Famine in Somalia: Evidence for a declaration

Peter Salama a, Grainne Moloney e,*, Oleg O. Bilukha b,1, Leisel Talley b,2, Daniel Maxwell d,3, Peter Hailey a, Christopher Hillbruner c,4, Louise Masese-Mwirigi e, Elijah Odundo e, Michael H. Golden f,5

a UNICEF, East and Southern Africa Offices, PO Box 44145-00100 Nairobi, Kenya
b Centers for Disease Control and Prevention, 600 Clifton Rd, Atlanta, GA 30333, USA
c Feinstein International Center, Friedman School of Nutrition Science and Policy, Tufts University, 114 Curtis StreetMedford, Boston, MA 02155, USA
d FEWS NET, 1717 H St, NW, Washington, DC 20006, USA
e Food Security and Nutrition Analysis Unit, Somalia, Food and Agriculture Organization of the United Nations, PO Box 1230, Village Market, Nairobi, Kenya
f Pollgorm, Ardbane, Downings, Co Donegal, Ireland

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Abstract

Objective: On 20 July 2011, for the first time since 1991–1992, the United Nations declared famine in parts of Somalia. Here, we report the methods, data and analysis that underpinned this declaration along with the review of trends in mortality and malnutrition.

Methods: During July 2011, 16 population-based nutrition and mortality surveys were conducted in southern Somalia. Data on food access, collected through seasonal assessments and monthly monitoring, were analyzed using Household Economy methods.

Results: In 11 of 16 survey locations, the prevalence of Global Acute Malnutrition exceeded the Integrated Food Security Phase Classification threshold for Phase 5 (Famine) of 30%. In five areas, Crude Death Rates exceeded the Integrated Food Security Phase Classification Phase 5 (Famine) threshold of 2/10,000/day. In agro-pastoral zones of the south, where access was most limited, more than 20% of households faced extreme food shortages.

Comment: Survey findings and analysis confirm that a famine occurred in parts of southern Somalia during 2011 and raise the question of why strong early warning analysis did not trigger an earlier, better funded and more effective, response.

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1. Introduction

Somalia, along with several other countries in the Horn of Africa face recurrent food insecurity as a result of drought, climactic variations and conflict (UNICEF, 2011). In addition, since the outbreak of conflict in 1991, no government has been able to exert control over the majority of Somalia’s territory. As of early 2011, the internationally recognized Transitional Federal Government (TFG) controlled only a small part of the country, while the Islamist Al-Shabaab group controlled much of the south of the country. The conflict has compounded vulnerabilities, undermining both traditional coping strategies as well as the informal economy that have sustained the population in the past (Anderson, 2009). Indeed, Somalia has some of the worst development indicators in the world (UNICEF, 2011) and has been described as ‘the most failed state’ (Anderson, 2009). Somalia is also the most dangerous place in the world for aid workers; two-thirds of all aid workers’ deaths recorded worldwide in 2008 were in Somalia (Bradbury, 2010).

Somalia has suffered famine previously, the most severe occurring in 1991–1992. That crisis prompted the US-led military intervention, Operation Restore Hope, and an accompanying humanitarian response that had mixed success; around 70% of the approximately 200,000 deaths that occurred were deemed preventable (Hansch et al., 1994). In order to learn lessons from that famine and other food security crises in the Horn of Africa, as well as develop reliable early warning and surveillance systems, two important projects focused on Somalia were initiated in 1995. These were the Food Security and Nutrition Analysis Unit (FSNAU), a multi-donor project now managed by the Food and Agricultural Organization (FAO) Somalia and the USAID-funded Famine Early Warning Systems Network (FEWS NET). Together
these initiatives aim to provide reliable early warning information on nutrition, food security and livelihoods, and to inform planning and response for Somalia.

Since early 2010, much of southern Somalia has been inaccessible to most non-Somali humanitarian actors. The World Food Programme (WFP), in particular, closed down much of its operation in January 2010. For a period after late 2009, the US Government ceased providing assistance because of fears that aid could be diverted to Al-Shabaab, a proscribed group under the US Patriot Act, and later imposed conditionality on any assistance (Ibrahim, 2010). In August 2010, FEWS NET released the first warning that drought was likely (FEWS NET, 2010). The subsequent failure of the October–December Deyr (short) rains resulted in extremely poor January harvests, an extended dry season and substantial pressure on local cereal prices. In March 2011, FEWS NET, FSNAU/FAO and WFP first raised the possibility of famine occurring in marginal cropping areas of southern Somalia (FEWS NET, 2011). The onset of the 2011 Gu rains, usually occurring from April to June, was then delayed by 3–4 weeks, resulting in a poor primary cropping season, reduced labor demand, excess livestock mortality, further increases in prices of local staple foods, and deterioration in food security, nutrition and mortality indicators. During the period, January–June 2011, refugee flows from Somalia to Kenya and Ethiopia increased substantially (UNHCR, 2011).

On 20 July 2011, based on joint FEWS NET and FSNAU/FAO analysis, the UN declared a famine in parts of Somalia (FSNAU and FEWS NET, 2011a); the declaration was extended to three additional areas on 3 August 2011 and to Bay Region on 5 September 2011 (FSNAU and FEWS NET, 2011a). Here we present the data collection methods, the nutrition, mortality and other data that led to the July and August declarations, compare the data with available baseline information and against established famine benchmarks, and assess whether the evidence supported a famine declaration.

2. Methods

During July 2011, FSNAU conducted 18 population-based, nutrition and mortality surveys in seven regions of southern Somalia (Bay, Bakool, Gedo, Hiran, Juba, Middle and Lower Shabelle) and in IDP settlements in Afgoye and Mogadishu that represent approximately 4.5 million people residing in the south of the country. The FSNAU has defined 5 main livelihood systems in Somalia; pastoral, agro-pastoral, riverine, coastal fishing and urban. These systems are further sub-divided into 33 livelihood zones (LHZ) based on agro-climatic characteristics, and the dominant production and marketing systems (FSNAU, 2012). A livelihood zone is defined as an area where households share broadly similar strategies for accessing food, income and markets. Each survey was representative of a livelihood zone within a region. For example, as Juba region consists of three LHZ (agro-pastoral, pastoral and riverine), 3 separate surveys were conducted in the region, one in each LHZ.

Survey teams carried out two-stage 30 cluster household surveys in all areas. Assuming a design effect of 1.5 for GAM and an average household size of 6, including 20% being children less than 5 years old, sample sizes ranging from 440 to 831 households were required to achieve a precision of at least ±4% around malnutrition prevalence levels similar to those found in previous surveys in the same location. The probability of selecting a given settlement as a cluster was proportionate to the estimated size of the settlement. The 2005 United Nations Development Program population estimates were used as a basis for the sampling frame and were adjusted at the district and settlement level using World Health Organization (WHO) estimates collected during National Immunization Days. Each survey was conducted by 6–8 teams, each consisting of 4 members. Because security limited the ability of UN staff to directly supervise the teams, members were recruited from the pool of staff of local non-governmental organizations (NGOs) and the Somalia Red Crescent Society, which had previously been trained by FSNAU in Standardized Monitoring of Relief and Transitions (SMART) survey methods (Golden et al., 2006). All teams received 3 days of pre-survey refresher training that covered household selection procedures, interviewing and measuring techniques, questionnaire content, and included development and adaptation of local events calendar as well as field testing of the questionnaire.

FSNAU teams recorded sex, age, height or length, weight, mid-upper arm circumference (MUAC) and presence or absence of bilateral pitting edema for all children aged between 6 and 59 months residing in randomly selected households. Weight and height were measured following standard procedures (Shorr, 1986). Weight was measured with digital Seca scales, accurate to 0.1 kg, and height (or recumbent length for children under 2 years of age) was measured with a Shorr Infant-Child Height Board accurate to 1 mm. Age was ascertained using the local events calendar. Due to security concerns and limited time available for field work, crude death rates (CDR) were measured using the current household census method with an abbreviated household mortality form, which only included information on the current size of the household and the number of deaths that occurred during a period defined by a memorable event occurring approximately 90 days before the survey. Security constraints did not permit age specific death rates (including deaths among children under 5) to be reliably collected.

z-Scores based on WHO, 2006 Growth Standards (WHO, 2006) were generated using the Epi Info/Emergency Nutrition Assessment (ENA) software. Acute malnutrition was categorized as global acute malnutrition (GAM, z-score < −2 and/or edema) and severe acute malnutrition (SAM, z < −3 and/or edema). Extreme outliers, defined as ±3 z-scores from the observed mean weight-for-height of the survey sample, were excluded from the analysis. Anthropometric data were analyzed using Epi Info/Emergency Nutrition Assessment software and mortality data using SAS version 9.2 (SAS Institute). 95% confidence intervals were generated around estimated mortality rates and prevalence of malnutrition taking into account cluster sampling design. These results were then compared with results of surveys conducted between 2007 and 2010, using similar SMART methods, in the same regions and livelihood zones. The data were subjected to rigorous quality checks using the ENA plausibility check module and to independent review by the Centers for Disease Control and Prevention (Moloney et al., 2011) and the SMART Technical Advisory Group. All survey data passed these quality checks, with the exception of two surveys conducted in Bakool. Therefore, the results of these two surveys were omitted from the analysis.

The proportion of households facing extreme food shortages was estimated using Household Economy methods (Boudreau et al., 2008) to assess the impact of crop and animal losses, increased food prices, reduced wages, and decreased livestock prices on household food access. For each livelihood zone in Somalia, baseline data were collected between 2003 and 2011 on food and income sources, expenditure patterns, asset holdings, seasonality, market access, and coping strategies. Focus group discussions with local residents were used to define poor, middle, and better-off wealth groups in terms of income and asset holdings. Taken together, these three information sources were used to create livelihood profiles for each zone. Next, data on crop harvests, livestock holdings, migration, household and market food supplies, and current coping strategies were collected.
through biannual national seasonal assessments, dry season impact assessments, and periodic updates from FSNAU/FEWS NET field analysts. This information was complemented by monthly assessments of food, water, and fuel prices, as well as reports on trade flows produced by a network of 80 FSNAU/FEWS NET market monitors based in Somalia and 6 FEWS NET/WFP/FAO market monitors stationed at ports and border crossings. To assess the prevailing level of household food access, these assessment and monitoring data were then analyzed within the context of the existing livelihood zone profiles described above. The impact of crop failure on household food consumption in a specific livelihood zone, therefore, depended not only on the magnitude of crop failure in that area, but also on the degree to which households in the affected zone relied on crop production for their own consumption, sales, or agricultural wage labor. Analysis focused on the 25–40% of households classified as “poor” as these households were most likely to be severely affected.

Data on 3 main variables were then compared against the criteria of the Integrated Food Security Phase Classification (IPC) for phase 5 (Famine) (FAO, 2008) Version 1.1 of the Integrated Phase Classification was the operative guidance at the time the famine was declared. The term famine is defined under the IPC system as follows:

1. At least 20% of households face extreme food shortages with limited ability to cope.
2. Global acute malnutrition prevalence must exceed 30%.
3. Crude death rates must exceed 2/10,000/day.

Other characteristics used to support the determination of famine include population displacement and disease outbreaks.

3. Results

All selected clusters were accessible to the survey teams. The prevalence of GAM, SAM, and CDR estimates, obtained from 16 surveys conducted in crisis-affected regions of southern Somalia, are presented in Table 1. In 11 of 16 surveys, the prevalence of GAM exceeded the IPC threshold for Phase 5 (Famine) of 30%. In 7 surveys, the prevalence of GAM exceeded 40%, and, in 2 surveys, it was higher than 50%. The prevalence of SAM was also extremely high—in 11 of 16 surveys it exceeded 15%, and, in Bay agro-pastoral zone, it was close to 30%. In all 16 surveys conducted in July 2011, CDR estimates exceeded 1 per 10,000 per day (the internationally accepted emergency threshold), although in 6 of these surveys CDR included 1.6 In 4 surveys, CDR exceeded 4 per 10,000 per day (four times the emergency threshold and twice the IPC threshold for Phase 5 (Famine)). By comparison, according to data obtained from 74 historical surveys performed between 2007 and 2010 (data not shown), “baseline” CDR for southern Somalia (calculated as a median of CDR estimates from 74 mortality surveys conducted in southern Somalia in 2007–2010) is 0.8 per 10,000 per day. GAM and SAM in some survey areas were highly clustered: design effect (DEFF) for GAM in 7 surveys was 0.8 per 10,000 per day. GAM and SAM in some survey areas were highly clustered: design effect (DEFF) for GAM in 7 surveys exceeded 3, and in 2 surveys exceeded 8. DEFF for CDR exceeded 2 in 4 surveys that had the highest CDR (exceeding 4/10,000/day).

The prevalence of GAM and SAM were highest in agro-pastoral livelihood zone of Gedo region, Riv is riverine livelihood zone of Juba region, IDP settlements in Shabelle region, also known as the Afgooye IDP settlement.

### Table 1

<table>
<thead>
<tr>
<th>Survey region and livelihood zone</th>
<th>N (children)</th>
<th>GAM, % (95% CI) DEFF</th>
<th>SAM, % (95% CI) DEFF</th>
<th>N (HH)</th>
<th>CDR, per 10,000 per day DEFF</th>
<th>CDR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Afgooye IDP</td>
<td>951</td>
<td>40.7 (34.5–47.2)</td>
<td>3.8</td>
<td></td>
<td>17.7 (13.4–22.9) 3.5</td>
<td>766 4.2 (3.2–5.3) 2.9</td>
</tr>
<tr>
<td>Bay agro-pastoral</td>
<td>456</td>
<td>55.0 (45.8–64.0)</td>
<td>4.0</td>
<td></td>
<td>29.8 (22.8–38.0) 3.0</td>
<td>616 1.1 (0.7–1.4) 1.0</td>
</tr>
<tr>
<td>Gedo agro-pastoral</td>
<td>834</td>
<td>51.9 (41.8–61.9)</td>
<td>8.3</td>
<td></td>
<td>19.3 (13.8–26.3) 5.0</td>
<td>531 1.7 (1.1–2.2) 1.1</td>
</tr>
<tr>
<td>Gedo pastoral</td>
<td>1078</td>
<td>23.8 (20.1–28.0)</td>
<td>2.3</td>
<td></td>
<td>5.9 (4.1–8.5) 2.3</td>
<td>608 1.2 (0.8–1.6) 1.1</td>
</tr>
<tr>
<td>Gedo riverine</td>
<td>642</td>
<td>48.1 (38.7–57.7)</td>
<td>5.5</td>
<td></td>
<td>25.2 (19.1–32.6) 3.7</td>
<td>386 1.6 (0.8–2.4) 2.0</td>
</tr>
<tr>
<td>Hiran agro-pastoral</td>
<td>535</td>
<td>43.2 (37.7–48.9)</td>
<td>1.6</td>
<td></td>
<td>16.3 (13.4–19.6) 1.0</td>
<td>655 1.5 (1.1–1.9) 1.0</td>
</tr>
<tr>
<td>Hiran pastoral</td>
<td>444</td>
<td>27.3 (24.2–30.6)</td>
<td>1.0</td>
<td></td>
<td>12.8 (10.5–15.6) 1.0</td>
<td>561 1.5 (1.1–2.0) 1.0</td>
</tr>
<tr>
<td>Hiran riverine</td>
<td>570</td>
<td>20.7 (18.4–23.2)</td>
<td>1.0</td>
<td></td>
<td>9.1 (7.2–11.5) 1.0</td>
<td>656 1.4 (1.0–1.7) 1.0</td>
</tr>
<tr>
<td>Juba agro-pastoral</td>
<td>825</td>
<td>38.9 (34.8–43.1)</td>
<td>1.3</td>
<td></td>
<td>17.2 (14.0–20.9) 1.7</td>
<td>700 1.1 (0.8–1.4) 1.0</td>
</tr>
<tr>
<td>Juba pastoral</td>
<td>868</td>
<td>39.5 (35.9–43.2)</td>
<td>1.2</td>
<td></td>
<td>18.7 (15.8–21.9) 1.3</td>
<td>781 1.2 (0.8–1.7) 1.3</td>
</tr>
<tr>
<td>Juba riverine</td>
<td>868</td>
<td>45.9 (41.5–50.3)</td>
<td>1.5</td>
<td></td>
<td>21.9 (18.9–25.2) 1.2</td>
<td>631 1.2 (0.8–1.5) 1.0</td>
</tr>
<tr>
<td>L Shabelle agro-pastoral</td>
<td>799</td>
<td>40.6 (34.6–46.8)</td>
<td>3.1</td>
<td></td>
<td>20.9 (16.2–26.5) 3.1</td>
<td>614 4.2 (2.9–5.5) 3.5</td>
</tr>
<tr>
<td>L Shabelle riverine</td>
<td>804</td>
<td>28.7 (24.4–33.5)</td>
<td>1.9</td>
<td></td>
<td>14.2 (11.6–17.3) 1.3</td>
<td>613 5.9 (4.3–7.6) 4.0</td>
</tr>
<tr>
<td>M Shabelle agro-pastoral</td>
<td>590</td>
<td>53.3 (47.9–47.3)</td>
<td>8.4</td>
<td></td>
<td>17.1 (10.3–27.1) 7.0</td>
<td>578 2.3 (1.7–2.9) 1.3</td>
</tr>
<tr>
<td>M Shabelle riverine</td>
<td>746</td>
<td>19.6 (16.4–23.2)</td>
<td>1.0</td>
<td></td>
<td>8.2 (5.7–11.6) 2.1</td>
<td>574 1.7 (1.1–2.3) 1.8</td>
</tr>
<tr>
<td>Mogadishu IDP</td>
<td>870</td>
<td>39.4 (32.4–46.9)</td>
<td>4.6</td>
<td></td>
<td>15.3 (11.6–19.8) 2.7</td>
<td>735 4.3 (3.2–5.4) 2.6</td>
</tr>
</tbody>
</table>

* Design effect.
observed during 2007–2009. In 2011, the prevalence of SAM was similar to or higher than prevalence of GAM in 2007–2010. Prevalence of GAM, SAM and CDR by geographical region of southern Somalia is mapped in Fig. 2.

The failure of the 2010 rains resulted in a Deyr-season cereal harvest of only 17,900 MT—19% of the 1995–2009 Post-War Average (FSNAU, 2011a). In addition to reducing household stocks and market supplies, the failure of the harvest drove up local cereal prices. For example, in the year leading up to the July 2011 Famine declaration, sorghum prices more than tripled in Baidoa and maize prices more than doubled in Qorioley. The physical condition of livestock and their value also dropped substantially. Changes in key terms of trade (ToT) from selected markets in southern Somalia during the period June 2010 through June 2011 are summarized in Fig. 3. In Baidoa, Qorlioley, Afmadow, and Bardhere, the value of livestock dropped between 63% and 83% during the year. The cereal equivalent of daily labor wages declined between 43% and 75% during the same period. Livelihoods analysis conducted by FEWS NET and FSNAU suggested that during the months leading up to the Famine declaration, rain failure, reduced income, and substantial increases in staple food prices, a heavy reliance on rainfed agriculture, wage labor, food purchases, and limited coping capacity, resulted in severe household food deficits in agro-pastoral zones. In Middle and Lower Shabelle, Bay, and Bakool, where humanitarian access was most limited, poor households were only able to access 40–60% of the food required for survival. Given that this group represents 24% and 40% of all households in southern Somalia, we determined that these deficits in food access exceeded the IPC threshold for Phase 5 (Famine). We present a summary of livelihoods analysis and estimated food deficits for poor households in four illustrative livelihood zones of southern Somalia in Table 2.

Fig. 2. Prevalence of GAM, SAM and CDR by region, southern Somalia, July 2011 (FSNAU, 2011b).
3.1. Comments

Based on the results described, as of late July 2011, all IPC criteria for phase 5 (Famine) were met in parts of southern Somalia: prevalence of GAM was consistently higher than 30%; CDRs were greater than 2/10,000/day in five locations; and, more than 20% of households in agro-pastoral areas and IDP settlements of the south faced severe food shortages. Furthermore, massive population displacement from Somalia to Ethiopia and Kenya occurred (OCHA, 2011), and large scale measles and cholera outbreaks were confirmed in Mogadishu and southern Somalia (WHO, 2011). In short, a famine occurred in parts of southern Somalia in 2011. Other famine frameworks, such as that proposed by Howe and Devereux (2004), include measures of severity of famine; by these criteria the situation in Somalia met ‘famine conditions’ but did not meet all the criteria simultaneously for ‘extreme famine conditions.’ As of late July 2011, many of the pre-conditions (such as poor access to safe water, low immunization rates, poor access to health care) necessary for an additional, very rapid, rise in mortality rates were still present. Historically, mortality rates during prolonged and severe famines only begin to rise dramatically once large scale outbreaks of infectious diseases occur (Salama et al., 2001). Of particular concern was a likely rise in incidence of cholera and malaria after the onset of the rainy season in October. Large outbreaks of measles had already occurred in Somalia and among Somali refugee populations in camps in Ethiopia and Kenya (Kamadjeu et al., 2011). Additionally, a small number of cases of Shigella had been detected among Somali refugees in Kenya, adding to the risk of potential outbreaks and additional mortality among the affected population. Furthermore, other indicators of a prolonged and severe famine (Collins, 1993), such as an increased prevalence of acute malnutrition in older children, adolescents and adults, were already present. Médecins Sans Frontières (MSF), for example, reported that up to 30% of those admitted to therapeutic feeding centers were children between the ages of 5 and 10 years (Personal communication, MSF, 18 August). In fact, over the following 2 months, mortality in Somalia did not reach the levels seen in parts of the country during the 1991–1992 famine or in the other severe famines in the region (CDRs between 10 and 15 deaths/10,000/day) (Salama et al., 2004). Instead, levels of mortality leveled off, rising only in Bay Region where famine was declared on 5 September (FSNAU and FEWS NET, 2011b). Though response in the weeks following the initial famine declaration was constrained by a combination of security, funding, logistic and political factors, when it did ramp up, it was “proportionate and appropriate” (Darcy et al., 2012), used innovative market-based interventions, like cash and vouchers, to mitigate access constraints, included a significant health component, and, in combination with dramatic declines in local cereal prices, and an excellent October–December rainy season, led to an easing of famine in early 2012.

Much progress has been made in recent years in standardizing assessment and survey methods for estimating prevalence of malnutrition and mortality rates in emergencies. In the 1991–1992 Somali famine, Boss et al. (1994) highlighted the lack of
standardization of survey methods as a major barrier to making an objective assessment of the humanitarian situation; similar findings have been observed in other famines (Spiegel et al., 2004). The surveys mentioned here all used SMART methods (Golden et al., 2006) for sample selection and for anthropometry, which includes prior testing of the accuracy and precision of the team's measurements, rigorous data quality checks, and standard analysis and presentation of the data. The interpretation is strengthened by having historical data collected from the same locations at identical times in the agricultural calendar and by the technical review described above. Similarly, the use of Household Economy method provides an example of the improvements in household food security analysis that have occurred in the last 20 years.

However, nutrition and mortality data were collected in highly insecure areas at a time of active conflict. For this reason, the amount of data collected was kept to a minimum and, in particular, collection of information that could be misinterpreted by combatants, such as data on migration were not gathered. Furthermore, the intention was for the data to be collected, analyzed and provided to humanitarian organizations with minimal delay. There are, therefore, several limitations. First, given that a population census has not been carried out in Somalia since 1975 (Mukungu, 2012) and the uncertainties around the sampling frame due to extensive, recent, distress migration, we cannot rule out the possibility of selection bias. In addition, the mortality rates were derived using the current household census method; the denominator (person-days at risk of death) was therefore not adjusted for migration out of, or into, the household during the recall period and births were not recorded. However, there are several factors that provide confidence in the results. First, the 2005 UNDP population data were adjusted with more recent WHO estimates from immunization records. Second, data from other sources, including feeding center data on admissions as well as data from surveys carried out in refugee camps in surrounding countries, have led to similar conclusions as to the severity of the situation. Third, the effect of the change in denominator is likely to be in the opposite direction for the IDP camps (household members arriving) than for some of the other survey areas (household members leaving). Fourth, the large number of survey sites across the country, allows us to capture aggregate data over a wide region thus mitigating the impact of internal displacement on the findings. However, we cannot rule out the possibility that mortality rates and malnutrition prevalence are underestimated because many of the most destitute families may have migrated out of Somalia altogether or may all have died during the famine and consequently could not have been available for selection. Mortality rates may also be overestimated if the most destitute families remained and were assessed whereas better-off households migrated out of affected areas. Recall bias is also an important limitation in any retrospective study of mortality. For this reason, the study period was limited to a period defined by a memorable event, occurring approximately 90 days before the survey. Finally, clustering of the key indicators in several survey areas was higher than initially expected; this resulted in higher design effects and wider confidence limits than initially predicted, especially for GAM estimates. However, since the prevalence of GAM was very high in all surveys areas, the wider than expected confidence intervals seen in a few surveys did not have

### Table 2


<table>
<thead>
<tr>
<th>Location</th>
<th>Proportion of households classified as “poor”</th>
<th>Sources of food for the poor households</th>
<th>Relative importance of food source (% of minimum food basket in the baseline year)</th>
<th>Change in 2010/11 compared to baseline year</th>
<th>Likely impact on April-June 2011 food access</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bakool Agro-pastoral</td>
<td>40%</td>
<td>Own crop production 25%</td>
<td>90% decline in crop production</td>
<td>Poor households only able to access 50–60% of food needed for survival</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Purchases funded by wage labor 25%</td>
<td>50% decline in wage:sorghum ToT</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Purchases funded by livestock sales 25%</td>
<td>87% decline in goat:sorghum ToT</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other* 25%</td>
<td>Net decline likely</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bakool Agro-pastoral Low Potential</td>
<td>35%</td>
<td>Own crop production 60%</td>
<td>90% decline in crop production</td>
<td>Poor households only able to access 40–50% of food needed for survival</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Purchases funded by wage labor 10%</td>
<td>60% decline in wage:sorghum ToT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L. Shabelle Riverine</td>
<td>38%</td>
<td>Other 30%</td>
<td>Net decline likely</td>
<td>Poor households only able to access 40–50% of food needed for survival</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Own crop production 75%</td>
<td>66% decline in crop production</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L. Shabelle Agro-pastoral</td>
<td>24%</td>
<td>Purchases funded by crop sales 15%</td>
<td>50% decline in wage:maize ToT</td>
<td>Poor households only able to access 50–60% of food needed for survival</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Purchases funded by wage labor 10%</td>
<td>50% decline in wage:maize ToT</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Own crop production 55%</td>
<td>66% decline in crop production</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Purchases funded by wage labor 15%</td>
<td>50% decline in wage:maize ToT</td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Purchases funded by livestock and livestock product sales 10%</td>
<td>40% decline in income from milk cattle:maize ToT</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other 20%</td>
<td>Net decline likely</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Depending on the livelihood zone, this includes gifts, remittances, and purchases funded by wage labor, self employment (e.g., charcoal production), or crop and livestock sales.
substantial impact on the interpretation of results. In the future, increasing the number of clusters and decreasing the number of survey subjects per cluster would help in decreasing DEFF in the areas where high heterogeneity of outcome distribution is expected.

4. Conclusion

A famine occurred in parts of Somalia in 2011. We believe that the trends, demonstrating that a significant food security crisis would occur in Somalia, were clear from late 2010. Furthermore, our findings illustrate the enormous strides that have been made in designing early warning systems, standardizing technical assessments and surveys, and improving the response to humanitarian crises since the Somali famine 20 years ago. The more than 20 years of investment by donors in FEWS NET and FSNAU provided strong baseline data, usually not available in such humanitarian crises, that enabled monitoring of the worsening trends using relatively consistent methods and the ability to interpret the data more easily.

However, the findings also raise the question of why the early warning signs and strong evidence available in 2010/2011 did not trigger an earlier, better funded and more effective, large scale warning. A recent Real Time Evaluation of the response to the emergent crisis in Somalia in late 2010 and early 2011... While many external factors made early action difficult, including major constraints on funding and access, the responsible mechanisms of the humanitarian system to respond in a timely fashion... did not function as well as they should have done to ensure the necessary change of strategy at the time required, in spite of the weight of early warning evidence available to them” (Darcy et al., 2012).

In order to prevent famine in the future, a next important step for the international community is to ensure a clearer and more robust link between evidence and accountability for action in humanitarian response as well as to support longer term measures that improve the resiliency of the civilian population. These challenges are dealt with in more depth elsewhere in this issue (Lautze et al., this issue; Hillbruner and Moloney, this issue; Menkhaus, this issue).

Disclaimer

The views expressed in this manuscript are those of the individuals authors and do not necessarily reflect those of the institutions that they represent.

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