Research Terms of Reference
Shocks Monitoring Index (SMI)
Research Cycle: SSD1902

February 2021

REACH Informing
more effective
humanitarian action

1. Executive Summary

Country of intervention	South Sudan				
Type of Emergency		Natural disaster	X	Conflict	
Type of Crisis	X	Sudden onset		Slow onset	X	Protracted
Mandating Body/ Agency	UK Foreign, Commonwealth and Development Office (FCDO), Needs Analysis Working Group (NAWG), Inter-Cluster Coordination Group (ICCG)				
Project Code	32iAIE				
Overall Research Timeframe (from research design to final outputs / M&E)	01/01/2020 to 31/12/2021				

Research Timeframe[1] Add planned deadlines (for first cycle if more than 1)	1. Start collect data: 01/01/2020	4. Data sent for validation 25/03/2021
	2. Data collected: 31/02/2020	5. Outputs sent for validation: 15/04/201`
	3. Data analysed: 15/03/2021	7. Outputs published: 20/04/2021

Number of assessments		Single assessment (one cycle)
	X	Multi assessment (more than one cycle)
		The INT system/map will be updated every month

Humanitarian milestones Specify **what** will the assessment inform and **when**	**Milestone**		**Deadline**
		Donor plan/strategy	_ _/_ _/_ _ _ _
	X	Inter-cluster plan/strategy	Bi-weekly
	X	Cluster plan/strategy	Bi-weekly

Audience Type & Dissemination Specify **who** will the assessment inform and **how** you will disseminate to inform the audience	**Audience type**	**Dissemination**
	X Strategic □ Programmatic □ Operational □ [Other, Specify]	X General Product Mailing (e.g. mail to NGO consortium; HCT participants; Donors) □ Cluster Mailing (FSL, Nutrition, Health and WASH) and presentation of findings at next cluster meeting X Presentation of findings (e.g. at HCT meeting; Cluster meeting) X Website Dissemination (ReliefWeb & REACH Resource Centre)

[1] The INT is updated monthly. After initial validation, data collection started in March 2019 and remains ongoing.

Detailed dissemination plan required	Yes	X	No

General Objective	To use existing research by both REACH and external partners to conduct monthly monitoring of shocks, in order to improve the humanitarian community's ability to identify and predict counties at risk of a deteriorating humanitarian situation. Outputs from the shocks monitoring analytical framework will directly feed into the Integrated Needs Tracking System (INT), and in tandem will serve as a proxy "early warning" system to flag counties at risk of worsening outcomes.[2] This analysis will directly inform the Needs Analysis Working Group (NAWG) and other relevant humanitarian bodies.
Specific Objective(s)	- To expand the current understanding of the interaction of various typologies of shocks (conflict, climatic, economic, policy, etc.) and the effects they have on household (HH) vulnerability, resilience, and food security. - To understand how the combination of typology, timing and intensity of shocks affect HH decision making, such as displacement patterns and coping strategy trade-offs, such as when HHs choose to reduce meal frequency versus selling productive assets to purchase food and how these choices may change based on the type, timing and frequency of shock(s). - Develop an analytical framework to assess the severity and frequency of various shocks on a monthly basis. - Develop an analytical framework to understand the level of concern/severity of specific thematic shock groups; conflict, displacement, climate, disease incidence. - Develop an analytical system that monitors the compounding and accumulating severity of multiple shocks. - Develop flood and drought monitoring systems that can be updated on a monthly basis allow for better natural disaster early warning systems, and better targeted humanitarian assistance. - To implement the SMI into the INT system to allow for real-time tracking of the implication of shocks, serve as a proxy early warning system, and to guide the decision making of humanitarian fora such as the NAWG. Conduct shock verifications assessments in areas identified as experiencing shocks in order to develop situation overviews and to support the development of a more responsive and precise future iteration of the SMI by lessons learned on the multi-faceted nature of shocks in South Sudan.
Research Questions	- How to correctly weight and align the various components of shocks (typology, occurrence, intensity, recurrence and concurrence) and data sources (AoK, Climate, conflict, displacement) into a coherent, timely and applicable index? - How do communities perceive the severity and magnitude of current shocks to previous shocks that led to times of 'extreme hunger'? - How do communities rank their exposure to various shock typologies and which combinations do they perceive as being most likely to reduce their resilience? - Does the timing of specific shocks affect the severity of shocks? If so, which shocks are HHs most vulnerable to at a given period? - How do HHs mitigate the effects of shocks and how is the decision change based on the type of shock - i.e. If markets fail, what do HHs do to mitigate the consequences?

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[2] The INT is a multi-tiered multi-dimension framework and information management system that uses secondary data to monitor the risk of increasing needs concerning five conceptual indicators, food security and livelihoods (FSL), WASH, Health, Nutrition, and Mortality, at the county level. As a result, the INT will feed into South Sudan Needs Analysis Working Group (NAWG) and is designed to monitor the risk of a NAWG trigger being present.

	• How do HHs mitigating strategies change based on the typology, timing and intensity of the shock?
Geographic Coverage	South Sudan, dissagregated by county.
Secondary data sources	• REACH Area of Knowledge (AoK) • WHO Integrated Disease and Surveilance (IDSR) • Crop and Livestock Monitoring Information System (CLiMIS) • REACH-Cash Working Group Joint Market Monitoring Initiative (JMMI) • The Armed Conflict Location & Event Project (ACLED) • REACH Population Movement Baseline (PMB) • Ministry of Health and WHO COVID caseload data • FAO locust monitoring stations • Climate Hazards Group Infrared Precipitation with Station data (CHIRPS) • Moderate Resolution Imaging Spectroradiometer (MODIS) Satellite • Copernicus Sentintel-1 Satellite

Population(s) Select all that apply		IDPs in camp	X	IDPs in informal sites
	X	IDPs in host communities		IDPs [Other, Specify]
		Refugees in camp		Refugees in informal sites
		Refugees in host communities		Refugees [Other, Specify]
	X	Host communities	X	Other: Returnees

Stratification Select type(s) and enter number of strata	Geographical #:_ _ _ Population size per strata is known? □ Yes □ No	Group #: _ _ _ Population size per strata is known? □ Yes □ No	[Other Specify] #: _ _ Population size per strata is known? □ Yes □ No

Data collection tool(s)	X	Structured (Quantitative)		Semi-structured (Qualitative)

	Sampling method	Data collection method
Structured data collection tool # 1 Select sampling and data collection method and specify target # interviews	X Purposive (AoK) □ Probability / Simple random □ Probability / Stratified simple random □Probability / Cluster sampling □ Probability / Stratified cluster sampling □ [Other, Specify]	X Key informant interview (Target #): 5% of known settlements □ Group discussion (Target #):_ _ _ _ _ □ Household interview (Target #):_ _ _ _ _ □ Individual interview (Target #):_ _ _ _ _ □ Direct observations (Target #):_ _ _ _ _ □ [Other, Specify] (Target #):_ _ _ _ _
Structured data collection tool # 2 Select sampling and data collection method and specify target # interviews ***If more than 2 structured tools please duplicate this row and complete for each tool.	□ Purposive □ Probability / Simple random □ Probability / Stratified simple random X Probability / Cluster sampling □ Probability / Stratified cluster sampling □ [Other, Specify]	□ Key informant interview (Target #):_ _ _ _ _ □ Group discussion (Target #):_ _ _ _ _ X Household interview (Target #): 108 per county □ Individual interview (Target #):_ _ _ _ _ □ Direct observations (Target #):_ _ _ _ _ □ [Other, Specify] (Target #):_ _ _ _ _

Target level of precision if probability sampling	_ _% level of confidence – **N/A**			_ _+/- % margin of error – **N/A**		
Data management platform(s)	□	IMPACT		□	UNHCR	
	X	Dropbox and in-house webplatform – specifics are in the INT web platform ToR				
Expected ouput type(s)	□	Situation overview #: _ _	□	Report #: _ _	□	Profile #: _ _
	X	Presentation (Preliminary findings) #: 1 every month	X	Presentation (Final) #: 1 every month	□	Factsheet #: _ _
	□	Interactive dashboard #: 1 every month	□	Webmap #: _ _	X	Map #: 1 every month
	□	[Other, Specify] #: _ _				
Access	□	Public (available on REACH resource center and other humanitarian platforms)				
	□	Restricted (bilateral dissemination only upon agreed dissemination list, no publication on REACH or other platforms)				
Visibility	REACH, DFID, FSL (tbd), WASH (tbd), Nutrition (tbd), Health (tbd)					

2. Rationale & Objectives

2.1 Rationale

The dynamic and multi-faceted nature of the South Sudanese displacement crisis has created significant challenges for humanitarian information management. As a result of the continued insecurity and overall unpredictability of a sudden onset shock, it is becoming increasingly important to quickly identify and fill information gaps relating to potential areas of severe humanitarian distress in a systematic and timely manner.

In October and November 2020, the IPC identified six counties with populations facing catastrophic levels of food insecurity. These six counties had experienced large-scale shocks such as ongoing access constraints, conflict, or compounding climate shocks, which had likely resulted in high acute food insecurity. These events illustrate the importance of regular and sustained monitoring different types of shocks in order to identify areas facing a sudden deterioration of humanitarian conditions in order to guide the prioritisation of humanitarian assistance. For the purpose of this monitoring index, a shock is defined as an exogenous event that negatively affects a household or community's ability to access food, WASH, livelihoods and other essential services such as healthcare.

As identified in the REACH report on the impact of shocks on food security in South Sudan, residents of South Sudan are vulnerable to various different types of shocks. The typology, occurrence, severity, reoccurrence and concurrence can all have different effects on the impact a shock has on a location's food security, engagement in negative coping strategies, and resilience to future shocks.[3] Developing a better understanding of the frequency and severity of these different shocks is thus key to better predicting and understanding areas of humanitarian concern.

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[3] i. Typology: What are the different types of shocks that have occurred over different time periods?
ii. Occurrence: How frequent are the different shock events that have occurred?
iii. Intensity: How severe was the effect on food security and livelihoods of a given event each time it occurred?
iv. Recurrence: How often has the same event, at varying intensities, occurred over a defined period?
v. Concurrence: When have different events affected the area simultaneously or in close succession?

Currently, no analytical system in South Sudan brings together multiple data sources to monitor the severity and frequency of shocks. As such, REACH will build an analytical framework that takes in various secondary datasets to measure the occurrence of shocks, severity of different shock types (conflict, displacement, climate, disease, etc.), and the accumulation of shocks at the county level on a monthly basis. This system will be analysed in parallel with REACH's Integrated Needs Tracking (INT) system, which assesses overall needs severity at the county level on a monthly basis. Together, these systems can flag areas of humanitarian concern for targeted assistance and also act as proxy early warning system that identifies areas of potential deteriorating humanitarian vulnerability.

2.2 Objectives

- To expand the current understanding of the interaction of various typologies of shocks (conflict, climatic, economic, policy, etc.) and the effects they have on household (HH) vulnerability, resilience, and food security.
- To understand how the combination of typology, timing and intensity of shocks affects HH decision makings, such as displacement patterns and coping strategy trade-offs.
- Developing an analytical framework to monitor the occurrence and frequency of various shocks on a monthly basis.
- Developing an analytical framework to understand the level of concern/severity associated with specific thematic shock groups: conflict, displacement, climate, disease incidence.
- Developing an analytical system that monitors the compounding and accumulating severity of multiple shocks.
- Developing remote sensing based flood and drought monitoring systems that can be updated on a monthly basis to allow for better early warning of natural disasters.
- To implement the SMI into the INT system to allow for real-time tracking of the implication of shocks, serve as a proxy early warning system, and to guide the decision making of humanitarian fora such as the NAWG.
- Conducting shock verifications assessments in areas identified as experiencing shocks in order to develop situation overviews and to support the development of a more responsive and precise future iteration of the SMI by lessons learned on the multi-faceted nature of shocks in South Sudan.

3. Methodology

3.1 Overview

The aim of the SMI monitoring index is to monitor the frequency and typology of major exogenous shocks, the severity of specific shock themes / pillars, and to better quantify the severity of accumulating / reoccurring shocks over time. This framework is outlined in figure 1 below. The SMI will incorporate data backdated to January 2020 and be run on a monthly and continuous basis from March 2021 onwards. As an analytical framework the SMI monitoring index will have three principal components:

1. **Shock Occurrence Monitoring:** To **monitor the occurrence, frequency and concurrence of exogenous shocks** at the county level **on a monthly basis**. This is based on initial work done by the Food Security and Nutrition Analysis Unit (FSNAU) Somalia. FSNAU Somalia has categorised multiple shock indicators from different data sources, to determine a scale of alarm in each county that allows trend analysis and serves as a proxy early warning system. REACH South Sudan will be utilising a similar methodology to quantify the number of shock events happening at the county level.
2. **Shock Severity Monitoring**: To monitor the level of shock severity for the four identifed thematic areas: conflict, displacement, climate, and disease outbreak. The severity of the shocks identified in each thematic area will be calculated through the analysis of multiple different indicators which are weighted according to how significantly they impact severity. Subsequently, the severity level may be raised further based on accumulating shocks; an additional accumulating severity value is produced by calculating the frequency and magnitude of shock incidences over the previous six months.

3. **Ad-hoc verification assessments:** In areas identified as being affected by exogenous shocks verification assessments will be carried out in order to better understand the drivers and implications of shocks in any given area. Depending on the context, REACH will aim to either produce a brief or situation overview, and use lessons learnt from any such assessment in order to better inform future development of the SMI system.

Additional methodological components include **combining the SMI with the INT system** in order to build a proxy early warning system and to better understand the impact of exogenoous shocks on needs severity.

Figure 1: Shocks Monitoring Index Analytical Components
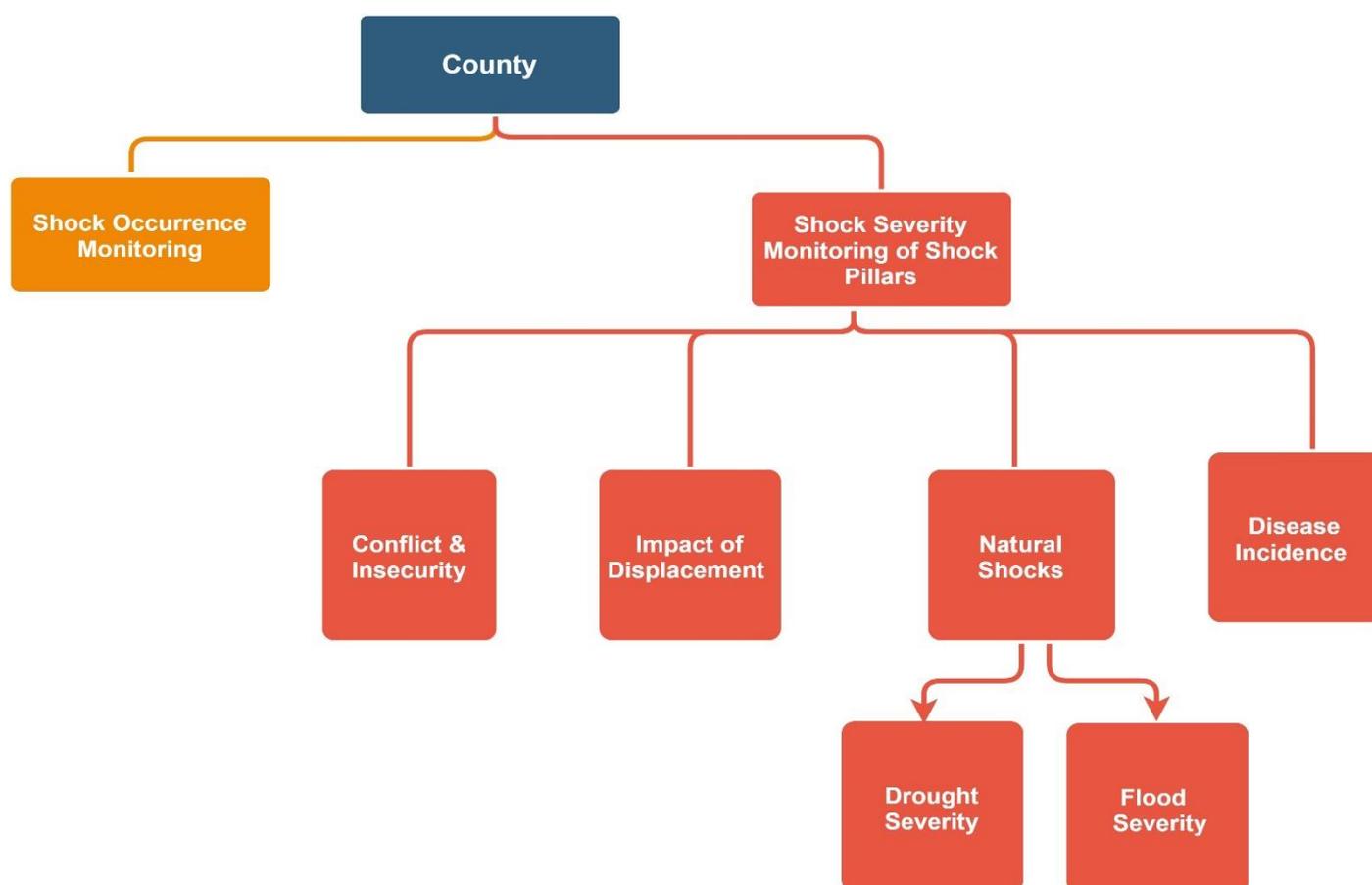
3.2 Shock Occurrence Monitoring

The shock occurrence monitoring component of the SMI aims to flag whether any one of a range of shocks has occurred in a particular month, at the county level. This will support analysis of shock frequency and concurrence by illustrating county exposure to multiple shocks on a monthly basis. The system will assess 12 different shock incidence indicators, as outlined in table 1 below. Indicators were selected after internal review and through consultations with the NAWG. Selection criteria for indicators included the availability of timely data that can be aggregated on a monthly basis, and that can be aggregated at the county level. The data sources for the different shock indicators are also listed below in table 1.

Analysis will be conducted to determine the occurrence of a shock in a county in a given month. Although it can be used as a proxy tool to determine monthly severity and accumulating severity of shocks, it will not provide a robust analytical framework for shock severity as calculated in the below shock severity monitoring system. The shock occurrence monitoring system will assign each county a shock occurrence value corresponding with the number of shocks that have occurred in the month of interest. These values are categorised as follows:

- o Very High level of concern = 8-12 shocks
- o High level of concern = 6-7 shocks
- o Moderate level of concern = 4-5 shocks
- o Low level of concern = 1-3 shocks
- o No shocks reported = 0 shocks

Table.1 Shock Occurrence Monitoring Indicator List and Thresholds

| Shock Indicator	Data Source	Threshold (per month, per county)	Rationale
Armed conflict incidents with ICV or organised armed groups	Per reported data from an NGO inSouth Sudan that focuses on independently collecting and analysing security incident data for humanitarians.	>=4	Armed conflict has a central role in the disruption of livelihoods and in reducing access to food, impeding access to services, and exacerbating a range of humanitarian needs. Multiple armed conflict events occurring in a month is a strong indicator of a conflict shock in a county.
Fatalities attributed to insecurity / conflict	ACLED	>=15	Armed conflict has a central role in the disruption of livelihoods and reducing access to food, impeding access to services, and exacerbating a range of humanitarian needs. Multiple fatalities attributed to insecurity and conflict are a strong indicator of a conflict shock in a county. Fatalities may be attributed to armed conflict, looting, protests, or riots.
Measles cases above national average	WHO IDSR	>=77% historic national rates	Measles is considered a severe disease that can lead to high mortality rates among children. and actively drive Global Acute Malnutrition (GAM) prevalence. It can also be a reliable proxy for deteriorating food security.
Drought	MODAS Satellite	Normalised Drought Difference Index (NDDI) scores equal to or greater than 9% above long term average for that month for county of analysis	Severe drought can have major ramifications for crop production and subsequent food availability. It can also affect access to water, with implications to both cattle health and household sanitation. Due to climate change, drought is projected to become both increasingly severe and frequent.
Flooding	Sentinel-1 Satellite	Flood inundation surface area equal to or greater than 9% above long term national average (November - June); Flood inundation surface area more than 10% total surface area (July – October)	Flooding is a regular occurrence in South Sudan, and like drought is forecasted to become increasingly severe and far-reaching. Flooding has severe implications for access to food, due to the inundation of cropland. Flooding is also associated with an increase in water-borne diseases, impediments to mobility and access, and comprehensive shelter damage.
COVID caseload	WHO/MoH	Above 50 cases at the time of framework publication	COVID-19 is a highly virulent respiratory illness that causes cold-like symptoms in most people but can have particularly severe and fatal respiratory implications for those with an underlying medical condition. Furthermore, high COVID caseloads

REACH SMI

			could result in public restrictions to movement in order to reduce transmission of the disease. This would likely have notable implications on access to markets, the provision of key services such as healthcare, and access to livelihoods.
Ebola caseload	WHO	1 or more confirmed cases	Ebola is an extremely dangerous virus that will likely result in border closures and a breakdown of social structures in the affected area.
Acute Watery Diarrhoea (AWD) /Cholera caseload	WHO IDSR	>=77% historic national rates of one or both cholera and/or AWD	Diarrhoeal disease is the second leading cause of death in children under five years old. Diarrhoea is defined as the passage of three or more loose or liquid stools per day. Cholera is considered an extremely severe disease that can lead to high mortality rates among children and actively drive GAM prevalence, It is also a reliable proxy for poor WASH conditions.
Cereal Price (Maize and sorghum depending on location)	JMMI/CLIMIS	15% price increase over the price average of the previous three months	South Sudan has faced significant economic turmoil since independence in 2011, and inflation continues to be a severe concern. Increased prices can be a barrier to food access for many of the most vulnerable households.
Bean Price	JMMI/CLIMIS	15% price increase over the price average of the previous three months	South Sudan has faced significant economic turmoil since independence in 2011, and inflation continues to be a severe concern. Increased prices in price changes can be a barrier to food access for many of the most vulnerable households
Displacement to county of interest	REACH PMB	>=5,000	Significant numbers of arrivals of displaced persons to a community/area has the potential to exacerbate food and resource access, and to disrupt livelihood patterns.
Displacement from county of interest	REACH/PMB	>=5,000	Significant numbers of displaced persons leaving a community/area is able to exacerbate community vulnerability as markets, access to key services, and trade-based livelihoods become impacted by a fall in labour.
Locust Monitoring	FAO	Presence of desert locust swarms in county	Desert locust infestations have the potential to destroy farmed crops and damage non-cultivated vegetation, thus reducing the amount of wild foods available and the pasture for livestock.

3.3 Shock Severity Monitoring

The aim of the severity monitoring component is to analyse the four aforementioned shock pillars, as shown in figure 2, and assign a level of severity to the shocks being encountered. These shock pillars were selected based on internal review, external discussions with humanitarian bodies such as the NAWG, and through reccommendations from an in-depth report on the impact of shocks on access to food, conducted by REACH. As identified in this report, the seven key shocks pillars are conflict/insecurity, displacement, markets, natural shocks, disease outbreak, cessation of humanitarian aid, and policy changes. A lack of available data on the latter two pillars means that it is not possible to include them in the SMI for the time being. However, REACH will constantly review available data sources and will aim to develop a future iteration of the SMI that incorporates analysis of both these pillars. The shock severity monitoring system will also not incorporate a markets pillar due to the comprehensive work done by the REACH-CWG JMMI in monitoring markets on a monthly basis, and by the INT on monitoring FSL needs severity on a monthly basis. The INTanalyses hunger severity, key market prices, and barriers to accesing markets and thus already provides a proxy of market shock severity.

The shock severity monitoring system will analyse and weight composite indicators in order to develop a multifaceted understanding of shock severity on a monthly basis for the aforementioned different shock pillars. As above, indicators were selected after internal review and through consultation with the NAWG, and based on the availability of county-level data on a monthly basis.

Figure 2. Shock Severity Monitoring
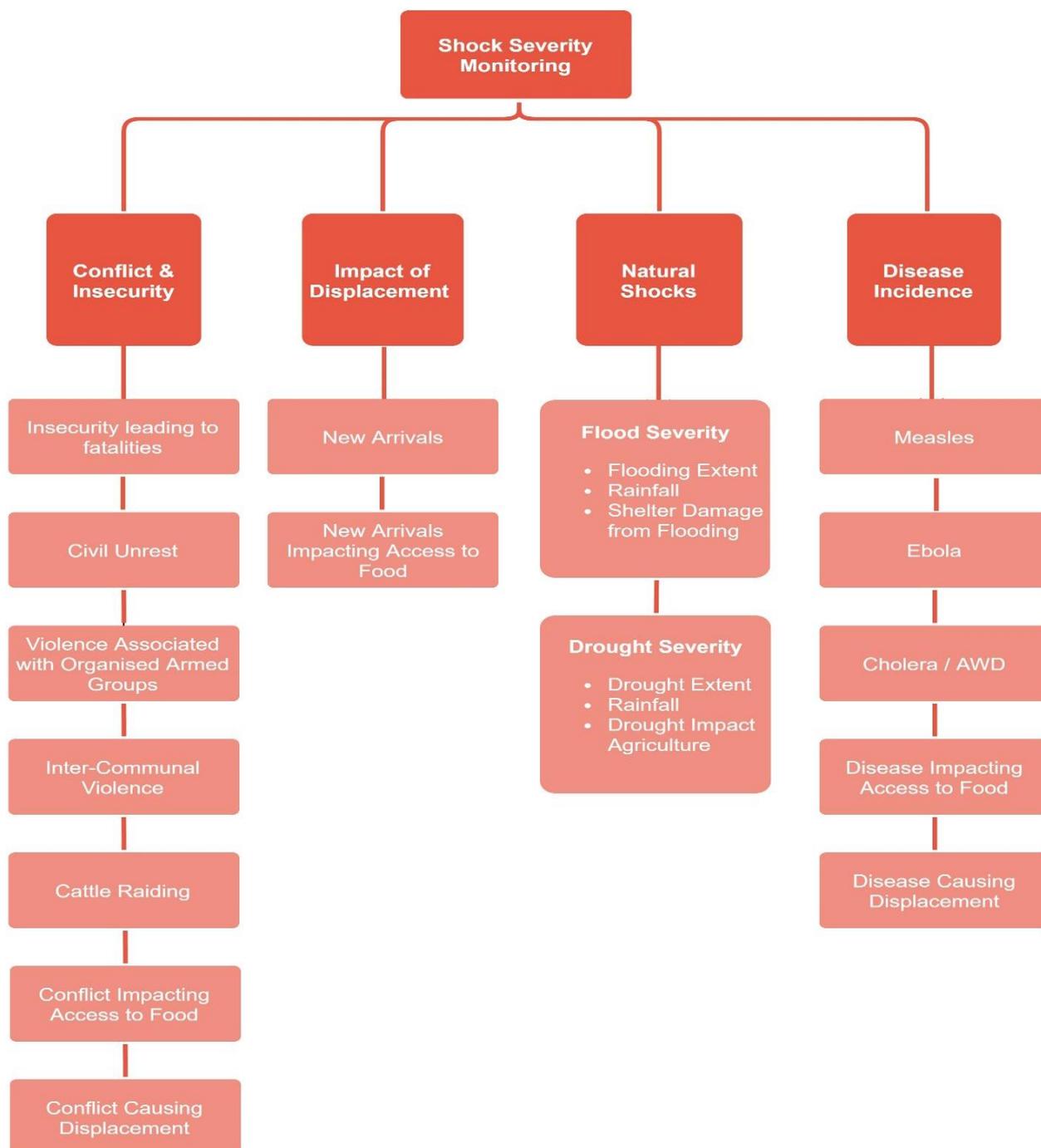
3.3.1 Shock Severity Monitoring Data Analysis

For each shock pillar, indicators were drawn from a range of secondary data sources and analysed to produce county-level statistic scores. These indicator scores are then aggregated based on pre-established thresholds, and then weighted based on significance in triggering a shock, in order to build an overall severity score for each pillar. An additional "accumulating shock" severity score is calculated by weighting severity scores for the past six months per county to build a shock accumulation (reoccurrence) severity score for each county. The data analysis and processing steps are outlined below and in figure 3.

1. **Indicators – summary statistic analysis and imputation:** Indicators are derived from available external and internal data sources, and a value is calculated or imputed for each county based on the available information. To allow for aggregation between indicators, each indicator is first converted into a summary statistic at the county level, as either a proportion, ratio, absolute number, or a percent change over time. If not all values are available at the county level, they may be imputed from values for other counties in the state, to allow for a complete dataset.

2. **Indicators – severity thresholds:** After indicators are converted to a summary statistic, the value of each indicator is then assigned a "weighted score" between 1-4 based on pre-determined thresholds of severity.[4] For a full outline of these thresholds please view the appendix below.

3. **Shock pillar indicator weighting and severity scores:** In order to caluclate the overall shock severity score each indicator is assigned a weight between 0.1 and 1.0 based on it's significance in influencing the overall shock score. A full list of these indicator weights can be found in the below appendix. These weighted values are then used to calculate an overall risk socre for each shock pillar. To allow comparability between different shock pillars, each shock pillar is given a score between 0-4. Pillar scores are then classified to severity scores as follows:
    a. $x>0$ = Minimal Severity
    b. $x>1$ = Moderate Severity
    c. $x>2$ = High Severity
    d. $x>3$ = Very High Severity

4. **Accumulated score analysis:** Time series data analysis is conducted to determine a severity value for accumulated exposure to shocks over the past six months. Shock severity scores for the past six months are assigned a weight based on how recently they occurred. As with the above severity scores, these subsequent scores are scored between 0-4 and classified as above. After weighting, the values are summed to build an overall accumulated severity score as above. The weighting of each time series can be listed below:
    o Shock score last month = 0.45
    o Shock score 2 months ago = 0.25
    o Shocks score 3 months ago = 0.175
    o Mean shock score 4-6 months ago = 0.125

In figure 3 below, a full example is provided of the data aggregation and analysis process. The below example goes through the data processing steps of the dispalacement shock pillar.

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[4] The creation of pre-determined thresholds is based on where possible cluster or equivalent technical review. In some cases this has not been possible and these thresholds are determined through statistical analysis of existing data to build appropriate scoring thresholds based on deviation from the mean. These thresholds are under constant review and subject to change accordingly.

Figure 3. Shock Severity Monitoring data aggregation and analysis process:

The below table provides a step-by-step example of analysing the indicator "IDP arrivals impacting access to food" from an indicator statistic to an accumulated shock severity score. All dummy data provided in the following steps is arbitrary.

	Step 1	Step 2	Step 3	Step 4
Step	Indicators are individually processed at the county level	Indicators are aggregated to a pre-determined threshold score between 1-4	Shock pillar scores are calculated by aggregating and weighting different indicator values	Accumulating shock pillar scores for time series analysis of accumulating shock severity
Example	*[Proportion of new IDP arrivals affecting access to food]* For County A, KIs in 12% of communities reported that IDP arrivals had negatively affected access to food in month B.	*[Proportion of new IDP arrivals affecting access to food]* Indicator weight based on pre-established thresholds of severity: 4 (weight) = >20% 3 (weight) = >10% 2 (weight) = >5% 1 (weight) = <5% In the example, a weight of **3** is assigned based on the indicator value of 12% as shown in Step 1.	*[Weighting scores for all displacement pillar indicators]* *IDP arrivals score [this is the additional indicator used to calculate displacement severity score]: 3 and indicator weighted as 0.8* *IDP arrivals affecting access to food score = 3 and weighted as 0.2* Displacement shock for County A = ((0.8x3)+(0.2x3)) **3.0 = Very High Severity**	*[Shock severity scores for past times series]* Last month = 2.8 (weight **0.45**) 2 months ago = 2.1 (weight **0.25**) 3 months ago = 2.2 (weight **0.175**) Mean 4-6 months ago = 3.1 (weight **0.125**) *Shock accumulation score for County A= ((2.8x0.45)+ (2.1x0.25) + (2.2x0.175) + (3.1x0.125)* **3.6 = High Severity**

3.3.2   Shock Severity Monitoring Data Imputation and Processing

As mentioned above, due to the challenges of data collection and coverage in South Sudan, data will need to be imputed where there are gaps in coverage. For data sources where there is imperfect coverage at the county level, efforts are made to impute the missing values to allow for a complete analysis. Some instances where imputation may be used are as follows:

- **WHO Integrated Disease Surveillance and Response (IDSR) data** – counties without values are imputed with the median of existing values within the state (the next highest admin level above county).
- **REACH AoK Data** – counties without values are imputed with the median of existing values within the state (the next highest admin level above county).

If it is not possible to incorporate all data for a county, then this is clearly flagged in any subsequent reporting output.

Data sources within the framework are updated on a monthly basis, or less frequently depending on how often new data is available. Data will be accessed either through online, publicly accessible web portals, or through bilateral requests to NAWG partners (such as the Health Cluster or WFP). The table below summarizes the different sources used in the SMI.

Table 2: Data sources and access for Shock Severity Monitoring

Data source	How is data accessed?
COVID-19 caseload data	Upon request to WHO, or from Ministry of Health (MoH) update presentations
REACH Population Monitoring Baseline (PMB)	Updated on a monthly basis by REACH South Sudan's Population Movement & Protection Unit
REACH Area of Knowledge (AoK)	Updated on a monthly basis by REACH's GIS Unit
Moderate Resolution Imaging Spectroradiometer (MODIS) Satellite Imagery	Drought analysis is conducted throughthe Google Earth Engine satellite imagery platform. Analysis of the Normalised Drought Difference Index (NDDI) is done on a monthly basis, using publicly available MODIS imagery.
Copernicus Sentinel-1 Satellite Imagery	Flood analysis is conducted through the Google Earth Engine satellite imagery platform. Analysis of flood extent is done on a monthly basis, using publicly available Sentinel-1 imagery.
Climate Hazards Group Infrared Precipitation with Station data (CHIRPS)	Publicly available dataset
WHO Integrated Disease and Surveillance and Response IDSR data	Upon request from the Health Cluster
REACH-CWG Joint Market Monitoring Initiative	Available in the first week of the month for the previous month; updated monthly by REACH South Sudan's Cash & Markets team.
Crop and Livestock Monitoring Information System (CLiMiS) price data	Publicly available dataset updated on a monthly basis.
ACLED	Publicly available dataset updated on a monthly basis.
Locust Monitoring	Upon request from Food and Agricultural Organisation (FAO) and through FAO field monitoring weekly updates

3.4 Integration into the Integrated Needs Tracking (INT) system

The SMI is designed to be a complementary feature to the INT system, particularly as a proxy early warning component. The INT system is a cross-cutting tracking system that enables the identification of areas where humanitarian needs are increasing, which can then be further analysed by the NAWG and other relevant humanitarian channels. As highlighted in the aforementioned REACH Shocks report, typology, occurrence, severity, reoccurrence and concurrence can all having different effects on the impact a shock has on a households or location's food security, engagement in negative coping strategies, and resilience to future shocks. Therefore, the use of the shock index as an early warning indicator within the INT system is crucial, allowing users to analyse the impact of shocks in combination with the other four INT conceptual components (FSL, WASH, Health, and Nutrition). The interconnected relationship between shocks and these INT components is highlighted in figure 4 below.

To assist the operationalisation of the SMI within the INT, the two systems will share the same set of thresholds for the different classifications (Minimal severity, moderate severity, high severity, very high severity). However, unlike the other conceptual indicators, the SMI will be both backward looking, by telling users that a shock has reportedly occurred, and forward-looking, as continued shocks reduce household resilience, increasing the risk of growing humanitarian needs, see figure 4. When analysed in tandem with the INT, the SMI is able to have multiplier effect on risk categorisation. For example, if a county is at 'moderate risk' based on the standard INT categories but has a very high SMI score, then the county will be flagged for internal review and may be updated to a 'high risk' category.

Figure 4 Interaction between INT conceptual indicators and shocks
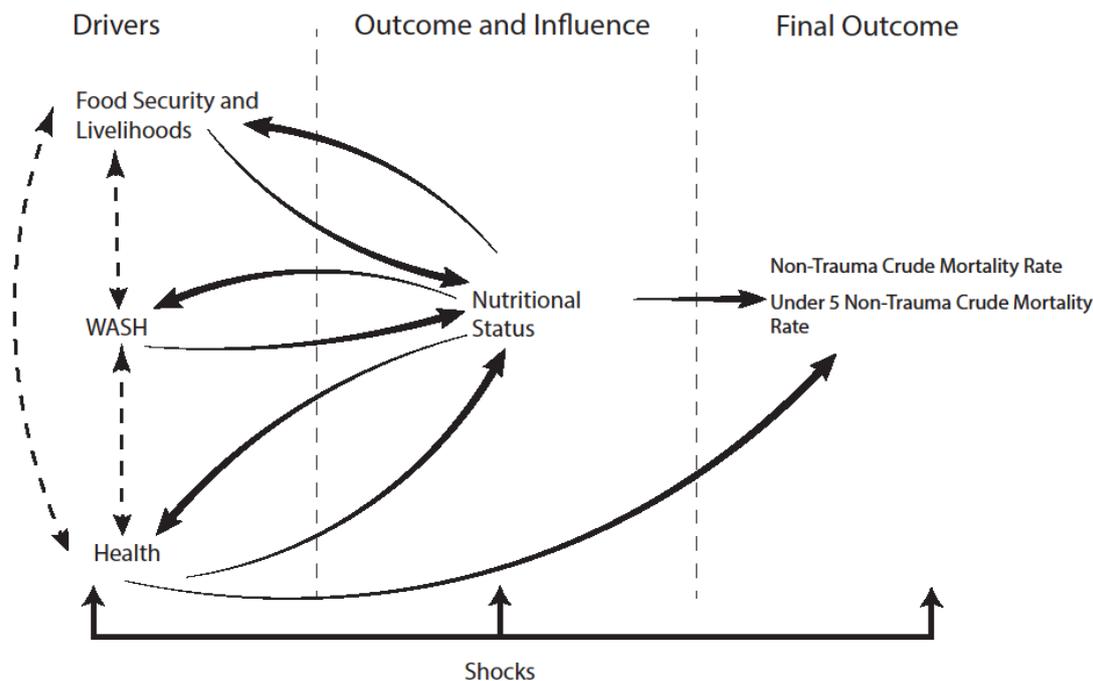
3.5 Shock Verification Assessments

The second major part of the SMI project is to use the index to identify potential counties or sub-county locations, and for REACH and supporting partners to carry out shock verification and exploration assessment in identified and agreed upon areas. The assessment will be triggered by the SMI, NAWG or ICCG and likely be carried out within the geographic area affected – varying on the type and scope of the shock observed. Each assessment will be designed to verify the shock, understand how the shock has impacted humanitarian needs, and to also determine how the shock may inform further development of the SMI. When launched, each assessment will have an independent and specific researc hdesign phase. Data collection will include, although not be limited to, focus group discussions (FGDs), key informant interviews (KIIs), direct observation and, when necessary, household level data collection through a multi-sector quantitative tool Additionally, to better conceptually understand the impact of shocks, exploratory questions will be utilised to explore the following topics:

- The interaction of various typologies of shocks (conflict, climatic, economic, policy, etc.) and their effects on household vulnerability, resilience, and food security.
- How does the timing of specific shocks affect the severity of shocks (rainy versus dry season)?
- The effects shocks have on household decisions outside of mitigation food consumption gaps, such as reducing protection risks.
- How does the combination of typology, timing and intensity of shocks affect household decision makings, such as displacement patterns and trade-offs?

The first ad-hoc assessment was conducted in Akobo in April 2020 in response to continued cycles of conflict and displacement shocks attributed to increased levels of food insecurity. This initial tool is attached in the below annex and will serve as an essential template for the development of future verification missions. A second assessment was conducted in Northen Bahr el Ghazal in December 2020 in response to compounding cycles of climate shocks being attributed to food insecurity and triggering displacement. The tool and methodology note are also in the below annex. In both instances, these assessments will serve to help guide the

development of the future REACH rapid and verification assessments. Furthermore, the information gathered will allow for the refining and adjusting of both the SMI and the INT and their inter-connected relationship, and also inform key research on the community perception of shocks and their impacts.

3.5.1 Assessment Protocols

The location of the verification assessment will determined by the area of interest meeting at least two of the following criteria:
- The location is triggered by the INT system as "Current risk high" or "Current risk very high."
- The SMI is at a similar category
- The NAWG and ICCG recommend a follow-up mission.

By following these parameters for assessment locations, the verification assessments will fill information gaps that exist within the humanitarian response.

All verification missions will follow a similar data collection structure, allowing for comparability and consistency. The FGDs and KIIs will support the objectives of the SMI (understanding the typology, occurrence, recurrence and concurrence of shocks) by ensuring that qualitative data are used to triangulate the magnitude and severity of the reported shock.

4. Roles and Responsibilities

The SMI system will be managed by the Sectors Unit within REACH South Sudan, and receive revision and feedback from the NAWG and other relevant cluster and technical bodies. The technical aspects of the system, data storage, coding, and verification assessments will be managed by REACH.

Table 3: Description of roles and responsibilities

Task Description	Responsible	Accountable	Consulted	Informed
Development of methodology	REACH Climate and Needs Officer	Assessment manager	GIS Officer, FSL Officer, WASH Officer, Senior AOs, Research Design and Data Unit (RDDU) in Geneva and AOs with area-specific knowledge	NAWG
Verification Assessments	REACH Climate and Needs Officer	Assessment manager	FSL assessment officer, County representative, cluster IMOs	NAWG
Establishing conceptual indicators	REACH Climate and Needs Officer	Assessment manager	NAWG, Cluster IMOs and technical leads	NAWG, cluster coordinators
Establishing thresholds	REACH Climate and Needs Officer	Assessment manager	Cluster technical experts	NAWG
Presenting at the NAWG and other fora	REACH Climate and Needs Officer	Assessment manager	Cluster technical experts	Ad-hoc
Processing data (i.e. preparing data)	REACH Climate and Needs Officer	Assessment Manager	Assessment manager, cluster IMOs	REACH GIS officer

Responsible: *the person(s) who executes the task*

Accountable: *the person who validates the completion of the task and is accountable of the final output or milestone*

Consulted: *the person(s) who must be consulted when the task is implemented*

Informed: *the person(s) who need to be informed when the task is completed*

NB: Only one person can be Accountable; the only scenario when the same person is listed twice for a task is when the same person is both Responsible and Accountable.

5. Risks & Assumptions

Risk	*Mitigation Measure*
Lack of political buy-in for the INT / SMI	The SMI is most useful when integrated with the INT. Therefore, it is crucial to ensure that clusters and decision makers feel that they are involved in every step of the process. By giving them ownership of the product, they are more likely to use it regularly.
Inability to conduct verification missions on a timely basis	Ensure there are AOs that are familiar with the tool and can quickly deploy to areas that are triggered by the SMI.
Collection of contradicting information during similar periods.	Review of methodology and data sources to ensure high-quality data is used
Duplicating efforts of other partners	Through research and conversation with other organisations that may be or have intentions to build a shock monitoring index.
Lack of consistent, timely data	1) Ensuring that IMOs can easily submit data to the system without burdensome format requirements. 2) Data sources that are collected monthly (AoK, admission data) are integrated into the system even if they are not always representative of the county population.

6. Monitoring & Evaluation Plan

IMPACT Objective	External M&E Indicator	Internal M&E Indicator	Focal point	Tool	Will indicator be tracked?
Humanitarian stakeholders are accessing IMPACT products	Number of humanitarian organisations accessing IMPACT services/products Number of individuals accessing IMPACT services/products	# of website visits	Country request to HQ	User_log	Yes
		# of downloads of INT factsheets from Relief Web	Country request to HQ		Yes
		# of downloads of INT factsheets from Country level platforms	Country team		Yes
		# of page clicks on INT website link from the country newsletter, sending blue, bit.ly	Country team		Yes
IMPACT activities contribute to better program implementation and coordination of the humanitarian response	Number of humanitarian organisations utilising IMPACT services/products	# references in HPC documents (HNO, SRP, Flash appeals, Cluster/sector strategies)	Country team	Reference log	*NAWG, ICWG, 2019 South Sudan HPC. IPC updates, FSL/WASH Cluster updates*
		# references in single agency documents			*Assist VSF, Oxfam, ICRC, ACTED, Save the Children with prioritising operational areas.*
Humanitarian stakeholders are using IMPACT products	Humanitarian actors use IMPACT evidence/products as a basis for decision making, aid planning and delivery Number of humanitarian documents (HNO, HRP, cluster/agency strategic plans, etc.) directly informed by IMPACT products	Perceived relevance of IMPACT country-programs	Country team	Usage_Feedback *and* Usage_Survey template	*Conversation and survey monkey with key stakeholders on how they use REACH RA products, what they find useful and how to improve*
		Perceived usefulness and influence of IMPACT outputs			
		Recommendations to strengthen IMPACT programs			
		The perceived capacity of IMPACT staff			
		Perceived quality of outputs/programs			
		Recommendations to strengthen IMPACT programs			
Humanitarian stakeholders are engaged in IMPACT programs throughout the research cycle	The number and/or percentage of humanitarian organisations directly contributing to IMPACT programs	# of organisations providing resources (i.e.staff, vehicles, meeting space, budget, etc.) for activity implementation	Country team	Engagement_log	Yes
		# of organisations/clusters inputting in research design and joint analysis			Yes
		# of organisations/clusters attending briefings on findings;			Yes

7. Appendix

7.1 Indicator thresholds for Conflict shock pillar

Indicator	Data Source	Indicator Weight	Severity (Ranking)	Indicator Threshold	Rationale / Analysis
Insecurity leading to fatalities in the past month	ACLED	0.2	Percentage of assessed settlements reporting:		Armed conflict has a central role in the disruption of livelihoods and reducing access to food, impeding access to services, and exacerbating a range of humanitarian needs. Multiple fatalities attributed to insecurity and conflict are a strong indicator of a conflict shock in a county. Fatalities may be attributed to armed conflict, looting, protests, or riots.
			Very high (4)	x > 15	
			High (3)	10< x <=15	
			Moderate (2)	5< x <=10	
			Low (1)	Above conditions are not met	
Incidences of civil unrest in past month	ACLED	0.12	Number of incidences of civil unrest:		Incidences of civil unrest include riots, mob violence, violent demonstrations, looting or property destruction as reported by ACLED. As well as being directly representative of deteriorating security conditions in an assessed area, civil unrest can also be a determinant of an impending deterioration of security and conflict dynamics.
			Very high (4)	x >3	
			High (3)	2< x <=3	
			Moderate (2)	1< x <=2	
			Low (1)	Above conditions are not met	
Incidences of armed conflict attributed to inter-communal violence in past month	Per reported data from an NGO in South Sudan that focuses on independently collecting and analysing security incident data for humanitarians.	0.2	Number of armed conflict events attributed to inter-communal violence:		Armed conflict has a central role in the disruption of livelihoods and in reducing access to food, impeding access to services, and exacerbating a range of humanitarian needs. Multiple armed conflict events occurring in a month is a strong indicator of a conflict shock in a county. Inter-communal violence (ICV) is regularly reported in South Sudan, and thus monitoring ICV is key to building an understanding of shock severity.
			Very high (4)	x >= 3	
			High (3)	2<= x < 3	
			Moderate (2)	1<= x < 2	
			Low (1)	Above conditions are not met	
Incidences of armed conflict attributed to organised armed groups	Per reported data from an NGO in South Sudan that focuses on independently collecting and analysing	0.12	Number of armed conflict events attributed to organised armed groups:		Armed conflict has a central role in the disruption of livelihoods and in reducing access to food, impeding access to services, and exacerbating a range of humanitarian needs. Multiple armed conflict events occurring in a month is a strong indicator of a conflict shock in a
			Very high (4)	x >=3	
			High (3)	2<= x < 3	

			Moderate (2)	1<= x < 2	county. Armed conflict attributed to organised armed groups (OAGs) is reported less frequently than ICV, however can be a determinant of regional and more sophisticated conflict, thus making it key in building an understanding of shock severity.
	security incident data for humanitarians.		Low (1)	Above conditions are not met	
Cattle raiding in past month	REACH - AoK[5]	0.12	Proportion of settlements where KIs reported:		Cattle raiding can drive the disruption of disruption of livelihoods and in reducing access to food, impeding access to services, and exacerbating a range of humanitarian needs. In addition, cattle raiding can be an indicator of a breakdown in regional conflict dynamics and it is thus key to monitor to understand conflict severity.
			Very high (4)	x >=35%	
			High (3)	20% <= x < 35%	
			Moderate (2)	10%<= x < 20%	
			Low (1)	Above conditions are not met	
Conflict has impacted access to food	REACH AoK	0.12	Proportion of settlements where KIs reported:		Monitoring the impact of conflict/instability on access to food is a useful proxy for understanding the severity of conflict events.
			Very high (4)	Conflict has had large impact on access to food >=15% OR Conflict has had large impact and conflict on access to food + conflict has had small impact on access to food >= 50%	
			High (3)	20% <= Conflict has had large impact and conflict on access to food + conflict has had small impact on access to food < 30%	

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[5] For all AoK Indicators we take the standard consensus-based approach to analysing differing key-informant (KI) based responses.

			Moderate (2)	10%<= Conflict has had large impact and conflict on access to food + conflict has had small impact on access to food < 20%	
			Low (1)	Above conditions are not met	
Conflict has triggered displacement	REACH - AoK	0.12	Proportion of settlements where KIs reported new arrivals in the past month who had been reportedly displaced by conflict:		Monitoring the impact of conflict/instability on displacement is a useful proxy for understanding the severity of conflict events.

7.2 Indicator thresholds for Displacement shock pillar

Indicator	Data Source	Indicator Weight	Severity (Ranking)	Indicator Threshold	Rationale
Arrival of IDPs in past month	PMB	0.8	Number of displaced persons:		Significant numbers of arrivals of displaced persons to a community/area has the potential to exacerbate access to food and essential services, as well as having the potential to disrupt livelihood patterns.
			Very high (4)	x >= 5000	
			High (3)	3400<= x < 5000	
			Moderate (4)	1700<= x < 3400	
			Low (1)	Above conditions are not met	
New IDP arrivals impacting adequate access to food	REACH AoK	0.2	Proportion of settlements where KIs reported returnees or new arrivals in the past month:		Monitoring the impact of newly displaced persons on community access to food is a useful proxy for understanding the severity of displacement events.

7.3 Indicator thresholds for Natural Hazard shock pillar

7.3.1 Indicator thresholds for drought shock component

Indicator	Data Source	Indicator Weight	Severity (Ranking)	Indicator Threshold	Rationale
Drought	MODAS Satellite	0.7	Percentage of assessed settlements reporting an increase or decrease in comparison to long term mean:		Spectral satellite imagery analysis is conducted to of MODAS satellite imagery to analyse the severity of drought at the county level. Normalised Difference Drought Index (NDDI) is used to assess drought severity. NDDI is the index value between Normalised Difference Vegetation Index (NDVI) and Normalised Difference Water Index (NDWI) values, and is an index value regularly used in remote sensing analysis of drought. To detect anomalies in drought levels and thus identify shocks, the mean NDDI value is calculated for each month of analysis, and compared with a long term average monthly drought figure calculated for each county from imagery between 2001-2019.
			Very high (4)	x >= 9%	
			High (3)	6% <= x < 9%	
			Moderate (2)	3% <= x < 6%	
			Low (1)	Above conditions are not met	
Rainfall	CHIRPS	0.15	Counties reporting a decrease in rainfall in comparison to long term mean:		Rainfall is crucial for all livelihoods in South Sudan. Dry spells can limit crop production and force cattle to migrate further than usual to find water and grazing land. Excessive rainfall can lead to outbreaks of pest that damage crops, spread livestock disease, and cause road closures, limiting supplies to remote locations.
			Very high (4)	x >=30%	

			High (3)	20% <= x < 30%	
			Moderate (2)	10%<= x < 20%	
			Low (1)	Above conditions are not met	
Drought had impacted agriculture in past month	REACH AoK	0.15	Proportion of settlements where KIs reported:		Monitoring the impact of drought on agriculture is a useful proxy for understanding the severity of drought as a natural hazard.

7.3.2 Indicator thresholds for flood shock component

Indicator	Data Source	Indicator Weight	Severity (Ranking)	Indicator Threshold	Rationale
Flooding	Sentinel-1 Satellite	0.7	Percentage of assessed settlements reporting:		Synthetic Aperture Radar (SAR) satellite imagery analysis of Sentinel-1 imagery is conducted to detect and quantify the amount of flood inundation. Flood severity is calculated by comparing the difference in surface area of flooding (km2), with the long term average (2017-2019) surface area of flooding (km2), for the month of interest. For the peak of the rainy season between July-September, for counties identified as being particularly susceptible to heavy flooding, flood severity is calculated by calculating the total surface are of flooding in the county of interest.
			Very high (4)	Increase or decrease from long term flooding mean >= 9%. For areas identified as susceptible to regular severe flooding during the rainy season (July-Sept), coverage of flood extent > =10% of total county surface area	
			High (3)	Increase or decrease from long term flooding mean 6% < x <= 9% For areas identified as susceptible to regular severe flooding during the rainy season (July-Sept), coverage of flood extent 7.5% <= x < 10 %of total county surface area	

			Moderate (2)	Increase or decrease from long term flooding mean > 3% For areas identified as susceptible to regular severe flooding during the rainy season (July-Sept), coverage of flood extent 5% <= x < 7.5% of total county surface area	
			Low (1)	Above conditions are not met	
Rainfall	CHIRPS	0.1	Counties reporting a decrease in rainfall in comparison to long term mean:		Rainfall is crucial for all livelihoods in South Sudan. Dry spells can limit crop production and force cattle to migrate further than usual to find water and grazing land. Excessive rainfall can lead to outbreaks of pest that damage crops, spread livestock disease, and cause road closures, limiting supplies to remote locations.
			Very high (4)	x >=30%	
			High (3)	20% <= x < 30%	
			Moderate (2)	10%<= x < 20%	
			Low (1)	Above conditions are not met	
Households displaced by flooding in past month	REACH AoK	0.2	Proportion of settlements where KIs reported:		Monitoring the impact of flooding on displacement is a useful proxy for understanding the severity of flooding.
			Very high (4)	x >=45%	
			High (3)	30% <= x < 45%	
			Moderate (2)	15%<= x < 30%	
			Low (1)	Above conditions are not met	

7.4 Indicator thresholds for Disease Incidence shock pillar

Indicator	Data Source	Indicator Weight	Severity (Ranking)	Indicator Threshold	Rationale
Displacement triggered by disease outbreak	REACH AoK	0.2		Proportion of settlements where KIs reported:	Monitoring the impact of a disease outbreak on displacement is a useful proxy for understanding the severity of a possible disease outbreak.
			Very high (4)	x >= Disease had caused already caused displacement >=15% OR Disease had caused already caused displacement + households were planning to move due to disease >= 30%	
			High (3)	20% <= Disease had caused already caused displacement + households were planning to move due to disease < 30%	
			Moderate (2)	10%<= Disease had caused already caused displacement + households were planning to move due to disease < 20%	
			Low (1)	Above conditions are not met	
Health impacted ability to access food	REACH AoK	0.2		Proportion of settlements where KIs reported:	Monitoring the impact of ill health on ability to access food is a useful proxy for understanding of health related issues
			Very high (4)	Health problems have had a large negative impact on access to food >=15% OR Health problems have had a large negative impact on access to food + health problems have had a small impact on access to food >=40%	
			High (3)	30% <= Health problems have had a large negative impact on access to food +	

			Moderate (2)	20%<= Health problems have had a large negative impact on access to food + health problems have had a small impact on access to food < 30%	
			Low (1)	Above conditions are not met	
Ebola	WHO IDSR	1	Percentage of assessed settlements reporting:		Ebola is an extremely dangerous virus that will likely result in border closures and break down of social structures in the country. As a result, it must be carefully monitored and given the highest priority for health implications. If any case of ebola is identified the severity of this pillar is immediately calculated as very high.
			Very high (4)	Confirmed cases >= 1	
			High (3)	N/A	
			Moderate (2)	N/A	
			Low (1)	Above conditions are not met	
Measles	WHO IDSR	0.2	Percentage of assessed settlements reporting:		Measles is considered an severe disease that can lead to high mortality rates among children and actively drive global acute malnutrition (GAM) prevalence.
			Very high (4)	Morbidity x >= 77% of historic national rates	
			High (3)	Morbidity 66% <= x < 77% of historic national rates	
			Moderate (2)	Morbidity 55%<= x < 66% of historic national rates	
			Low (1)	Above conditions are not met	
Cholera //AWD	WHO IDSR	0.2	Percentage of assessed settlements reporting:		Cholera is considered an extremely severe disease that can lead to high mortality rates among children and actively drive global acute malnutrition (GAM) prevalence. Diarrhoeal disease is the second leading cause of death in children under five years old. Where data is not available for cholera morbidity, or if cholera caseload is zero, AWD cases are used to calculate severity.
			Very high (4)	Morbidity x >= 77% of historic national rates	
			High (3)	Morbidity 66% <= x < 77% of historic national rates	
			Moderate (2)	Morbidity 55%<= x < 66% of historic national rates	
			Low (1)	Above conditions are not met	

8. Annexes

8.1 KII and FGD tools used for April 2020 Akobo verification mission

8.2 Methodology note & tool for shock verification assessment December 2020 Northern Bahr el Ghazal

Annexe 8.1: April 2020 Akobo Verification Mission Tools
Area of Knowledge Food Security and Livelihoods Focus Group Discussions
FOCUS GROUP DISCUSSION QUESTION ROUTE

Moderator Name: **Assistant Moderator Name:**

Focus Group Name/Code: **Started at**   **Completed at**

Name	Area of knowledge	How do they know about area? (Recently left, HH member visited, Regular contact etc.)	State of origin	Age	Sex
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

INTRODUCTION

A. Facilitator's welcome, introduction and instructions to participants [5 minutes]

– Welcome and thank you for volunteering to take part in this discussion. You have been asked to participate as your point of view is important. I appreciate your time.

– This discussion is designed to understand the overall welfare situation in your community and factors and risks affecting this welfare amongst communities like yours across South Sudan.

- Participation to this discussion is entirely voluntary, and anyone who does not desire to participate can leave. It is not mandatory to answer all the questions.

- **Anonymity:** I would like to assure you that the discussion will be anonymous. We would appreciate it if you would refrain from discussing the comments of other group members outside of this session. If there are any questions or discussions that you do not wish to answer or participate in, you do not have to do so; however please try to answer and be as involved as possible.

- The discussion will take no more than 1 hour.

- The FGD uses the generic word "shock" to represent an acute event that has directly affected livelihoods in the area being assessed. It could be one or multiple events and has reportedly led to a large decrease in access to livelihoods, food, and critical services. The 'shock' should be pre-identified before the assessment.

B. Ground rules [2 minutes]

- The most important rule is that only one person speaks at a time. There may be a temptation to jump in when someone is talking but please wait until they have finished.

- There are no right or wrong answers.

- You do not have to speak in any particular order.

- When you do have something to say, please do so. There are many of you in the group and it is important that I obtain the views of each of you.

- You do not have to agree with the views of other people in the group.

- Does anyone have any questions? (*answers*)

- With this in mind, may I tape the discussion to facilitate its recollection? *(if yes, switch on the recorder)*

- OK, let's begin.

QUESTION ROUTE (60minutes)

Stage 1: IDENTIFYING LIVELIHOODS [10 minutes]

Note to facilitator: the purpose of this stage is to identify 〝normal〞 livelihoods, before the shock. Make sure that participants are talking about their day to day livelihoods.

1. **[Engagement Question]** In normal times, what main activities do most households in your area engage in to access and acquire resources that meet their needs?

   ➢ **[Probing Questions]**

      a. How important is agriculture (crops and livestock) as an activity for most households in this area? In a normal year, what challenges (if any) are faced in undertaking agricultural activities?

      b. What other sources of livelihoods are usually available in this area? (add on flipchart)

[Participatory Mapping] *Direct participants to the map and ask participants to mark the following:*

Note to facilitator*: Introduce participants to the map, show them key features (big roads, rivers) and ask them to find their settlement of knowledge on the map. Get each participant to help you mark where their settlement is, <u>do not</u> try and do this for them, or let others do so, encourage touching and pointing of the map so they all feel comfortable and understand how to read the basic geographical features and where they live.

- *[If agricultural activities present] Where on the map are agricultural activities (crops and livestock) being regularly undertaken? (outline with a blue marker where these activities are being used)*

- *[if other income/resource generating activities present] Where on the map are different employment opportunities and IGAs available (outline with a black marker where these activities are being used)?*

2. What challenges are most households in your area facing in terms of livelihoods this year?

3. Are there longstanding problems that affect the households's ability to rely on traditional livelihoods?

Stage 2: IDENTIFYING IMPACT OF A SHOCK ON LIVELIHOODS AND ACCESS TO FOOD 10 minutes]

2. How has the recent shock affected access to livelihoods (agriculture and livestock rearing, fishing…) for most households in your area?

2.1. How has the recent shock affected agriculture in your area?

➢ **[Probing Questions]**

a. How is the harvest this year, and how does it compare to the 2018 harvest?

b. In comparison to previous years, how many feddans are people planting? (I.e. Are they planting more or less compared to previous years?)

[Participatory Mapping] *Direct participants to the map and ask participants to mark the following:*
a. *[If agricultural activities present] Where on the map have agricultural activities been affected by shock the most?*
b. *[If agricultural activities present] Where on the map has access to pasture for livestock been affected by shock the most?*

2.2. How has the recent shock affected livestock rearing in your area?

[Probing Questions]

a. Has access to cattle been affected by shock or other factors this year?

b. Has the recent shock affected cattle migration patterns? If so, how?

c. Do livestock keepers expect there to be any reduction in access to grazing area during the dry season? If so, where will they go? Will livestock be over crowded?

[Participatory Mapping] *Direct participants to the map and ask participants to mark the following:*

a. *Draw cattle migration patterns. If the migration patterns have been modified as a result of the shock, draw the ''normal' migration routes and the ''new'' migration routes with two different colours.*

2.3. **Have any other factors affected access to livelihoods this year? If so, which ones? (probe for pests, conflict, insecurity, other climatic problems, etc.)**

> **[Participatory Mapping]** *Direct participants to the map and ask participants to mark the following:*

>> *a. Draw any other shocks that may have affected livelihoods over the past 3 months.*

3. What is currently the main source of food in [AREA OF INTEREST]? Which other sources of food do most households rely on in this area?

> ➢ **[Probing Questions]**

>> a.   Is there sufficient access to food [AREA OF INTEREST)?

>> b.   If no, how does access do food compared to the period before the shock?

>> c.   If no, which are the reasons for absence/insufficient access to food?

4. Has market access been affected by shock in this area? If so, how?

> a. Are prices for retail staple foods increasing, decreasing or staying the same?

> b. How do HHs expect the prices to change in the next few months, and why?

> c. Do HHs expect that their access to functioning markets will reduced be due to challenges inflicted by shock?

4.   Do you foresee that HHs will be facing more challenges in their ability to access enough food in the near future due to the shock? If so, how?

> ➢ **[Probing Questions]**

> a. How long do you expect harvest to last from the current cultivation cycle?

> b. Are HHs planning to engage in smaller agricultural activities such as planting vegetables?

> c. How do HHs expect that hunger may compare with previous historical episodes of hunger in the area?

> **Note to facilitator**: On a flipchart, list key periods of hunger with the local name and descriptions/causes. Probe participants on whether they expect this year will be worst or better than these episodes.

Stage 3: RISK RESILIENCE AND MITIGATION [20 minutes]

1. What are the usual strategies that most households in your area adopt to cope with a lack of resources to meet your families basic needs?

> ➢ **[Probing questions]**

>> a.   Are households of your area currently able to use these strategies to cope with a lack of resources?

b. If not, why are they unable?

c. Are there some HHs that are considering migration to Sudan as a coping strategy? If so, which members of the household will be migrating?

2. Have the strategies used by most households of your area to cope with a lack of resources changes in the past 30 days?

➢ **[Probing questions]**

a. If these strategies have recently changed, what strategies are HHs now using?

b. Why have these strategies recently become unavailable?

3. Do households in your area rely on family networks, neighbours and friends to share resources and receive support when facing food or resource shortages?

➢ **[Probing questions]**

a. Could you please describe how these networks of support work?

b. Are these networks of support still functioning?

c. If not, why not?

d. If not, since when have these support networks ceased to function?

CONCLUSION [5 MINUTES]

– Thank you for participating. This has been a very successful discussion. We hope you found it interesting
– Your opinions will be a valuable asset to the study
– I would like to remind you that any comments featuring in this report will be anonymous.
– Before you leave, please ensure you have completed the personal details. questionnaire

Key Informant Interview Tool

- Will be the first tool used in the assessment
- This tool is broad topics to be discussed with key informants (KIs) on the ground
- Target KIs, NGO FSL and WASH officers, government ministers from the health and agriculture departments.

1. **Have any recent shock(s) disrupted food availability or the communities' ability to access food? (Availability is the general level of food in the area; access reflects a HHs ability to obtain the food – physical, financial or social restrictions apply)**
   - **Probing questions**
     i. Describe the shock – security, climatic, economic
     ii. How much of the population was affected?
     iii. Are their particular groups that were more effected?

2. How does this year's harvest compare to previous years?

➢ **Probing questions**
   • If worse, why?

           ◦   Pest, erratic rainfall, less land planted – why? Lack of tools, insecurity
- What are the primary crops planted?
- What are the main areas for crop production?

3. How does access to food for the general population in the affected location changed during the previous 3 months compare to the same period last year?

    ◦   How long do you expect harvest to be available for consumption for the current cultivation cycle?
    ◦   If worse, why?
    ◦   If worse, how does this year compare to 'years of extreme hunger'?

4. Did shock(s) affect other livelihoods and people's ability to access enough food? (fishing, livestock rearing…) If so, how?

    ➢ **Probing questions**

- How did shock(s) affect livestock rearing?
- Are most traditional grazing grounds still accessible following the shock(s)?
- How did shock(s) affect fishing?
- How did shock(s) affect market supply?

4. Over the past six months, what were other challenges to livelihoods apart from the shock(s)?

    ➢ **Probing questions**

- Has there been an outbreak in disease (both cattle and human) in the past 6 months?
- Has there been an increase in insecurity (intra-communal or inter-communal) that has limited access to traditional livelihoods in the past 6 months?
- Has the availability of resources such as agricultural inputs and tools, or fishing kits, decreased in the past 6 months?

5. How have communities coped with the impacts of the shock(s) mentioned previously on their livelihoods and on their access to food?

    ➢ **Probing questions**

- Human migration to other locations?
- Have households change cattle migration routes as a result of the destruction of pasture by shock(s)?
- Has there been an increased dependence on certain livelihoods?
- Have people been limiting their consumption of food to cope with limited access to food?
- Increased raiding for resources (including cattle)

5. **Since climatic shocks have been taking place regularly most years, how have communities been adapting their livelihoods in order to mitigate vulnerability to shocks and to build resilience?**

Annexe 8.2: December 2020 Climate Impact Assessment Northern Bahr el Ghazal

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METHODOLOGY NOTE AND QUESTION ROUTE

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1. Executive Summary

Country of intervention		*South Sudan*					
Type of Emergency	□	Natural disaster	X	Conflict	□	Other *(specify)*	
Type of Crisis	□	Sudden onset	□	Slow onset	X	Protracted	

Mandating Body/ Agency	REACH	
IMPACT Project Code	32iAEI	
Research Timeframe *Add planned deadlines (for first cycle if more than 1)*	1. Travel to Field: 30/11/2020	2. Preparation/training complete: 30/11/2020
	3. Start collect data: 1/12/2020	4. Data collection complete: 5/12/2020
	5. Return to Juba: 7/12/2020	6. Data analysed: 14/12/2020
	7. Preliminary presentation: 19/03/2020	8. Report drafted: 28/12/2020
Audience Type & Dissemination *Specify who will the assessment inform and how you will disseminate to inform the audience*	**Audience type**	**Dissemination**
	X Programmatic	**X** General Product Mailing (e.g. mail to NGO consortium; HCT participants; Donors) X Presentation of findings (e.g. at HCT meeting; Cluster meeting)
Detailed dissemination plan required	□ Yes	X No
General Objective	*To understand the impact of drought and flooding on communities in NBeG to better inform the humanitarian support.*	
Specific Objective(s)	A) **Flood and drought 2020 impact analysis:** Understanding current inter-connected severity of needs in order to better inform immediate and future humanitarian assistance. B) **Inter-connected nature of the subsequent impact flooding and drought:** Understanding implications for humanitarian needs when drought is followed by flooding. C) **Understanding the effect of climate change on community practices, and future coping strategies:** How are communities planning to adapt to mitigate the impact of increased climate hazards? How have practices already changed? D) **Understanding common perceptions around climate change and future climatic hazard vulnerability:** Climate change is going to lead to increasingly volatile conditions, and localised perceptions and understanding around this phenomenon are key to providing future community engagement and assistance. E) **Identifying indicators that can be used to flag risk of deteriorating conditions:** To better assist future early warning systems, this assessment aims to identify proxy indicators to better flag future deterioration of conditions.	
Research Questions	1) What are typical income generating activities and what does the cultivation calendar usually look like? 2) Are communities facing increased exposure to extreme weather events? 3) What was the impact of drought on humanitarian needs in 2020? 4) What was the impact of flooding on humanitarian needs in 2020? 5) What are local perceptions of the severity of existing and future climate shocks? 6) What are planned coping and adaptation strategies for future climate shocks?	
Geographic Coverage	Northern Bahr el Ghazal State (Aweil Centre, Aweil East, Aweil North, Aweil South, Aweil West counties).	
Population(s) *Select all that apply*	□ IDPs in camp	□ IDPs in informal sites
	□ IDPs in host communities	□ IDPs [Other, Specify]
	□ Refugees in camp	□ Refugees in informal sites
	□ Refugees in host communities	□ Refugees [Other, Specify]
	X Host communities	□ [Other, Specify]

Data collection tool(s)	□	Structured (Quantitative)		X	Semi-structured (Qualitative)	
	Sampling method			**Data collection method**		
Structured data collection tool # 1 *Select sampling and data collection method and specify target # interviews*	X	Purposive		Focus group discussion (Target #): 8		
Data management platform(s)	X	IMPACT		□	UNHCR	
Expected ouput type(s)	X	Situation overview #: _ _	□	Report #: _ _	□	Profile #: _ _
	□	Presentation (Preliminary findings) #: _ _	X	Presentation (Final) #: _ _	□	Factsheet #: _ _
	□	Interactive dashboard #:_	□	Webmap #: _ _	□	Map #: _ _
Access	X	Public (available on REACH resource center and other humanitarian platforms)				
	□	Restricted (bilateral dissemination only upon agreed dissemination list, no publication on REACH or other platforms)				
Visibility *Specify which logos should be on outputs*	*REACH*					

2. Rationale

The state of Northern Bahr el Ghazal (NBeG) is susceptible to experiencing both drought and flooding as extreme weather shocks.[1] Historically, NBeG is one of the most frequently drought-affected regions in South Sudan, yet there is limited information on the humanitarian implications of drought-related climate shocks.[6] Further, NBeG state regularly experiences severe flooding shocks, which can have disastrous humanitarian implications by triggering displacement, creating physical barriers to movement, and damaging agricultural cropland.[7]

In 2020, NBeG was affected by these dual climate shocks of drought and flooding, which are attributed with causing a particularly complex combination of humanitarian needs. It has been reported that farmers were unable to plant crops in the typical planting season (May-June) due to drought, and subsequent flooding has adversely affected large areas of cropland leading to complications in the typical cultivation season (Oct-Nov).[8] Logistical constraints have also meant that three humanitarian food distributions were missed in Aweil South county, in August, September, and October, putting increased pressure existing food stocks.

Although these climatic shocks are not uncommon in NBeG, climate change will likely cause them to increase in frequency and severity. As such, it is important to develop a better understanding of the impact of these types of shocks, particularly when occurring consecutively, to better inform existing and future humanitarian response. Further, given the significant impact climate change is likely to have in areas such as NBeG in the future, it is also critical to better understand community level perceptions around historic and future weather hazards, as well as existing and planned adaptation and coping mechanisms.

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[6] Food and Agriculture Organization of the United Nations (FAO) – Global Information and Early Warning System (GIEWS)
[7] J.V. Sutcliffe and Y.P Parks – The Hydrology of the Nile, Chapter 6 - The Bahr El Ghazal Basin
[8] Famine Early Warning Systems Network (FEWS NET) – Livelihood Zone Map and Descriptions for the Republic of South Sudan

3. Objectives

The general objective of the assessment is to understand the impact of drought and flooding on communities in NBeG to better inform humanitarian support. Additionally, the assessment aims to build an understanding of community level perceptions around extreme weather events and the coping strategies and mechanisms used to adapt to them. The specific research questions for the assessment are as follows:

1. What are typical income generating activities and what does the cultivation calendar usually look like?
2. Are communities facing increased exposure to extreme weather events?
3. What was the impact of drought in 2020 on humanitarian needs?
4. What was the impact of flooding in 2020 on humanitarian needs?
5. What are perceptions on the severity of existing and future climate shocks?
6. What are planned coping and adaptation strategies for future climate shocks?

4. Methodology Overview

Coverage:

We will be exploring the above research questions through qualitative assessment, primarily using focus group discussions (FGDs). NBeG consists of five counties; Aweil Centre, Aweil East, Aweil North, Aweil South, and Aweil West. In order to understand the implications of the aforementioned climate shocks across the state, FGDs will be conducted in all counties. For Aweil North FGDs will be conducted in Gok Machar. For the remaining counties FGDs will be coordinated from the centrally located Aweil Town. Participants will be selected through community mobilisation conducted by the South Sudan Relief & Rehabilitation Commission (RRC), who will make sure to obtain participants from a broad demographic and socio-economic strata. Half of all FGDs will be all male, with the remaining half all female.

Data collection:

Eight FGDs will be conducted across four days. Two FGDs will be conducted in both Aweil North and Aweil South as the former has been particularly ill affected by flooding and the latter was reported as having highly concerning food security findings in the recent Food Security and Nutrition Monitoring System (FSNMS) data (September/October 2020). Four FGDs will be conducted across the remaining three states. In order to reduce gender bias of the data collection, half of the FGDs will be conducted solely with male participants, and the other half solely with female participants. This assessment is being jointly conducted with REACH South Sudan's population movement team, who are implementing a parallel qualitative assessment on displacement triggered by climate shocks.

Focus Group Discussion Question Route:

1. **What are the main livelihood or income generating activities in your settlement?**
    a. What does the usual cultivation calendar look like (months of sowing/growing/harvesting, livestock movement)?
        i. How does this align with weather patterns?
        ii. When is the dry season?
        iii. When is the rainy season?

2. **Have there been changes in weather patterns in recent years?**
    [Probing questions]
    a. Have you noticed a change in the dry season over the past 10-20 years?

        i.   Have droughts become worse? More common? Longer?
- b. Have you noticed a change in the rainy season conditions over the past 10-20 years?
  - i.   Has flooding become worse? More common? Longer?
- c. Do you think this trend will continue?

3. What difficulties or shocks has your community encountered this year?
- a. Climatic, conflict-related, other…

4. Were you affected by drought between May – July this year?
[Probing questions]
- **a.** Was this drought more severe than the previous periods of drought you have mentioned? If so, how?

5. **What was the impact of recent drought [July 2020] on agricultural livelihood opportunities:[9]**
[Probing questions]
- a. Agriculture:
  - i.   Has the drought impacted the amount of food/cereal available in this current harvest period?
  - ii. Were farmers able to plant staple crops such as sorghum in the drought? If not, why not? Was the soil too dry? Conditions too hot?
  - iii. How was crop health affected?
- b. Pastoralists:
  - i.   How was livestock affected?
  - ii. Was there an increase in livestock disease?
  - iii. Did reduced access to drinking water have an impact on livestock health?
  - iv. Were livestock migration patterns altered?
- c. Was access to wild foods affected by drought?

6. How did normal food consumption habits change due to the drought?
- a. Was there a change to the type of food people ate? If so, what was the change?
- b. Was there a change in how many meals people consumed per day?
- c. How was food consumption affected by (the absence/presence of) humanitarian food aid?
- d. If people faced a shortage of food, what strategies did they use to cope (sharing food, selling/killing more livestock, skipping meals)?
  - i.   Are these strategies normal in your area?

7. Did the drought this year have any other significant implications?
[Probing questions]
- a. Was access to drinking water affected? If so, how?
- b. Was there an increase in the level of disease and illness? *[Facilitator note: There is potentially an increase in malnutrition related and respiratory diseases]*

8. Was the flooding this year worse than previous years?
[Probing questions]
- a. Has the land affected been inundated for more or less time than previous years? Was the amount of land affected more or less than the previous year?
- b. When are you expecting existing food stocks to run out? Is this earlier than last year?

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[9] Question route may have to be altered depending on audience as identified in question 1.

      c.   Have market prices risen more than is typical for this time of year? Is there less availability of key goods at market than is typical for this time of year?

9. **What was the impact of recent flooding on access to food and agricultural livelihood opportunities?**
[Probing questions]
   - a. Agriculture:
     - i. Were crops affected by flooding? Approximately what percentage was lost due to flooding? Was more cropland affected than last year?
     - ii. During the floods were farmers able to access farmland to weed and tend for produce?
   - b. Pastoralists:
     - i. Were livelihood migration routes altered?
     - ii. Was there an impact on livestock disease?

10. **Did the flooding this year have any other significant implications?**
[Probing questions]
   - a. What was the impact on mobility/transport? How did this affect access to healthcare, education and markets?
   - b. Was there an increase in water-borne diseases? *[Facilitator note: There is potentially an increase in water-borne diseases such as malaria and measles]*

11. **What has been the impact of the combination of drought in May-July followed by subsequent flooding on access to food and livelihoods?**
[Probing questions]
   - a. Is there an increased reliance on humanitarian assistance to address gaps in food availability?

12. **Do you think that extreme weather such as flooding and drought will happen more often in the future?**

13. **If extreme weather did take place more frequently in the future, what strategies are you planning to employ to ensure that you will be able to maintain your livelihoods and access to food?**
[Probing questions]
   - a. Are you planning to change agricultural practices?
     - i. Are you looking to employ more mechanized practices?
     - ii. Are you changing rotation policies?
     - iii. Are you looking to change when you plant and harvest crops? Are you looking to change which crops you plant?
   - b. For pastoralists, are you looking to change livestock migration patterns? Or are you planning to sell more livestock?

14. **If extreme weather did take place more frequently in the future, what strategies are you planning to employ to keep yourself and your household safe?**
[Probing questions]

   - a. Are you planning to relocate your dwelling/shelter to somewhere in the nearby area less exposed to floods/droughts? [micro-displacement]
   - b. Are there any plans to improve flood prevention mechanisms such as digging dykes and banks to mitigate future flooding?