application was limited in FY2014 due to limited project funds. Following a review of the application by a senior geographer of Drew University, which identified a potential source of errors in the method used to produce population estimates, Kimetrica undertook a major revision of the underlying algorithm to

correct the issue. In addition, some additional changes were introduced to make it easier to import shape files into the application and Kimetrica provided additional online documentation. In March 2014, Kimetrica provided a half-day Population Explorer training session to FEWS NET IQC staff in Washington, DC.

In August 2014, as an update to a similar report produced in FY2013, Kimetrica commissioned the same senior geographer to review Population Explorer functionality and, in cooperation with FEWS NET IQC staff, the analytical needs of project staff in order to make recommendations for new features to be included in the application to enhance its value to FEWS NET analysts. Kimetrica compiled the recommendations of this report with the previous FY2013 report to develop a product backlog for further development of the application.

At the request of the FEWS NET IQC Project, Kimetrica again engaged the senior geographer to explore methods to integrate data on wealth categories from FEWS NET livelihoods assessments with population estimates from Population Explorer to calculate the percent of the population that is poor within various IPC classification zones. Using data from Chad as a case study, the report presented a methodology to incorporate this data into the FEWS NET IPC analytical process as well as recommended modifications to Population Explorer itself to make it easier to conduct this type of analysis in the future. Kimetrica also assessed the impact of internal migration on county-level populations in South Sudan, again using Population Explorer functionality.

C. ETHIOPIA CLIMATE RESILIENCE PILOT

In February 2014, Kimetrica produced an implementation deliverable to develop a new and straightforward methodology to estimate both climate resilience and climate vulnerability indices by combining microeconomic data with climate data. The methodology should prove useful in policy planning and in the early warning context by providing a conceptual and empirical approach to understanding these crucial dimensions of food insecurity. This approach should also inform efforts to evaluate the impact of projects intended to strengthen resilience among households in high-risk environments. This deliverable was approved in early FY2015 and work commenced immediately thereafter.

D. MARKET ANALYSIS

Given the increasing emphasis on market-based interventions to humanitarian crises, in the form of local and regional purchases and cash relief distributions in lieu of in-kind food aid, it is critical that FEWS NET assess its approach to market analysis to ensure that it provides the most complete analysis possible to inform the evolving decision-making requirements in humanitarian programming. In FY2014, Kimetrica undertook two preliminary studies to assess opportunities to enhance FEWS NET market analysis to respond to these new programming challenges.

1. Opportunities for Enhanced Market and Price Analysis.

This activity provided a background document that assessed the FEWS NET approach to market, trade and price analysis, in order to identify opportunities for the development of new tools, methodologies, and approaches to enhance FEWS NET's various analytical products for USAID decision-makers. The scope of the assessment included issues related to agricultural commodity markets and labor markets in particular. The assessment provided the basis for further work (currently underway in FY2015) to prioritize new tool development activities related to enhanced market, trade and price analysis.

2. Spatial Analysis of Market Interactions for Early Warning Purposes.

In FY2014, Kimetrica also commissioned a paper to explore methods to develop a better understanding of the geo-spatial dimensions of agricultural commodity markets, in particular the nature of market interactions with other markets and with populations in surrounding areas. With a better understanding of how prices transmit over time and space, early warning analysts should be able to identify price anomalies more clearly and be able to draw more precise conclusions about the impact of observed price changes for specific livelihood groups. The report provided insights on analytical approaches related to the following specific topics:

- An analysis of price behavior within market basins defined in an integrated and systemic fashion at the regional, national and sub-national levels—providing a specific geographic context to the analysis—rather than the current practice of viewing market prices largely as individual, somewhat independent observations defined at a single point in space;
- The creation of price surfaces in order to describe the geographic extent of price changes and (via the Population Explorer application) estimate the population affected by price changes in crisis periods; and
- An estimation of the degree of market integration of local populations to inform decisions on appropriate food assistance modalities (cash versus in-kind distributions).

In addition to framing the analytical problems described above in terms that are most directly relevant to the FEWS NET Project's operational objectives, the report also presented a deliverable for a proof of concept, or case study, to demonstrate directly the value of the proposed analytical approaches for early warning purposes for the FEWS NET East Africa region, for maize and sorghum markets.