

Research Terms of Reference

Livelihood coping assessment, Somali region.

ETH2305

Ethiopia

[October 2023]

[V1]

REACH Informing
more effective
humanitarian action

1. Executive Summary

| | | | | | | |
|---|---|--|--------------------------|--|-------------------------------------|-----------------|
| Country of intervention | Ethiopia | | | | | |
| Type of Emergency | <input checked="" type="checkbox"/> | Natural disaster | <input type="checkbox"/> | Conflict | <input type="checkbox"/> | Other (specify) |
| Type of Crisis | <input type="checkbox"/> | Sudden onset | <input type="checkbox"/> | Slow onset | <input checked="" type="checkbox"/> | Protracted |
| Mandating Body/ Agency | iMMAP (back donor: ECHO) | | | | | |
| IMPACT Project Code | 29FPM | | | | | |
| Overall Research Timeframe (from research design to final outputs / M&E) | 28/08/2023 to 31/12/2023 | | | | | |
| Research Timeframe | 1. Pilot/ training: 08/11/2023 - 10/11/2023 | | | 6. Preliminary presentation: 22/12/2023 | | |
| | 2. Start collect data: 13/11/2023 | | | 7. Outputs sent for validation: 18/12/2023 | | |
| | 3. Data collected: 01/12/2023 | | | 8. Outputs published: 31/12/2023 | | |
| | 4. Data analysed: 11/12/2023 | | | 9. Final presentation: 29/12/2023 | | |
| | 5. Data sent for validation: 15/12/2023 | | | | | |
| Number of assessments | <input checked="" type="checkbox"/> | Single assessment (one cycle) | | | | |
| | <input type="checkbox"/> | Multi assessment (more than one cycle) [Describe here the frequency of the cycle] | | | | |
| Humanitarian milestones Specify what will the assessment inform and when e.g. The shelter cluster will use this data to draft its Revised Flash Appeal; | Milestone | | | Deadline (can be tentative) | | |
| | <input checked="" type="checkbox"/> | Donor plan/strategy | | 21/12/2023 | | |
| | <input type="checkbox"/> | Inter-cluster plan/strategy | | --/--/---- | | |
| | <input type="checkbox"/> | Cluster plan/strategy | | --/--/---- | | |
| | <input type="checkbox"/> | NGO platform plan/strategy | | --/--/---- | | |
| | <input type="checkbox"/> | Other (Specify): | | --/--/---- | | |

| Audience Type & Dissemination | Audience type | Dissemination |
|---|--|---|
| Specify who will the assessment inform and how you will disseminate to inform the audience | <input checked="" type="checkbox"/> Strategic <input checked="" type="checkbox"/> Programmatic <input checked="" type="checkbox"/> Operational <input type="checkbox"/> [Other, Specify] | <input type="checkbox"/> General Product Mailing (e.g. mail to NGO consortium; HCT participants; Donors) <input checked="" type="checkbox"/> Cluster Mailing (Education, Shelter and WASH) and presentation of findings at next cluster meeting <input checked="" type="checkbox"/> Presentation of findings (e.g. at HCT meeting; Cluster meeting) <input type="checkbox"/> Website Dissemination (Relief Web & REACH Resource Centre) <input type="checkbox"/> [Other, Specify] |
| Stakeholder mapping Has a detailed stakeholder mapping been conducted during research design to identify all actors that could contribute to and/or benefit from the research? | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No |
| General Objective | This study aims to examine the current livelihood situation in the Somali region, emphasizing the impact of drought on livelihood conditions, to guide humanitarian actors in making informed decisions focusing on food security, livelihoods, essential services, and humanitarian assistance needs. | |
| Specific Objective(s) | <ol style="list-style-type: none"> 1. Evaluate the current impact of drought on households' access to food, including food availability, access, and utilization, 2. Examine how drought affects households' livelihoods, including income sources, employment opportunities, and asset sustainability. 3. Assess the current impact of drought on households' access to basic services, such as water encompassing experiences of water insecurity, sanitation, health, and nutrition. 4. Determine the specific needs of households for humanitarian assistance in the context of drought, including emergency relief and long-term support. 5. To investigate the severity and extent of drought across Somali region using remote sensing analysis. | |
| Research Questions | <ol style="list-style-type: none"> 1. What is the current livelihood situation of households in the Somali region, especially in the context of drought and other contributing factors? | |

| | | | | |
|---|---|---|-------------------------------------|---|
| | <p>2. <i>How has drought affected the livelihoods of households in the Somali region, in terms of income sources, employment opportunities, and asset sustainability?</i></p> <p>3. <i>In what ways has drought impacted households' food security, particularly regarding food availability, access, and utilization?</i></p> <p>4. <i>How has the drought affected households' access to essential services, encompassing water, sanitation, health, and nutrition?</i></p> <p>5. <i>What are the specific needs of households concerning humanitarian assistance due to drought? Are they more in need of immediate relief or long-term support?</i></p> <p>6. <i>Using remote sensing analysis, how extensive and severe is the drought across the Somali region?</i></p> | | | |
| Geographic Coverage | 9 administrative zones of Somali region. This will involve data collection from Afder, Dawa, Doollo, Erer, Fafan, Jarar, Korahay, Liban and Nogob zones of the Somali region. | | | |
| Secondary data sources | UN OCHA situation reports WFP Emergency Food Security Assessments IOM Displacement Tracking Matrix (DTM) ACAPS Ethiopia Thematic Reports Somali Region 2023 Gu/Belg Seasonal Assessment Report REACH, AFP SMART+ Report Academic articles FEWS NET Ethiopia reports | | | |
| Population(s) <i>Select all that apply</i> | <input type="checkbox"/> | IDPs in camp | <input checked="" type="checkbox"/> | IDPs in informal sites |
| | <input checked="" type="checkbox"/> | IDPs in host communities | <input type="checkbox"/> | IDPs [Other, Specify] |
| | <input type="checkbox"/> | Refugees in camp | <input type="checkbox"/> | Refugees in informal sites |
| | <input type="checkbox"/> | Refugees in host communities | <input type="checkbox"/> | Refugees [Other, Specify] |
| | <input checked="" type="checkbox"/> | Host communities | <input type="checkbox"/> | [Other, Specify] |
| Stratification <i>Select type(s) and enter number of strata</i> | <input checked="" type="checkbox"/> | Geographical #:9 administrative zones Population size per strata is known? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | <input checked="" type="checkbox"/> | Group #: 2 population groups by displacement status (host and IDPs) Population size per strata is known? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |
| | | | <input type="checkbox"/> | [Other Specify] #: _ _ Population size per strata is known? <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Data collection tool(s) | <input checked="" type="checkbox"/> | Structured (Quantitative) | <input type="checkbox"/> | Semi-structured (Qualitative) |
| | Sampling method | | Data collection method | |
| | | | | |

| | | | | | | |
|--|--|--|---|--------------------------------|--------------------------|------------------|
| Structured data collection tool Household Survey <i>Select sampling and data collection method and specify target # interviews</i> | <input type="checkbox"/> Purposive <input type="checkbox"/> Probability / Simple random <input type="checkbox"/> Probability / Stratified simple random <input type="checkbox"/> Probability / Cluster sampling <input checked="" type="checkbox"/> Probability / Stratified cluster sampling <input type="checkbox"/> [Other, Specify] | | <input type="checkbox"/> Key informant interview (Target #):_ _ _ _ - <input type="checkbox"/> Group discussion (Target #):_ _ _ _ _ <input checked="" type="checkbox"/> Household interview (Target #): 2687 (1302 for host communities and 1385 for IDPs) <input type="checkbox"/> Individual interview (Target #):_ _ _ _ _ <input type="checkbox"/> Direct observations (Target #):_ _ _ _ <input type="checkbox"/> [Other, Specify] (Target #):_ _ _ _ _ | | | |
| Target level of precision if probability sampling | 95% level of confidence | | 10+/- % margin of error | | | |
| Disaggregation by gender and age <i>Are you planning to conduct sex/age disaggregated analysis?</i> | Gender | | Age | | | |
| | X | Yes | <input type="checkbox"/> | Yes | | |
| | <input type="checkbox"/> | No | X | No | | |
| Data management platform(s) | X | IMPACT | | <input type="checkbox"/> UNHCR | | |
| | <input type="checkbox"/> | [Other, Specify] | | | | |
| Expected output type(s) | X | Situation overview #: 01 | <input type="checkbox"/> | Report #: 1 | <input type="checkbox"/> | Profile #: _ _ |
| | X | Presentation (Preliminary findings) #: 01 | <input type="checkbox"/> | Presentation (Final) #: 01 | <input type="checkbox"/> | Factsheet #: _ _ |
| | <input type="checkbox"/> | Interactive dashboard #: _ | <input type="checkbox"/> | Webmap #: _ _ | X | Map #: _8_ |
| | <input type="checkbox"/> | [Other, Specify] #: _ _ | | | | |
| Access | X | Public (available on REACH resource center and other humanitarian platforms) | | | | |
| | <input type="checkbox"/> | Restricted (bilateral dissemination only upon agreed dissemination list, no publication on REACH or other platforms) | | | | |
| Visibility <i>Specify which logos should be on outputs</i> | REACH | | | | | |
| | Donor: iMMAP (backdonor : ECHO) | | | | | |
| | Coordination Framework: AAWG | | | | | |
| | Partners: DRMB | | | | | |

2. Rationale

2.1 Background

Recurrent droughts in the Somali region have severely affected pastoral communities, who heavily rely on livestock for their livelihoods. These droughts have led to inadequate pasturelands and crop failures, posing significant threats to food security. Additionally, conflicts and the influx of internally displaced persons (IDPs) and returnees due to the drought have strained resources and escalated disputes over grazing and water sources within the community. Livestock productivity has continued to decline, resulting in reduced income and poorer nutrition among affected communities. The prolonged drought, coupled with livestock disease outbreaks, has led to substantial livestock losses, with an estimated death toll of over 2 million animals¹. More recently, significant floods impacted most of the Somali region, affecting over 600,000 people, cutting access to many areas.²

In the Somali region of Ethiopia, communities face a convergence of multifaceted shocks that extend beyond the adversities of drought. Since August 2022, a cholera outbreak has further strained the region. Additionally, over 1.2 million individuals have been displaced due to a combination of conflict and climatic adversities, primarily conflict and droughts³. This highlights the region's intricate crisis landscape, necessitating multifaceted interventions. Historically, Ethiopian pastoral communities have employed various coping mechanisms and adaptive strategies to counteract the effects of drought. However, with the compounding challenges of conflict and other climatic shocks, the escalating severity and growing frequency of these events are diminishing the effectiveness of these traditional approaches⁴.

Despite the end of the prolonged 2020-2023 drought, acute food insecurity remains high due to the depletion of productive assets during the crisis. Limited access to food and income from crop and livestock production has forced impoverished and displaced households to rely on non-standard coping mechanisms, including community assistance. According to FEWSNET, emergency-level (Phase 4) food security outcomes are widespread, with a likelihood of catastrophic food security conditions (Phase 5) for the most destitute and displaced households, especially those with minimal or no livestock. While households are expected to have some access to milk starting in September, the recovery of livestock production is expected to be minimal due to extensive drought-related losses⁵. Most severely drought-affected areas include Afder, Dawa, and Liban zones, as well as parts of Korahe and Shabelle zones.

In the absence of livestock and food aid, vulnerable households can only alleviate hunger through meager wages from labor, income from firewood and charcoal sales, community support, and limited assistance from programs like PSNP and WFP, which has reached an estimated 324,000 households in the Somali region². Acute malnutrition remains a critical concern, with elevated levels attributed to substantial food consumption gaps resulting from drought and disease outbreaks like cholera. Screening data from the Somali Region in early 2023 indicates a proxy Global Acute Malnutrition (GAM) rate of 21.6 percent among children aged 6 to 59 months, signifying a critical level, with slight variations across zones, as evidenced in the Afder Zone's AFP livelihood zone, where GAM levels were estimated at 21.9 percent⁶.

¹ Somali Region 2023 Gu/Belg Seasonal Assessment Report

² <https://www.unocha.org/publications/report/ethiopia/ethiopia-floods-flash-update-2-15-november-2023>

³ Ethiopia National Displacement Report 15 Site Assessment Round 32 & Village Assessment Survey Round 15 November 2022-January 2023.

⁴ ACAPS Ethiopian Thematic Reports: Coping mechanisms and adaptive strategies in drought-affected Somali region, February 2023.

⁵ FEWS NET. Ethiopia Food Security Outlook June 2023 - January 2024: Lasting, severe impacts of conflict and drought leave millions struggling to cope, 2023.

⁶ REACH, AFP SMART+ Report, May 2023.

Given the severity of these challenges and the urgent need for targeted interventions and assistance, the proposed survey/study in this context is crucial. It will provide vital data on the prevailing conditions, vulnerabilities, and needs of the affected population. The survey results can be instrumental in informing partners, helping them allocate resources effectively and prioritize areas with the most pressing needs.

2.2 Intended impact.

The information derived from this assessment is to inform not just emergency response prioritization but also early recovery and resilience building response approaches. Through detailed situational analysis and presentations to key stakeholders at regional and national levels, the primary intended impact is:

- Due to the recurrent droughts in Somali, it is important to understand the specific needs of households, the current drivers and underlying causes of food insecurity and high malnutrition rates. In addition, there is need to fill information gaps in a systematic and comprehensive manner and inform a more effective humanitarian, development and government response and planning for immediate life-saving activities and contingency plans for sustainable solutions.

3. Methodology

3.1 Methodology overview

The assessment will adopt a quantitative approach and will involve household surveys, representative at the zonal level, encompassing 53 districts, depending on accessibility. A structured household survey questionnaire will be developed in partnership with all pertinent stakeholders. This is aimed at providing information vital for effective humanitarian strategy and implementation. The period for data collection is scheduled from the start of November 2023 to mid-November 2023. The results from this survey will be represented with a 95% confidence level and a 10% margin of error at the zonal level (admin 2) for the host and IDP population.

Our sampling technique will employ a two-stage stratified cluster sampling. In this approach, the primary sampling units (PSU) or clusters are Kebeles (Admin 3) and are chosen based on a probability proportional to size (PPS). Subsequently, the secondary sampling units (SSU) or households will be selected at random within each of these clusters. The total number of households set to be surveyed across the nine chosen zones of the Somali regions is 2687.

The data collection is designed to span extensively across the Somali region, particularly targeting 9 of the 11 administrative zones. These zones were selected based on the FewsNet Phase 4 emergency outcomes as of September 2023⁷. The selection will also consider our logistical capacity and accessibility.

3.2 Population of interest

3.2.1. Geographical area assessed.

This assessment will be representative at the zonal level (admin 2), across 9 zones. The selected include Afder, Dawa, Doolo, Erer, Jarar, Korahay, Liban, Nogob and Shebele zones of Somali region. These zones were selected based on the severity levels from FewsNet Phase 4 emergency outcomes as of September 2023⁶.

Several challenges related to geography are expected that may affect data collection and analysis:

⁷ FEWS NET. Ethiopia Food Security Outlook Update August 2023: Food security emergency persists across Ethiopia in aftermath of severe shocks, 2023.

- **Physical access during the rainy season:** The rainy season in the Southern Somali region is expected to begin in October and to last until at least December 2023. IGAD climate analysis suggests the possibility that there will be an exceptionally high forecast probability of experiencing wetter than normal rainfall conditions⁸. During this period, some roads may become impassable. Physical access may also be limited by floods or the risk of floods. These conditions can also have profound implications on food security and livelihood outcome indicators. In areas prone to floods, heavy rainfall might cause damage, destroy crops, kill livestock, displace people, restrict aid access, and increase food insecurity.⁹.
- **Security concerns:** Some portions of Somali region may be inaccessible during the data collection period due to security or other, related reasons.

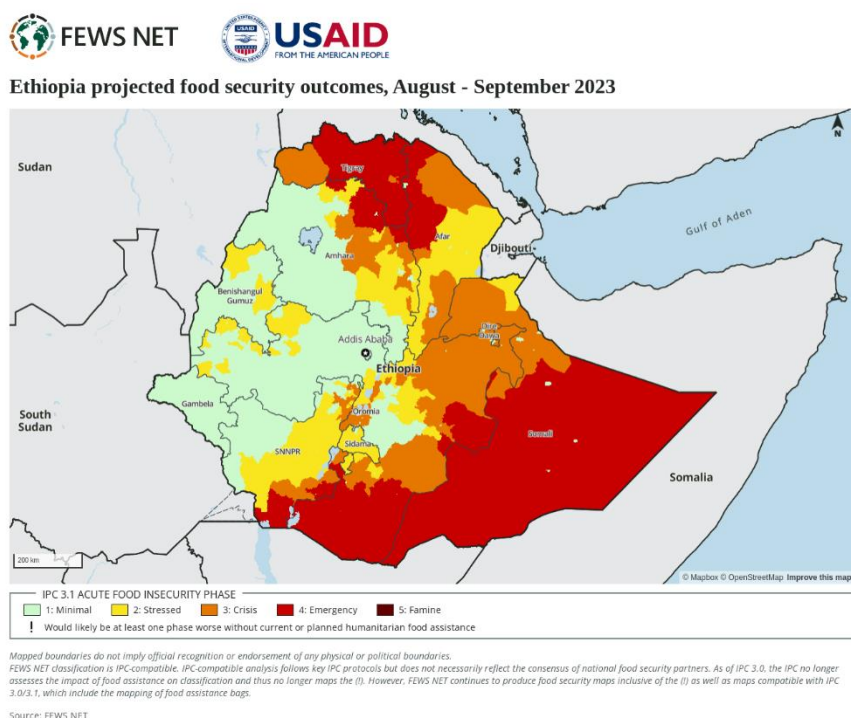
To mitigate above mentioned challenges, for non-accessible areas or loss of access during data collection:

- A review of operational and security access will be carried out prior to data collection to determine any challenges to access and to study methodological alternatives.

In addition, the following strategies will be used:

- Firstly, a 5% buffer will be included in the initial sampling calculation. The aim of this will be to compensate for the possible loss of access to certain areas where selected PSUs may be located and to maintain a level of representativeness for the stratum in question.
- In the event that the buffer is not sufficient to compensate for the number of interviews for which access is impossible, a number of clusters/Kebeles corresponding to the number of unreached clusters in the same stratum will be resampled. To maintain a known level of data representativeness, the weighting calculation should take account of the resampling.

Food insecurity phases (IPC) across Somali region (August – September 2023)



Source: FEWS NET (accessed 13/10/2023)

⁸ IGAD (ICPAC) - Summary for Decision Makers, Seasonal Forecast June to September 2023

⁹ Special Report. El Niño and Positive Indian Ocean Dipole to have Significant Multi-Sectoral Impacts in East Africa, 11 October 2023

3.2.2. Population assessed.

- **Host Community/Non-displaced:** For this survey, non-displaced people, also called host community, are considered people that have never been displaced from their habitual residence due to the droughts or have returned to their original homes after being displaced.
- **Internally Displaced Persons (IDPs):** Persons or groups of persons who have been forced or obliged to flee or to leave their homes or places of habitual residence, in particular because of droughts.

3.2.3. Unit of measurement

We will use one unit of measurements, which is households, for the two components of the final dataset.

- **Household:** A household is a group of people who live in the same dwelling and share food and other key resources. This may include people who are not part of the family but who are being hosted by the family. If there is any ambiguity, survey respondents will have the final say on who belongs to their household.

3.3 Secondary data review

Secondary data will be used throughout all stages of the research cycle to identify locations most in need of data collection and to support in the design of the tool, triangulation of collected data in analysis and product drafting, and for verification and confirmation of findings. Geographical secondary data sources will also be used in the questionnaire design.

| Secondary source | Purpose |
|--|---|
| ACAPS Ethiopia thematic reports | Baseline information to inform research design and prioritization and for triangulation and contextualization of findings. |
| REACH: SMART+ Report May2023. https://repository.impact-initiatives.org/document/reach/cba5d96d/REACH_ETH-2302_Report_Smart-Plus-Survey_May-2023_Final.pdf | |
| Household Economy Analysis Baseline Update, SomaliRegion. https://foodeconomy.com/resources/ | |
| Famine Early Warning Systems Network, (FEWSNET), Ethiopia reports | |
| REACH: Drought in the Horn of Africa Regional analysis | |
| COD; Administrative boundaries, Settlements , OCHA 2023 | For selecting geographic coverage |
| International Organization for Migration (IOM) Displacement Tracking Matrix | Triangulation and contextualization of data by matching against multi-sector data collected in Tigray and information on internal displacement and returns through Site and Village assessment. |

| | |
|--|---|
| IGAD (ICPAC) - Summary for Decision Makers, Seasonal Forecast June to September 2023. https://www.icpac.net/climate-forecasting/ | For planning |
| Somali Region 2023 Gu/Belg Seasonal Assessment Report | Baseline data and information on crop productivity during conflict and immediate post conflict period to aid in scoping and identification ¹⁰ of research themes, and triangulation of collected data. |

3.4 Primary Data Collection

3.4.1. Method

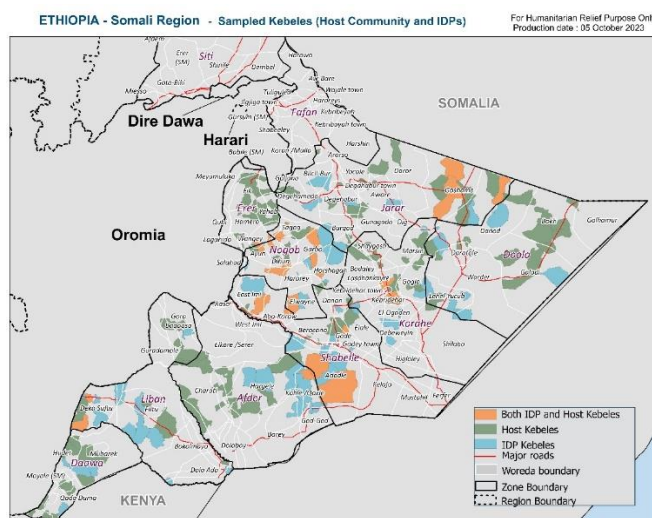
To ensure a representative sample, we will utilize probability two-stage stratified random sampling at zonal level, targeting a 95% confidence level with a 10% margin of error. Additionally, we will incorporate a 5% buffer to account for potential non-responses and data to be excluded during cleaning.

3.4.2. Sampling strategy

First stage sampling – primary sampling units (PSUs):

- In the first stage, Kebeles, which will serve as the primary sampling units (PSUs), will be chosen randomly with their probability being proportional to size; the selection will be made with replacement.
- Based on prior security and accessibility analysis, a number of exclusions have been made to ensure safety of the data collection teams.
- The minimum cluster size is six. For each Kebele, a minimum of six households or SSUs will be targeted for selection.

Sampled kebelles, Somali Region



Second stage sampling – secondary sampling units (SSUs): At the second stage, households will be selected using the simple random sampling within each cluster. Two strategies will be used depending on operability:

- i) The primary methodology for randomly selecting SSUs involves generating random GPS points within each cluster, weighted by the density layer. This ensures that when the density is not uniformly distributed within a designated cluster, the GPS points have a higher likelihood of being situated near dwellings. To facilitate this process, each surveyor is assigned a specific GPS point, which they can locate using the OpenStreetMap (OSM) application, where all these points have been pre-loaded. Once at the designated GPS location, the interviewer will then choose the closest household to conduct the interview. It's essential to recognize that various circumstances might affect the household selection strategy based on random GPS points. In such instances, the following guidelines should be observed:
 - If a GPS point lands in a zone devoid of households or an inaccessible location, the interviewer should proceed to the household that's closest to that GPS coordinate.
 - If the closest household is either unavailable or unwilling to participate, the interviewer should then approach the next nearest household relative to the assigned GPS point.
 - In scenarios where the chosen cluster has no households or is found to be deserted, the team will need to advance to the subsequent cluster on their list, but only after obtaining validation from the research team.
- ii) In situations where the primary SSU method is infeasible, particularly when buildings or households aren't evenly dispersed within a cluster, an alternative procedure for selecting households within PSUs is adopted:
 - Starting with the center of Kebeles as their central point, each interviewer employs the "pen method." This involves placing a pen on the ground, letting it rotate, and then observing the direction it points to. The interviewer then proceeds in that indicated direction.
 - After walking for approximately 5 to 7 minutes, covering roughly 500 meters, the interviewer notes the number of dwellings they pass by. Once this time elapses, they tally the number of homes they've seen.
 - To determine the dwelling where the interview will be conducted, the interviewer divides the total number of encountered shelters by their unique interviewer number, resulting in a quotient we'll term "n."
 - The interviewer then persists along their path, stopping at the nth shelter to conduct their initial interview. Should there be a need for more than one interview at this GPS point, the interviewer, post-completion of the initial interview, proceeds forward, repeating the process of identifying and stopping at every nth shelter for subsequent interviews.

Table 1: number of surveys per administrative zones (admin 2) and per population group

| Admin zones | No of Woredas to be visited | Number of HHs (Host) | Number of HHs (IDPs) | Total HHs |
|--------------------|------------------------------------|-----------------------------|-----------------------------|------------------|
| Afder | 4 | 144 | 174 | 318 |
| Daawa | 4 | 168 | 101 | 269 |
| Doolo | 6 | 138 | 186 | 324 |
| Erer | 5 | 150 | - | 150 |
| Jarar | 10 | 144 | 276 | 420 |
| Korahe | 7 | 138 | 198 | 336 |
| Liban | 4 | 138 | 144 | 282 |
| Nogob | 6 | 144 | 150 | 294 |
| Shabelle | 7 | 138 | 156 | 294 |
| TOTAL | 53 | 1302 | 1385 | 2687 |

3.4.3. Data collection and monitoring

Household surveys will be administered to the self-reported head of the household. In cases where the head of the household is unavailable, another knowledgeable adult within the household will be interviewed. No individuals under the age of 18 will be surveyed. The sample size calculation will be based on household population figures from the 2015 EC population estimates provided by BOFED and regional DRMB.

The data collection process will involve the use of Open Data Kit (ODK) Collect via mobile phones. Enumerators will undergo three days training session covering tool usage and best practices during data collection including pilot of the tool will be conducted to ensure enumerator familiarity and to address any initial issues. Feedback from the tool's pilot phase will be considered during debriefing before official data collection commences.

3.5 Data Processing & Analysis

The following steps will be taken in order to ensure data quality during data collection:

- All household survey data will be inputted into Kobo Collect and then uploaded to the Kobo server daily. The database officer will conduct daily data cleaning in line with IMPACT's Data Cleaning Minimum Standards Checklist to pinpoint potential inaccuracies or inconsistencies.
- Every survey submitted is promptly sent to the REACH database officers who oversee data tracking and cleaning. On a daily basis, the data and GIS officers diligently undertake several steps to ensure data quality.
 - o First and foremost, they anonymize all sensitive personal information, emphasizing erasing specific details like phone numbers and GPS coordinates.
 - o They also closely monitor the sampling procedures and the specific GPS locations where interviews were held.
 - o In their analysis, they look out for anomalies, such as exceptionally large household or shelter sizes, and cross-check for duplicate entries.

- Furthermore, they execute a specialized data cleaning script which is designed to highlight any inconsistent data or outliers. This script operates based on a pre-established list that pinpoints potential logical errors in the data.
- Cleaning logs, derived from this cleaning process, will be sent to the field team. These logs will guide direct verification of any dubious data with the enumerators and be a foundation for briefings with enumerators prior to subsequent data collection.
- Once the data cleaning phase concludes, the data from the household surveys will be processed using the R statistical software.

Data Analysis: Data analysis will be carried out in accordance with the Data Analysis Plan (DAP) and using calculation scripts on the R data processing software at the desired geographical level (department, livelihood zones) and within the sampling definitions. Additional disaggregation may be carried out if required by the humanitarian coordination, such as a distinction based on the gender of the head of household.

Limitations

The kebele/village-level data source primarily relied on government agencies, including the Disaster Risk Management Bureau (DRMB) and BoFED (Bureau of Finance and Economic Development). However, it's important to note that the population data at the village level is primarily estimated due to the absence of a recent census. To mitigate this limitation, we employed population density data to cross-reference and validate the population estimates.

3.6 Remote sensing analysis

Objective: The aim of our remote sensing analysis is to augment the data obtained from the quantitative household survey, providing in-depth insights into the magnitude and extent of drought within the Somali region of Ethiopia.

Key Indices:

- Modified Normalized Difference Water Index (MNDWI): This index is crucial for determining water content within a given area. By tracking changes in MNDWI values over consecutive periods, we can pinpoint zones where water content has significantly decreased, signaling intensified drought conditions.
- Normalized Difference Vegetation Index (NDVI): NDVI serves as an effective metric for gauging vegetation vitality, reflecting the influence of rainfall, or lack thereof, on vegetation conditions. A decrease in NDVI values can imply compromised health, density, and availability of crops and pasture.

Methodology:

- Data Acquisition: We will source high-resolution satellite images, specifically from the Sentinel 2A/B satellites, which will serve as our primary dataset for the period spanning March to June across 2020 to 2023, coinciding with the critical 'Gu' crop season.
- Preprocessing: Leveraging Google Earth Engine, the acquired imagery will undergo thorough preprocessing to correct any atmospheric disturbances or inconsistencies, ensuring data accuracy and reliability.
- Supervised Classification: To grasp the drought's repercussions on the regional agricultural endeavors, we will deploy supervised classification methods. This will allow us to effectively map out cultivated lands within the Agropastoral livelihood zones, highlighting areas potentially vulnerable to the drought.

- Time-Series Analysis: Observing the temporal variation of both MNDWI and NDVI values will give a chronological understanding of drought progression, providing a timeline of its onset, peak, and potential retreat.

Visualization: Results will be disseminated in a visually intuitive manner, harnessing a combination of detailed maps and illustrative graphs. This will enable stakeholders to easily interpret the findings, facilitating informed decision-making.

4. Key ethical considerations and related risks

The proposed research design meets / does not meet the following criteria:

| <i>The proposed research design...</i> | <i>Yes/ No</i> | <i>Details if no (including mitigation)</i> |
|---|----------------|--|
| ... Has been coordinated with relevant stakeholders to avoid unnecessary duplication of data collection efforts? | Yes | |
| ... Respects respondents, their rights and dignity (specifically by: seeking informed consent, designing length of survey/ discussion while being considerate of participants' time, ensuring accurate reporting of information provided)? | Yes | |
| ... Does not expose data collectors to any risks as a direct result of participation in data collection? | Yes | <p>A review of security access will be conducted, and areas deemed too dangerous will be excluded. Collection will be carried out remotely for these areas using a hard-to-reach method.</p> <p>In addition, a safety analysis protocol will be put in place to daily monitoring of the data collection data collection.</p> |
| ... Does not expose respondents / their communities to any risks as a direct result of participation in data collection? | Yes | |
| ... Does not involve collecting information on specific topics which may be stressful and/ or re-traumatizing for research participants (both respondents and data collectors)? | Yes | <p>All participation in the questionnaire is following informed and explicit consent of the respondents. Any person with a disability or survivor of a protection incident are welcome to take part in the evaluation.</p> |
| ... Does not involve data collection with minors i.e. anyone less than 18 years old? | No | |

| | | |
|--|-----|--|
| ... Does not involve data collection with other vulnerable groups e.g. persons with disabilities, victims/ survivors of protection incidents, etc.? | Yes | |
| ... Follows IMPACT SOPs for management of personally identifiable information ? | Yes | |