

MERIAM formative research to inform modelling specifications

Background

Modelling Early Risk Indicators to Anticipate Malnutrition (MERIAM) is a research initiative by Action Against Hunger (ACF) to strengthen anticipatory capabilities in the nutrition security field. MERIAM constitutes an innovative approach to forecast acute malnutrition prevalence rates and caseloads using statistical modelling techniques. It is implemented in the Horn of Africa across four pilot countries – Ethiopia, Kenya, Somalia and South Sudan – with the aim of enhancing the capabilities of humanitarian actors and governments to implement effective, evidence-based anticipatory actions in response to climate- and conflict-related shocks.

The current work builds on earlier research assessing the viability of reliably forecasting acute malnutrition prevalence rates with forecast horizons of up to 12 months down to the first administrative level (cf. [Backer & Billing, 2024](#); for a full list of publications, check [here](#)). Building on this successfully tested prototype, the current work seeks to extend the granularity of forecasts. In particular, the present work seeks to broaden the scope and provide more insights (e.g. down to lower administrative levels or considering specific outcomes) on trends and burden of acute malnutrition to increase the operational applicability and relevance of the forecasts. Providing such forecasts also requires access to much more granular data to feed into custom-built models that consider the data availability and requirements of specific country contexts.

To ascertain that model forecasts will match the requirements of operational partners, Action Against Hunger engaged in an in-depth formative research process across the four pilot countries to gauge preferences and requirements. This report details the methods employed and resulting findings. The conclusion reflects on how these findings inform the next steps in refining MERIAM models, including customization and testing of operational pilots.

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Methods

To inform the development and application of MERIAM models and forecasts, formative research interviews were conducted with 55 participants from five stakeholder category across the four countries. The semi-structured interviews lasted between 1 – 1.5 hours. A single trained interviewer conducted all interviews to minimize bias and maintain consistency. Care was taken to allow participants to freely express their views and experiences, enabling the capture of a diverse set of perspectives. Interviews were recorded with participants' consent to allow accurate transcription and analysis.

Participants were purposefully selected based on their relevance to the project's aims and their thematic expertise in food security, nutrition and anticipatory action. The selection process aimed to ensure a balance of perspectives from different organizational backgrounds. Table 1 provides an overview of the respondent profiles. The gender of respondents was not captured.

Table 1: *Number of stakeholders per category by country*

	ETH	KEN	SSD	SOM	Total
Government organizations ¹	4	4	6	3	17
NGO	5	5	6	3	19
UN	2	2	6	1	9
Data Stakeholders	1	4	-	2	7
Clusters	1	-	-	-	1
Total	13	15	18	9	55

¹ Government organizations comprised ministries, commissions, agencies and institutes

Participants selection covered diverse roles, including managing emergency responses, serving as nutrition focal points in health ministries, and leading data collection and analysis efforts. Other participants specialize in technical coordination and oversee food security and livelihood initiatives.

Following interviews, each country office undertook an analysis of responses involving descriptive analysis of quantitative measures and coding and thematic analysis of qualitative data to identify key themes and patterns. Excel, NVivo, and R were used for organizing and analysing the data.

Informed consent was obtained from all participants. A briefing was conducted at enrolment to ensure all potential participants understood the purpose of the research and their right to withdraw at any time without consequence. Throughout the research process, confidentiality and anonymity were prioritized, with data reported in aggregate form to protect individual identities.

Whilst the research sought to capture a diverse range of perspectives. The number of respondents per country ranged from 9 in Somalia to 18 in South Sudan. Despite careful measures to ensure objectivity, there is a possibility that some participants may have provided socially desirable responses rather than objective feedback. Language barriers were another consideration; despite efforts to conduct interviews in participants' preferred languages (Amharic, Swahili, Somali in addition to English) subtle nuances may have been lost in translation.

Results

The questionnaire was structured in several subsections, each of which sought to capture specific elements of interest. The first section sought to capture views on stakeholders' information needs for addressing acute malnutrition. It gathered details on early warning systems they currently rely on, as well as the strengths and shortcomings these information resources. The second section delved deeper into the desired features of forecasts. The third section explored how stakeholders would be able to apply forecasts in their planning and operations to better address acute malnutrition. The results are organized around these thematic areas and presented following sections.

Information needs and current practice

Overall, 89% of respondents confirmed participating in existing analytical processes (such as the IPC, FSNAU and FEWS analyses and the Food Security and Nutrition Monitoring System (FSNMS)), indicating that data-driven decision-making is generally deemed important. For example, IPC's consensus-building approach and consideration of available evidence, including the reliability scoring process, was described as technically reliable and globally accepted. It is deemed a valuable source of information for sector preparedness and response planning, particularly in guiding projections and estimating caseloads – even though it was observed that coverage is not universal, and the frequency of updates could be improved.

In addition to these analytical processes, several data sources were flagged as important. These included SMART surveys, demographic and health information surveys, household economic surveys, CMAM/IMAM programme data, CFSAM, climate outlook data (provided for example by ICPAC), displacement data (DTM, REACH) and information provided in humanitarian needs overviews and response plans.

Participants also provided insights on additional information resources which the project team should consider. These included KAP Surveys, Rapid Nutritional Assessments (RNA), Nutrition Vulnerability Analysis (NVA), Nutrition Causal Analysis (NCA), DHS, and FEWSNET among others.

Limitations of the existing information sources

Stakeholders flagged several weaknesses of existing information resources and challenges in utilizing them. These included questions about the quality of available data and ability to access information in a timely manner. The absence of a centralized information system and limited coverage of existing information systems leading to data gaps were observed as additional challenges. Data is sometimes not disaggregated to lower geographical areas or granular raw data is difficult to access for those who receive information outputs.

Regarding concerns about the quality of data and information resources, a representative from the South Sudan National Bureau of Statistics observed that “Our data systems are fragmented, which makes it difficult to track and respond to emerging issues efficiently,” while an officer from the Ministry of Health highlighted issues with sample sizes and representativeness, stating, “The sample sizes are often too small to be reliable, and there are problems with extrapolation, making it hard to apply findings across regions.” Infrequent updates of data were also cited as a challenge, as a UN agency representative explained, “The information is outdated by the time we get it, so it’s hard to make timely decisions.”

Other concerns related to inconsistencies in data arising from the use of varying methodologies employed in data collection and to biases that can arise due to individual interests. In Somalia, it was observed that indicators on preventive measures related to infant and young child feeding practices, as well as the nutritional status of pregnant and lactating mothers are not sufficiently captured.

Opportunities for improvement

When asked what they would change about existing early warning systems for acute malnutrition, some stakeholders highlighted the need for improved coordination and awareness-raising efforts and the importance of linking forecasting mechanism to mobilization of necessary resources for effectively managing acute malnutrition.

Stakeholders also highlighted the necessity of integrating nutrition-sensitive early warning indicators with food security monitoring to provide a comprehensive view of the situation. They called for the development of community-level frameworks that facilitate early action based on warning signals. One participant mentioned the need for digitalization of data collection processes to improve real-time reporting and accessibility. Moreover, they suggested creating awareness within communities about the importance of early warning systems and establishing alarm systems to prompt timely interventions. Strengthening capacity of government staff was also proposed.

A consideration of multi-sectoral nature and interlinkages of hazards was also emphasized, including agricultural, water and sanitation, health, and educational data, to create comprehensive understanding of malnutrition risks. According to one participant, the ideal information resource should include "a comprehensive repository of real-time data on food security and nutrition indicators" to ensure timely and effective interventions. Others echoed this need, highlighting the importance of "integrating data across sectors to provide a holistic view of the food security situation" and stressing that "a user-friendly interface for accessing and analysing data is crucial for field-level decision-making and coordination." The participants collectively agreed that the ideal information resource should facilitate "efficient data sharing and collaboration among various stakeholders to enhance the effectiveness of response efforts" (WFP, UNICEF, FAO).

Desired features of forecasts

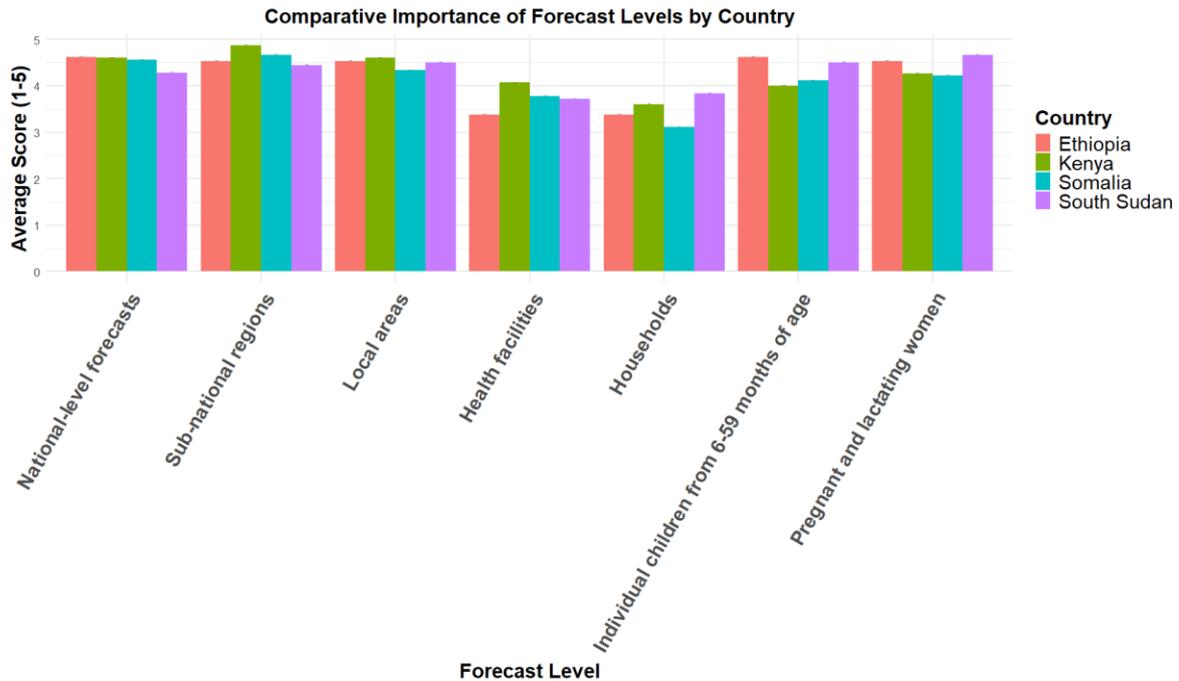
Desired features of forecasts were captured on a variety of aspects: general aspects, forecast levels/granularity, frequency of forecast updates, whether forecasts should be made for a specific month or a period of months, and how far out projection horizons should go.

In general, most outlined aspects of forecasts were deemed important, with clarity of information provided, regularity of updates, and timeliness of the information shared deemed the top three priorities. Figure 2 illustrates this in more detail. The overall feedback suggests that while each feature is critical, a balanced approach addressing all aspects is essential for the tool's effectiveness.

Table 2: Average scores of importance of features in forecasts, from 1 (unimportant) to 5 (very important) by country

Features of forecasts	ETH	KEN	SOM	SSD	Overall
The information that the forecast provides is clear to comprehend.	4.7	5.0	4.8	4.6	4.8
The forecast appears to be logical (intuitive) for the context.	4.5	4.8	4.1	4.4	4.5
The forecast is timely (available early enough to be useful).	5.0	5.0	4.1	4.4	4.7
The forecast is precise (pinpoints where and when an outcome will occur).	4.7	4.8	4.3	4.6	4.6
The forecast is updated on a regular and frequent basis.	4.7	4.9	4.2	4.6	4.7
Information about risk factors linked to the outcome(s) is supplied with the forecast.	4.5	4.8	4.4	4.7	4.6
I trust the input data which has gone into generating the forecast.	4.3	4.9	4.2	4.4	4.5
I understand the methodology of how the forecast was generated.	4.2	4.5	4.2	4.3	4.3
I trust that the forecast is dependable.	4.4	4.9	4.7	4.3	4.5
The forecast has a high degree of certainty.	4.3	4.7	4.4	4.2	4.4
The forecast is delivered to the organization in an appealing format.	4.2	4.3	4.0	4.1	4.2
The forecast is suitable for the requirements of the organization.	4.4	4.7	4.4	4.4	4.5

Regarding forecast levels, forecasts that cover different subnational levels and local areas, alongside the ability to generate national-level aggregates were deemed most important. There was also strong interest in forecasts that relate to pregnant/lactating women and children under 5 (individual-level forecasts). Less of a priority overall were forecasts that relate to households or health facilities, though notably forecasts for health facilities were deemed consistently relevant by the Ministries of Health in all four countries as well as various NGOs.



The most favoured projection periods were forecasts that look 3-6 months ahead, with 6 months horizons being the most favoured option in South Sudan and Ethiopia. In Somalia, the preferred option is 12 months in advance. In Kenya, an even number of respondents favoured forecasts 3 and 6 months ahead.

Quarterly updates were the most desired option, with some actors preferring more frequent (monthly) or less frequent (semi-annual) updates. There was a clear preference for forecasts to cover a period of multiple months (preferred by 85% of respondents) as opposed to a specific month.

A wide variety of channels was mentioned as preferred channels for receiving forecasts, including policy briefs, online platforms, regularly published updates, newsletters, websites, webinars, local radio stations, conferences, meetings, etc. Integrating forecasts into intersectoral working groups was also deemed key by respondents.

Opportunities to apply forecasts

Overall, forecasts are valued for enhancing "evidence-based decision-making" and optimizing resource use. Their applications range from emergency planning and program design to advocacy, resource mobilization, allocation, and prioritization. Forecasts are seen as playing a critical role in improving outcomes for vulnerable populations and achieving sustainable progress in addressing malnutrition globally.

In Ethiopia, 7 out of 13 participants indicated an interest to incorporate MERIAM forecasts into their analysis, planning, and decision-making processes. The integration of MERIAM forecasts into existing planning processes, including those led by OCHA, is thought to offer great potential to enhance early warning information, better anticipate needs and undertake proactive responses. Forecasts can also help determine the number of potential beneficiaries and are thus vital for intervention planning.

In South Sudan, respondents indicated that MERIAM forecasts could be used as an information resource to support planning, for advocacy and proposal development, aiding evidence-based decision-making and complementing IPC analysis and FSNMS with the potential to provide additional data layers for the HNO process and NAWG classification. MERIAM could fill gaps in areas where there is no reliable data for the IPC process and aid in overall projections. Its impact could be further enhanced through integration with health services like EPI and ANC programs and disaster management, according to officials. Overall, respondents thought that integrating MERIAM could significantly strengthen analysis, planning, and decision-making processes across various sectors by providing more reliable and timely information.

Several respondents indicated that capacity building would be necessary to effectively utilize forecasts for acute malnutrition. In Ethiopia, five participants highlighted that building capacity in forecasting, anticipation, and effective utilization is crucial due to existing gaps in experience. In Kenya, the main capacity-building needs related to analysis skills, interpretation, and utilization of forecasts, understanding methodologies and context, operationalization of forecasts. In Somalia, 6 out of organizations consulted confirmed the necessity of training programs aimed at enhancing skills in analysis and usage of forecasts.

Conclusions and Outlook

Overall, the findings of the formative research affirmed the importance of data-driven decision-making. Whilst 9 out every 10 respondents confirmed participating in existing analytical processes, stakeholders flagged several weaknesses of existing information resources and challenges in utilizing them. Whilst a lot of data is available, not always are mechanisms in place to connect the dots and provide actionable insights. A further challenge relates to how forecasting capacities are linked to the mobilization of necessary resources to act before a crisis manifests or its peak impact is felt.

The formative research also rendered valuable insights into the priority features that forecasts of acute malnutrition should offer. Clarity of information provided, regularity of updates, and timeliness of the information shared were deemed the top three priorities. But other aspects, such as precision in pinpointing where an outcome will occur, linking

information about risk factors to the outcome(s) supplied by the forecast, transparency around methodologies and conveying information in an appealing format that matches requirements of receiving organizations, also carry significant weight. Another important aspect is the quality of data which has gone into generating the forecast.

Forecasts that cover different subnational levels and local areas, alongside the ability to generate national-level aggregates were deemed most important. There was also strong interest in forecasts that relate to individuals (pregnant / lactating women and children under 5). Furthermore, forecasts for health facilities were deemed consistently relevant by the Ministries of Health in all four countries as well as by various NGOs.

The most favoured projection periods were forecasts that look 3-6 months ahead and the vast majority (85%) of respondents prefers forecasts that cover a period of multiple months, as opposed to a specific month. In terms of update frequency, different preferences were voiced, with quarterly the most desired option, whereas some actors prefer more frequent (monthly) or less frequent (semi-annual) updates.

A wide range of possible applications of forecasts were proposed, some of which link directly to enhancing capabilities for anticipatory actions, whilst others aim at improving evidence-based programming decisions, supporting better preparedness and aiding resource allocation decisions. Some respondents pointed out the potential for MERIAM forecasts to complement existing early warning capacities, such as those provided by IPC, FEWS NET and FSNAU, including the potential to step in where there are critical data gaps to improve overall projections.

In terms of outlook, the formative research has helped the project team to better understand stakeholder requirements, supporting the subsequent formulation of use case applications of MERIAM forecasts that will be piloted through 2025. Consultations that build upon the formative research findings and engage consulted stakeholders in the further elaboration of pilot planning took place throughout the second half of 2024. The formative research highlighted that a “one-size-fits-all” approach cannot be taken even at the individual country level and that the modelling process needs to address several outcome levels (prevalence rates, admissions) as well as distinct projection horizons adjusted to the needs of different stakeholders. It is thus expected that several variations of model forecasts will be generated in support of the various pilots, creating an opportunity to test the utility of different solutions and ultimately consolidate those that prove most useful to the humanitarian community and government counterparts.