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

Fiscal Year 2015 Annual Report

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## **DISCLAIMER**

The authors' views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government

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## OVERVIEW

According to its 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.”

FY15 represents a continuation of the evolution and progress of the TSC Project toward implementation of a small number of complex, management-intensive pilot activities. In addition to consultations on a range of key issues related to various dimensions of early warning and food security analysis, in FY15 the TSC Project focused its efforts on the development of:

1. Innovative analytical tools;
2. Improved technology for data management, analysis and dissemination; and
3. Innovative approaches to remote emergency monitoring in hard to reach areas.

Major accomplishments for FY15 include:

- A pilot study on resilience measurement based on a case study from Ethiopia; it provides a rigorous conceptual basis for incorporating the resilience perspective into early warning analysis, as well as a practical measurement tool that promises to support resilience policy and program development and to inform forecasts of consumption dynamics during a crisis.
- Using a case study from Yemen, an exploration of alternative data sources for FEWS NET’s livelihoods analysis, based on standard income and expenditure data sets available in most FEWS NET countries. This is an approach that promises to drastically reduce FEWS NET’s costs for the primary collection of livelihoods data while enhancing the transparency and rigor of the analysis. Given the success of the TSC pilot in Yemen, FEWS NET is planning to adopt a similar approach in two other countries in FY16.
- Continued development of the innovative and powerful FEWS NET Data Warehouse application to incorporate a growing list of data sets, including prices, crop production, cross-border trade, nutrition, population, humanitarian needs and responses, as well as canonical boundary and shapefiles that are central to all of FEWS NET’s analytical products.
- A Price Analysis Strategy Paper that defines a new set of quantitative analytical tools to enhance FEWS NET’s ability to support decision-making in the context of USAID’s increasing reliance on market-based humanitarian interventions.

- A strategy paper for Remote Emergency Monitoring that provides a framework for how FEWS NET can develop its capacity for more rapid and rigorous analysis, particularly in hard to reach areas.
- Implementation of an expanded remote emergency monitoring activity in difficult to access areas that has provided FEWS NET, local partners, and the international community with a rigorous empirical basis for humanitarian programming in those areas.

In addition, in FY15, the TSC Project also developed an ambitious research agenda for the final year (FY16) of the project. This agenda is based on the principle that, moving forward, FEWS NET should increasingly rely on analytical tools that are non-proprietary, transparent, replicable, verifiable, and based on peer-reviewed methods. Further, the new work plan should enable FEWS NET to make more extensive use of the rapidly expanding and diverse data sets that are freely available in FEWS NET countries related to poverty, food security and other relevant factors.

As detailed in the TSC Project Annual Work Plan for FY16, the TSC Project will continue its work on developing the FEWS NET Data Warehouse, as well as its remote emergency monitoring activities. New initiatives will focus on (a) the use of mobile technology for early warning purposes, (b) further development of the resilience measurement tool, (c) enhanced methods for livelihoods mapping and analysis, and (d) improved tools for market price analysis and price mapping.

## INNOVATIVE ANALYTICAL TOOLS

### A. RESILIENCE MEASUREMENT

In FY15, the TSC Project undertook an innovative research activity to develop a set of direct measures of climate vulnerability and resilience. Using 18 years of household survey data from Ethiopia, matched with climate data from remote sensing sources, TSC developed a climate hazard-consumption model to measure changes in household consumption related to the observed short-term weather fluctuations (droughts, floods) and longer-term shifts in climate patterns.

The model, which can be applied to a variety of data sets available in most country and program contexts, provides four specific measures of vulnerability and resilience:

- A *weather vulnerability index*, which measures the expected poverty gap caused by an adverse weather shock;
- A *climate vulnerability index*, which represents the average or expected weather-induced poverty gap, given the historical distribution of all-weather shocks of different magnitudes over time;

- A *weather-resilience index*, measuring the expected speed of recovery after a specific weather shock; and
- A *climate-resilience index*, which measures an average or expected recovery time, given the historical distribution of weather shocks of different magnitudes over time.

These measures can be used as inputs in an evidence-based, differentiated approach to resilience policy and program development to more effectively address the problems of poverty, vulnerability and the lack of resilience that often undermine human welfare. They also show promise in the evaluation of the impact of resilience programming, as well as in the early warning context, in forecasting poverty and consumption dynamics in the immediate post-crisis period.

While FEWS NET's analytical approach has traditionally focused on a given population's vulnerability to declines in consumption in the face of various shocks, the model's emphasis on the recovery path of affected populations, which is fundamental to the resilience concept, introduces a new area of exploration for early warning analysts. This approach further promises an improved understanding of: (a) the role of household coping behavior in the post-crisis recovery period, (b) the cumulative effects of recurrent crises, (c) the estimation of protracted emergency needs, and (d) the definition of exit strategies for humanitarian programs, among others.

After receiving approval for the activity in December 2014, the TSC Project produced an intermediate report on the resilience measurement model in March 2015, followed by a final report that was eventually presented in October 2015.

## B. ALTERNATIVE DATA SOURCES FOR LIVELIHOODS ANALYSIS IN YEMEN

In developing its needs estimates under various scenarios, FEWS NET typically relies on extensive primary data on livelihoods collected in each country using the Household Economy Approach (HEA). Facing a need to update these data sets, and given the significant cost of field-based primary data collection, it is important for FEWS NET to explore possible alternative and more cost-effective sources of this livelihood information.

In collaboration with its FEWS NET IQC partners, in FY15 the TSC Project undertook an analysis of income and expenditure data from the Yemen Household Budget Survey (HBS) to develop a set of HEA-like livelihood parameters for use in developing needs estimates under various scenarios in the current humanitarian crisis affecting that country. While addressing FEWS NET's immediate information needs in this crisis, the activity also yielded more general insights regarding the use of secondary data sets in livelihoods analysis:

- With the increasingly common practice of geo-coding primary sampling units in household surveys, it is possible to derive estimates of HEA-like livelihood parameters for each livelihood zone in the country.

- From the perspective of how the HEA analysis is structured, the survey data allow FEWS NET to pull out the same information on income and expenditure shares, sources of food, and others for each livelihood zone (LZ)—with even greater detail and flexibility to group populations and specify income and expenditure categories in some circumstances.
- The survey data is representative of the entire population in each LZ, not just “typical” households, as with HEA. “Typical” households defined in the HEA approach might be viewed as being analogous to the “mode,” which may actually represent only a small share of households in any subset of an LZ’s population.
- The survey data also represent the full income distribution across all income groups, rather than the HEA’s reporting of data from discrete, relative wealth group categories.
- The direct estimates of income levels from the survey data are comparable over time and across locations (and countries)—which should allow cross-country comparisons of need—a fact which is not strictly true of the HEA wealth categories.
- Survey data also provide greater flexibility in how households can be grouped in the analysis, to derive conclusions more directly relevant to populations of particular concern.
- At the same time, some of the standard errors of key parameter estimates were high and there were three small livelihood zones for which there were insufficient observations to create reliable estimates of the HEA parameters. However, with a clearer understanding of sample size, estimates of standard errors, etc., FEWS NET analysts will be in a better position to make informed decisions regarding how to address these weaknesses, perhaps through targeted data collection activities in under-represented LZs or other approaches.
- There is an important complementarity between qualitative and quantitative information. Mixed-methods approaches—using qualitative methods to understand coping strategies and other factors, for example, to enhance the use of the quantitative estimates derived from household survey data—can improve the overall understanding of relevant issues. Rather than suggest an incompatibility in the different information sources, the discrepancies observed between the qualitative and quantitative information for some of the LZs examined suggest a specific approach in merging these methodologies. The cheaply-available quantitative data results can be used as guideposts for follow-up qualitative assessments, which can themselves be used to either confirm or reject the results of the quantitative analysis and to expand the information base and depth of understanding of key issues.
- Finally, rather than be restricted to the current unwieldy, spreadsheet-based approach to data management, modeling and scenario development, the use of household survey data allows for

the testing of alternative simulation methods. These methods are well-established in the scientific literature and can produce transparent, rigorous, testable and replicable estimates of the impact of a crisis on livelihoods. While the use of household survey data as a substitute for costly HEA-style data collection efforts may be an important stop-gap measure for FEWS NET, it is important to test alternative approaches to modeling as well.

The use of existing, alternative data sources to develop HEA-compatible parameters could result in considerable cost savings across all FEWS NET countries. These alternative data sets, like the World Bank's LSMS survey data are available in most FEWS NET countries, including those where HEA data are not available. Further, these data sets are updated on a regular basis, over a period of 5-10 years with few exceptions, whereas HEA data sets will begin to require widespread updates.

### C. PRICE ANALYSIS STRATEGY PAPER

In Q2, the TSC Project developed a price analysis strategy paper to identify key analytical tools necessary to inform specific decisions taken by specific decision-makers, decisions that are beyond the current scope of FEWS NET decision support products, particularly those related to the use of market-based humanitarian food interventions, such as cash transfers and local and regional procurement.

TSC identified a number of quantitative analytical tools to enhance FEWS NET's national, regional and global markets and trade staff in providing in-depth analysis of market conditions. These include:

- Seasonally Adjusted Price Series
- Price Anomaly Indices
- Price Forecasts
- Price Volatility Index
- Consumption Share-Weighted Price Indices
- Import/Export Parity Price Series
- Market-Village Interaction Probabilities
- Market Basin Map

Most of these tools can be created using data already in the FEWS NET Data Warehouse. The document proposed to generate these analytical products automatically, using the analytical power of the FDW, as well as producing visualizations (graphs, charts, maps and dashboards) for easy access and interpretation via the FEWS NET Data Portal. The creation of these automated analytical tools would complement the local expertise and qualitative information contained in FEWS NET's Market Fundamentals analysis to strengthen the depth and timeliness of FEWS NET's market and trade analysis.

Specific benefits of the approach would include:

- Reduced need for routine analysis on the part of FEWS NET reps, so they can focus more on interpretation and written summaries;
- Increased opportunities for direct dissemination of high-end information products to the client group;
- Increased standardization of analytical products across countries;
- Reduced reliance on a variable staff skills capacity; and
- Reduced risk of serious misinterpretation based on failure to adjust for underlying inflation or seasonality.

## IMPROVED TECHNOLOGY

### A. FEWS NET DATA WAREHOUSE

In FY2015, TSC completed work on the price data domain within the FEWS NET Data Warehouse (FDW) and successfully developed capabilities to manage data domains for (a) nutrition data, (b) production data, (c) spatial data (maps), (d) cross-border trade, and (e) survey indicators. A new dropdown menu on the landing page was also created to ease access to different elements of the FDW. The website and manual were also translated into Spanish and French.

For the price data domain, feature enhancements included improved unit conversions, reformatted online charts, and support for weekly price series in anticipation of adding additional data from new and existing FEWS NET countries. TSC also added personal workspaces for FEWS NET analysts to maintain price data sets created for individual analysts use, as well as an additional spreadsheet extract to replicate the crosstab structure of the historical FEWS NET price data spreadsheets.

New system enhancements to the price data domain included 1) a detailed audit trail to allow system administrators to trace any changes to the FDW data or metadata, and 2) a simplified process to update aliases for market names and other metadata to allow for easier recognition of data series with varying spellings and smoother uploads overall. TSC also created an easy link between the FDW and ArcGIS software to simplify the process of creating market maps depicting the spatial distribution of price changes each month. A brief training tool was developed to assist FEWS NET Market and Trade analysts in creating those maps.

The nutrition data domain was developed on-time for rollout at the nutrition-oriented training at the FEWS NET Global Workshop in May 2015. TSC worked in close coordination with the FEWS NET IQC nutrition advisor in defining the functionality to be included in the nutrition domain. TSC also created training materials for the nutrition data set to be used at the Global Workshop. The nutrition domain was developed on the basis of a test data set. Full use of the nutrition data domain was pending completion of each country's nutrition data set and development of a master data set that defines seasons for each FEWS NET country, which was considered an important variable for the interpretation of nutrition information. By the end of FY2015, the country data sets had still not been compiled or

entered, nor had the seasonal definitions been finalized.

In fact, each of the five data domains created during FY2015 were built on the basis of test data sets and were yet to be fully populated, pending final compilation and processing of each country data set for each domain.

## B. POPULATION EXPLORER

During FY2015, TSC continued to maintain the Population Explorer online application. There were limited helpdesk requests each month and no major system issues. In August 2015, TSC successfully implemented a more efficient upload procedure for the Landscan data that reduced data upload and processing time by up to four weeks, reducing costs significantly. In addition, TSC provided an assessment of PopulationExplorer.com website which found over 9,700 users over the period January 1, 2015 to September 25, 2015, with more than 277,500 page views over that same period.

## REMOTE EMERGENCY MONITORING

### A. EXPANDED REMOTE MONITORING

The TSC Project oversaw a large expansion of its remote monitoring activities in a difficult to access area in FY2015. The expansion was primarily (a) to provide staff with direct access to the monitoring areas to improve training of monitoring staff and thereby improve data quality; (b) to improve the contextual basis of analysis and reporting for greater depth of insight; and (c) improve coordination with, and use of data by, local partners for their advocacy purposes and to improve programming through an enhanced understanding of local conditions.

The monitoring was comprised of three main components: (1) quarterly household surveys covering a range of food security-related issues, (2) monthly market monitoring and price data collection, and (3) monthly interviews with key informants and local administrators to track outcomes, the quality of the agricultural season, and other factors. The project would produce monthly monitoring reports and quarterly survey reports for the areas covered.

With funding approved in December 2014, the TSC immediately began to develop a new monitoring and survey strategy, including new survey questionnaires and monthly monitoring forms. The TSC also began to develop relationships with its local partners to inform them of the activity's objectives and develop coordination mechanisms for logistical support and data sharing. Three rounds of field testing of the survey instruments, and the development of data entry and training materials, the TSC began its first quarterly survey and monthly monitoring training on-time in March 2015. The surveys were completed in March/April, with data entry completed in late April/early May. Data entry and reporting were somewhat delayed by reduced field data entry staff among local partners and the need to transport survey forms to the regional data entry site for data entry there.

The TSC continued its monthly monitoring and reporting on an on-going basis over the course of FY2015. The project also completed a second-round household survey in June 2015. The third-round survey, which was to be implemented in September 2015, was delayed until October with the consent of USAID. Given poor early rainfall in the monitored areas, the October survey provided the earliest possible view of the overall quality of the harvest.

TSC monitoring in these areas identified a population of particular concern that was hard-hit by poor rains. The TSC estimated 30,000 people in the region would be in-need of immediate food assistance through the next harvest. TSC reporting was also quoted widely by FEWS NET, UNOCHA, Amnesty International and others, as well as in advocacy reporting and requests for emergency funding by local partner organizations.

The TSC has further worked with local partners to produce data, such as market price data and livestock holdings and conditions, for use in partner programming decisions. Partner feedback has resulted in revision to the TSC monitoring and survey approaches as well.

## **B. REMOTE EMERGENCY MONITORING STRATEGY PAPER**

In FY2015, as a product of a series of conversations with USAID and members of the FEWS NET IQC project, TSC produced a strategy paper for Remote Emergency Monitoring (REM). This paper provides a framework for how FEWS NET can develop its capacity for more rapid and rigorous analysis, particularly in hard to reach areas. The paper identified a series of steps in the implementation of REM activities, including a pre-crisis information preparedness phase and a post-crisis monitoring/implementation phase, as well as an agenda for on-going analytical tool development. The document also presented a framework for differentiating the design of monitoring activities according to differences in the degree of access to affected areas and populations and the institutional capacity available to FEWS NET to support different forms of monitoring.