

Research Terms of Reference

COVID-19 Monitoring Framework

SSD2001 South Sudan

June 2020 V1

REACH Informing more effective humanitarian action

1. Executive Summary

Country of intervention	South Sudan		
Type of Emergency	<input checked="" type="checkbox"/>	Natural disaster	<input type="checkbox"/> Conflict
Type of Crisis	<input checked="" type="checkbox"/>	Sudden onset	<input type="checkbox"/> Slow onset <input checked="" type="checkbox"/> Protracted
Mandating Body/ Agency	REACH Initiative		
Project Code	32iAKB		
Overall Research Timeframe (from research design to final outputs / M&E)	June to December 2020		
Research Timeframe Add planned deadlines (for first cycle if more than 1)	1. Start collect data: NA		5. Preliminary presentation: NA
	2. Data collected: NA		6. Analysis sent for validation: Monthly (3 rd week of the month)
	3. Analysis: Monthly (3 rd week of the month)		7. Outputs published: NA
	4. Data sent for validation: 29/06/2020		8. Final presentation: 31/12/2020
Number of assessments	<input type="checkbox"/>	Single assessment (one cycle)	
	<input checked="" type="checkbox"/>	Multi assessment (more than one cycle) Monthly, 4th week of each month	
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
	<input type="checkbox"/>	Donor plan/strategy	--/ /----
	<input type="checkbox"/>	Inter-cluster plan/strategy	--/ /----
	<input type="checkbox"/>	Cluster plan/strategy	--/ /----
	<input type="checkbox"/>	NGO platform plan/strategy	--/ /----
<input checked="" type="checkbox"/>	The Needs Analysis Working Group (NAWG) will use the analysis for prioritization of counties by COVID-19 risk.		Updated monthly, by end of the 3 rd week of every month
Audience Type & Dissemination Specify who will the assessment inform and how you will disseminate to inform the audience	Audience type		Dissemination
	<input checked="" type="checkbox"/> Strategic		<input checked="" type="checkbox"/> Presentation of findings (e.g. at HCT meeting; Cluster meeting) <input type="checkbox"/> [Other, Specify]

Detailed dissemination plan required	<input type="checkbox"/>	Yes	<input checked="" type="checkbox"/>	No
General Objective	<i>Monitor the overall risk of COVID-19 at the county level in South Sudan</i>			
Specific Objective(s)	<ul style="list-style-type: none"> • Monitor the risk of entry and spread of COVID-19 at the county level • Monitor intersectoral vulnerabilities of the population related to severe COVID-19 outcomes at the county level • Monitor the capacity of the population to cope with the impact of COVID-19 			
Research Questions	<ul style="list-style-type: none"> • <i>Which counties in South Sudan have the greatest risk for COVID-19 related humanitarian needs, and should be prioritized for COVID-19 response scale-up?</i> <ul style="list-style-type: none"> ○ <i>Which counties in South Sudan have the greatest risk of entry and spread of COVID-19 in the population?</i> ○ <i>Which counties in South Sudan have the greatest intersectoral vulnerability to experiencing severe consequences as the result of a COVID-19 outbreak, related to Demographics, WASH, Health, Food Security and Acute Malnutrition?</i> ○ <i>Which counties in South Sudan have the least ability to cope with the direct and in-direct impact of COVID-19?</i> • <i>What other shocks or emerging threats are present in counties that are at high overall risk for COVID-19?</i> 			
Geographic Coverage	<i>All counties in South Sudan</i>			
Secondary data sources	<ul style="list-style-type: none"> • INFORM Index for Risk Management. Concept and Methodology Version 2017. European Union Civil Protection and Humanitarian Aid. • Using Inform to assess crisis and disaster risk within a country or region. European Union Civil Protection and Humanitarian Aid. • Handbook on Constructing Composite Indicators Methodology and User Guide. JRC European Commission. • COVID-19 Caseload Figures (Ministry of Health, WHO) • Internal and Cross-Border Flow Monitoring Data (REACH SSD, UNHCR, IOM) • IDP and Refugee Population Estimates (CCCM Cluster South Sudan) • Urban centre population estimates (European Commission Global Human Settlement Layer) • County Population Estimates for South Sudan (OCHA Common Operational Dataset) • Food Security and Nutrition Monitoring System Round 24/25 (WFP) • Integrated Phase Classification Analysis Workshop January 2020 • Integrated Disease Surveillance and Response (IDSR) (WHO) • COVID Pillar Partner Presence (Health Cluster) • Joint Market Monitoring Initiative (JMMI) (REACH) • CLiMIS South Sudan (MoAgr, NBS, FAO, WFP, FEWSNET, CWW, ACTED) • Area of Knowledge (AoK) (REACH) • General Food Distribution reports (WFP) • Armed Conflict Location & Event Data Project (ACLED) • Desert Locusts reports (FAO) • Rainfall data (CHIRPS) 			
Population(s)	<input checked="" type="checkbox"/>	IDPs in camp	<input type="checkbox"/>	IDPs in informal sites

<i>Select all that apply</i>	<input type="checkbox"/>	IDPs in host communities	<input type="checkbox"/>	IDPs [Other, Specify]		
	X	Refugees in camp	<input type="checkbox"/>	Refugees in informal sites		
	<input type="checkbox"/>	Refugees in host communities	<input type="checkbox"/>	Refugees [Other, Specify]		
	X	Host communities	<input type="checkbox"/>	[Other, Specify]		
Data management platform(s)	X	IMPACT	<input type="checkbox"/>	UNHCR		
	<input type="checkbox"/>	[Other, Specify]				
Expected output type(s)	<input type="checkbox"/>	Situation overview #: __	<input type="checkbox"/>	Report #: __	<input type="checkbox"/>	Profile #: __
	<input type="checkbox"/>	Presentation (Preliminary findings) #: __	<input type="checkbox"/>	Presentation (Final) #: 6	<input type="checkbox"/>	Factsheet #: __
	<input type="checkbox"/>	Interactive dashboard #: __	<input type="checkbox"/>	Webmap #: __	<input type="checkbox"/>	Map #: __
	<input type="checkbox"/>	[Other, Specify] #: __				
Access	<input type="checkbox"/>	Public (available on REACH resource center and other humanitarian platforms)				
	X	Restricted (bilateral dissemination only upon agreed dissemination list, no publication on REACH or other platforms) – Restricted to NAWG and ICCG membership				
Visibility <i>Specify which logos should be on outputs</i>	REACH, OCHA					
	Donor: NA					
	Coordination Framework: NA					
	Partners: NA					

2. Rationale

COVID-19 is an international public health emergency on a previously unforeseen scale, and confirmed cases have rapidly been increasing since the first case was identified in South Sudan in March. The impacts of the pandemic are not limited to adverse health outcomes: individual sickness and mortality and the measures taken to prevent the spread of the disease are affecting market prices, productivity, and even the provision of humanitarian aid in a country whose population is already highly at risk of food insecurity and undernutrition.¹

The Needs analysis Working Group (NAWG) is co-chaired by REACH and OCHA, and attended by a variety of partners including cluster representatives, UN agencies, and NGOs. The aim of the NAWG is to monitor emerging humanitarian needs in South Sudan, and to make recommendations to the Inter-Cluster Coordination Group (ICCG) for further assessments or response scale-up. As such, this body is uniquely placed to monitor the impact of COVID-19 and provide recommendations for increased humanitarian aid. In April 2020, REACH supported the NAWG by conducting a COVID-19 Vulnerability Baseline analysis to support the prioritization of areas in South Sudan where a humanitarian response linked to the pandemic is most needed. The analysis was based on factors that would likely increase the risk of entry/spread of the virus as well as the risk of severe outcomes² due to the intersectoral vulnerability of the population. The analysis was approved and 19 priority counties were recommended to the ICCG for response scale-up.

In order to continue to monitor the dynamic risk presented by COVID-19 in South Sudan, the COVID-19 Monitoring Framework was developed to facilitate the re-prioritization of areas on a regular basis. This document details a revised version of the baseline framework and analysis that can be updated on a monthly basis and incorporates additional best practices from other composite frameworks that assess risk. The framework analysis will produce a monthly set of county level COVID-19 risk scores, comprised from three indexes representing the risk of exposure to COVID-19, susceptibility to severe COVID-19 outcomes, and low ability for the population to cope with the impact of the pandemic. At the end of each month, the results would be presented within the NAWG for review, and the analysis used to identify counties for COVID-19 response scale-up, close monitoring, or de-prioritization, which would then be recommended to the ICCG.

¹ [FEWS NET \(April 2020\), South Sudan Food Security Outlook Update.](#)

² Clinical illness severity of COVID-19 can range from mild, moderate, severe or critical. Severe and critical categorizations are the most life threatening and require hospitalization care and have been related to factors such as age, chronic disease status, and other vulnerable, immunocompromised groups. ([see explanation here](#))

3. Methodology

3.1. Methodology overview

The aim of the COVID-19 Monitoring Framework is to monitor the **overall risk** of COVID-19 impacting the humanitarian needs of the population of every county in South Sudan in order to assist in the prioritisation of COVID-19 related response scale up. The framework would additionally identify the key drivers of risk for each county, in order to inform the type of response needed.

As in other risk assessment frameworks, the COVID-19 Monitoring Framework defines **risk** as “the combination of the probability of an event and its negative consequences”³, and is calculated as the product of **Hazard or Exposure to the Risk^{1/3} x Vulnerability to the Risk^{1/3} x Lack of Ability to Cope with the Risk^{1/3}**. To this end, the framework uses secondary data from a variety of sources⁴, in order to assess and operationalize these three factors for risk of COVID-19:

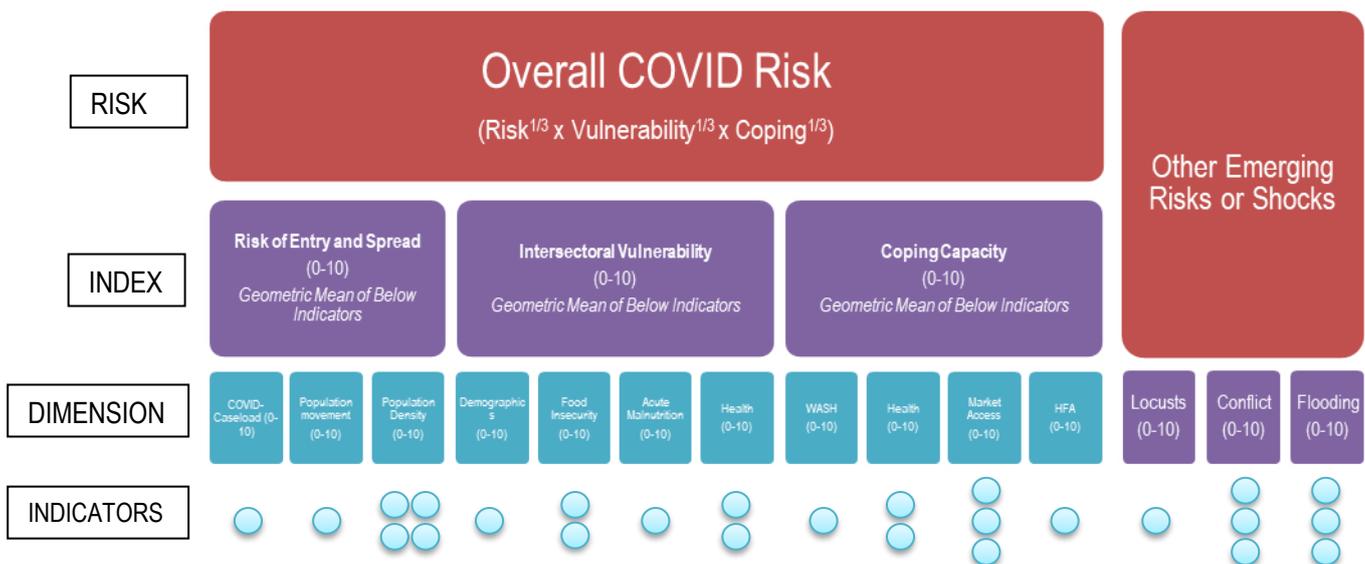
- 1) the **risk of entry and spread** for COVID-19 (*hazard and exposure*),
- 2) the **intersectoral vulnerability** of a county’s population to severe COVID-19 outcomes (*vulnerability*), and
- 3) the county population’s **lack of capacity to cope** with the direct or indirect impacts of COVID-19 (*lack coping*).

Indicators were drawn from a range of secondary data sources and analysed to produce county level results, which are then scored and aggregated into these three factors, and the overall risk for COVID-19. The relationship between indicators and overall risk for COVID-19 is as follows:

- **Indicators** are derived from available data sources, and a value is calculated or imputed for each county based on available information. Each indicator is assigned a “weight score”, for each county. Some values may be imputed from state level values, or other means, to allow for a complete dataset.
- **Dimensions** are comprised of groups of conceptually similar indicators. Each dimension is given a score which is derived one of two ways: (a) the geometric mean of its indicator weights, or (b) the sum of its indicator weights. The score for each dimension is on a range from 0-10, for each county.
- **Indexes** are derived from conceptually similar dimensions, and each index represents one of the main factors/elements used to assess risk, as described above. Each index score is derived one of two ways: (a) the unweighted geometric mean of its dimension scores, or (b) the weighted geometric mean of its dimension scores. The score for each index is on a range from 0-10, for each county.

Overall risk score is derived from the three main factors/elements used to assess risk. The overall risk score is calculated by taking the unweighted geometric mean of the three index scores for **risk of entry/spread, intersectoral vulnerability, and lack of coping capacity**. The final risk score is presented for each county is on a range from 0-10. This relationship is also depicted in Figure 1 below.

Figure 1: COVID Monitoring Framework Overview



³ UNISDR Terminology on Disaster Risk Reduction.

⁴ Data sources are summarized in Annex 1 tables.

- **Other emerging risks or shocks** are separate indexes that do NOT feed directly into the COVID-19 risk score for a county. These are included simply for the awareness of actors of other threats affecting high COVID-19 risk areas. A separate index is made for each shock of interest (locusts, conflict, flooding) and is given a score from 0-10).

Below is an example of the aggregation process described above:

	Step 1	Step 2	Step 3	Step 4
Step	Indicators are individually processed and analyzed at county level	Indicators are aggregated to a dimension score (0-10), either by geometric means or sum of weights	Aggregating weights into indexes (0-10)	Aggregating index scores into overall risk score
Example	<p>[Cross-border movement indicator]</p> <p># of people migrated from covid affected areas in neighbouring country in the last month.</p> <p>For County A, 30 people arrived the previous month from COVID affected areas.</p> <p>A weight of 7.5 is assigned based on the indicator value.</p>	<p>[Population movement dimension]</p> <p>Comprises two indicators: cross-border flows and internal flows. Cross-border flows are given a weight of 7.5, and internal flows a weight of 2.5.</p> <p>A dimension score is aggregated with the geometric mean of these two weights: 4.33</p>	<p>[Risk of Entry and Spread Index]</p> <p>For County A...</p> <p>COVID cases dimension: 3.33</p> <p>Population Movement Dimension 4.33</p> <p>Population Density Dimension: 8</p> <p>An unweighted geometric mean of these dimension scores gives an index score of: 4.87</p>	<p>[Overall COVID Risk Score]</p> <p>For County A...</p> <p>Risk of Entry/Spread Index: 4.87</p> <p>Intersectoral Vulnerability Index: 6.7</p> <p>Lack of Coping Capacity Index: 8.9</p> <p>The unweighted geometric mean gives an overall risk score of: 6.62</p>

Several aggregation methods are used throughout the framework for aggregating indicators, dimensions and indexes. A summary of these aggregation methods for the core COVID-19 indexes are included in Annexes 4 and 5.

3.2. Data Processing & Analysis

Data sources were selected through several approaches:

- 1) Through consultations with the NAWG
- 2) Adherence of indicators to conceptually relate to one of the three main factors for assessing risk (exposure, vulnerability, lack of coping)
- 3) Availability of data at the county level

To allow for aggregation between indicators, each indicator is first converted into a summary statistic at the county level, either a proportion, ratio, a z-score, a percent change over time, or an absolute number in cases of population flows. As described above, the values of these indicators are used to determine a weight for aggregation within that dimension on a 0-10 scale. 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 was used include:

- **Area of Knowledge data (market access)** – counties without values were imputed with the median of existing values within the state (the next highest admin level above county).
- **Market price changes from JMMI and CIIMIS data** – counties without values were imputed with the median of existing values within the state (the next highest admin level above county).
- **Area of Knowledge (Conflict related service disruption)** – counties without values used the median of values within counties affected by the same or related conflict.

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 below table summarizes the schedule of data processing and analysis

Data source	Frequency of Updating	How is data accessed?
COVID-19 caseloads	Monthly	Upon request to WHO, or from NSC update presentations
Flow Monitoring Data (REACH/IOM/UNHCR)	Monthly	Upon request (through UNICEF collab)
REACH AoK	Monthly	From GIS unit
CCCM Cluster IDP/Refugee population figures	Quarterly	Upon request
European Commission Global Human Settlement Layer	Never (not being updated)	NA
OCHA Population Estimates 2020 (COD-PS)	Yearly (November)	Publicly available
FSNMS data	Biannually (August/January)	Upon request (WFP)
IPC Classifications	Biannually (August/January)	Upon request (WFP)
IDSR data	Monthly	Upon request (through NAWG)
COVID Pillar Partner Presence	Monthly or Ad hoc	Dependent on Health Cluster
JMMI	Monthly	Available 1 st week of the month for previous month
CLIMIS price data ⁵	Monthly	Publicly available, dataset
ACLED	Monthly	Publicly available dataset (two week lag)
Confirmed locusts presence	Monthly	Upon request (FAO)

All data processing, indicator and weight calculations, and aggregation is conducted in R v.4.0.1. Indicators, weights and thresholds are summarized in Annex 1 for each dimension and index. Separate R scripts will be used to process, weight and aggregate each dimension. A separate R script will be used for aggregation of the final results into indexes, and a final excel output to summarize all indicators.

3.3. Recommendations

The overall COVID risk will be presented to the South Sudan Needs Analysis Working Group (NAWG) on a monthly basis. These presentations will consist of a Powerpoint presentation with at least the following information:

- A list of the 20 counties with the highest overall risk scores;
- A map showing the counties with the highest overall risk scores;
- For each of the 20 counties with the highest overall risk scores, information on the indexes that they score particularly high on and, if relevant, indicators of particular concern.

Following these presentations, the NAWG membership will be invited to discuss the outcomes of the monitoring framework, voice disagreements, and recommend additional counties for prioritisation based on contextual analysis. The membership may suggest two courses of action for flagged counties: continued monitoring or response scale-up. Once consensus is reached, the recommendations will be sent to the Inter-Cluster Coordination Group (ICCG) for further decision-making. The NAWG membership may also propose additional changes to the monitoring framework methodology. In the case of substantial changes, the present ToR may be expanded upon with a methodology note.

4. Roles and responsibilities

Table 3: Description of roles and responsibilities

Task Description	Responsible	Accountable	Consulted	Informed
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⁵ https://climis-southsudan.org/markets/export_weekly_data

<i>Research design</i>	<i>Assessment Specialist</i>	<i>Assessment Specialist</i>	<i>Research Manager, IMPACT Research Unit</i>	<i>County Coordinator</i>
<i>Supervising data collection</i>	<i>Assessment Specialist</i>	<i>Assessment Specialist</i>	<i>Research Manager, IMPACT Research Unit</i>	<i>County Coordinator</i>
<i>Data processing (checking, cleaning)</i>	<i>Assessment Specialist</i>	<i>Assessment Specialist</i>	<i>Research Manager, IMPACT Research Unit</i>	<i>County Coordinator</i>
<i>Data analysis</i>	<i>Assessment Specialist</i>	<i>Assessment Specialist</i>	<i>Research Manager, IMPACT Research Unit</i>	<i>County Coordinator</i>
<i>Output production</i>	<i>Assessment Specialist</i>	<i>Assessment Specialist</i>	<i>Research Manager, IMPACT Research Unit</i>	<i>County Coordinator</i>
<i>Dissemination</i>	<i>Assessment Specialist</i>	<i>Assessment Specialist</i>	<i>Research Manager, IMPACT Research Unit</i>	<i>County Coordinator</i>
<i>Monitoring & Evaluation</i>	<i>Assessment Specialist</i>	<i>Assessment Specialist</i>	<i>Research Manager, IMPACT Research Unit</i>	<i>County Coordinator</i>
<i>Lessons learned</i>	<i>Assessment Specialist</i>	<i>Assessment Specialist</i>	<i>Research Manager, IMPACT Research Unit</i>	<i>County Coordinator</i>

ANNEX 1: INDEX TABLES (ONE TABLE PER INDEX)

Table 1: Risk of Entry and Spread Index

Category and Aggregation Method	Indicator	Rationale/Comments	Proposed weights and thresholds		Data sources	
COVID-10 Caseload If weight from COVID cases is greater than the overall Risk for Entry and Spread index, then this score takes precedence.	# of confirmed COVID-19 cases in county	The greater the number of confirmed cases, the greater the risk of exposure for the county population	0	0 cases	Ministry of Health, WHO	
			3.33	1-5 cases		
			6.67	6-49 cases		
			10	50+ cases		
High levels of population movement (0-10) <i>Indicators aggregated with unweighted geometric mean</i> Anecdotal reports of population movements not captured in flow monitoring data, or known information gaps can trigger a decision tree, which may alter weights. See Annex 2 for Decision Trees	# of individuals reported arriving from neighboring countries/camps within the last month	Migration from neighboring countries with confirmed COVID-19 cases may increase the risk for cross-country transmission	0	<50 individuals arriving from neighbouring countries per month	IOM Flow Monitoring REACH PRM UNHCR Flow Monitoring	
			2.5	>= 50 and <150 individuals ⁶ arriving from neighbouring countr(ies) per month		
			5	>= 150 individuals arriving from neighbouring countr(ies) per month		
			7.5	>= 15 and <150 individuals ⁷ arriving from COVID-affected areas in neighbouring countr(ies) per month		
			10	>=150 individuals arriving from COVID-affected areas in neighbouring countr(ies) per month		
	# of individuals reported arriving from COVID affected district in neighboring countries/camps within the last month			0	<50 recorded arrivals from an internal movement	IOM Flow Monitoring REACH PRM UNHCR Flow Monitoring
				2.5	>=50 and <200 recorded arrivals from an internal movement	
				5	>= 200 recorded arrivals from internal movement	
				7.5	>=35 and <150 recorded arrivals from an affected SSD county	
				10	>= 150 recorded arrivals from an affected SSD county	
Population density (0-10)	# of IDP/Refugee (not in host community)	Informal camps, IDPs/Refugees not integrated in the host community. IDPs/Refugees living in camp-like or informal settings are considered more vulnerable due to the poor and concentrated living conditions, which may increase the rate of COVID transmission in those populations.	2.5	>=2,000 and 5,000	CCCM Cluster – Camp-like settings in SSD; UNHCR	
			5	>=5,000 and <=20,000		
			7.5	>20,000 and <=55,000		

⁶ Median number of individual arrivals into counties in South Sudan from neighbouring countries per county was 91.5 in March 2020.

⁷ Median number of individual arrivals into counties in South Sudan from confirmed COVID-affected areas in neighbouring countries per county was 14 in March 2020. It is noted that this number will likely increase as COVID spreads, so this threshold may fluctuate.

Indicators aggregated by weighted geometric mean (2:2:1:1 ratio for # of IDP/refugees, # of urban population, people/sq. km, and avg. household size, respectively)					
		10	>55,000		
# estimated population in urban centres	Large urban centres may lead to increased transmission given they are often key transit hubs, markets, and have high population density.	0	<100,000	European Commission Global Human Settlement Layer	
		5	>=100,000 and <=250,000		
		10	>250,000		
Avg. # people / km ²	Increased population density may lead to increased transmission; consider urban centres and POC sites	0	<50 th percentile	OCHA COD-PS	
		2.5	>50 th to 75 th percentile		
		5	>75 to 90 th percentile		
		7.5	>90 to 95 th percentile		
		10	>=95 th percentile		
Avg. household size	Counties with larger household size may have higher likelihood for increased transmission due to closer proximity of household members	0	Avg. HH size is <50 th percentile	FNSMS Round 25 data ⁸	
		5	Avg. HH size is >=50 th to 75 th percentile		
		10	Avg. HH size is >75 th percentile		

⁸ FNSMS is representative of rural areas only

Table 2: Intersectoral Vulnerability Index

Category and Aggregation Method	Indicator	Rationale/Comments	Weights	Thresholds	Data sources
Demographics (0-10)	Avg. # of elderly (60+) in the HH	Due to elderly vulnerability to COVID	0	<0.69	FNSMS Round 25 data ⁵
			5	>=0.7 and <0.89	WFP Urban Demographics Data (only Wau, Juba, and Bor, 2017)
			10	>= 0.9	
High food insecurity (0-10)	% of HHs by IPC Phase classification from Projection 1 (Feb – April 2020)	Greater food insecurity means a greater likelihood of reduced quantity or quality of the household diet, which could lead to a weakened immune system.	0	P3 < 20%	IPC South Sudan Jan 2020
			2.5	P3+ >=20% AND P3+ <50%	
			5	P3+ >= 50%	
			7.5	P3+ >= 75% OR P4+>= 20%	
<i>Indicators aggregated by weighted geometric mean (2:1 ratio for IPC population estimates, % market dependent population, respectively)</i>	% of HH reportedly main source of food is markets in lean season	Food insecurity may increase for market dependent households due to 1) spikes in food prices, and 2) reduced accessibility to markets due to movement restrictions. This increased risk of food insecurity may lead to a greater reduction in immune response, and therefore more severe COVID-19 outcomes.	0	<= 30% in lean season	FNSMS Rd 24
			10	if >30% in lean season	
High malnutrition (0-10)	IPC AMN Phase classification Projection (May-August 2020)	Acute malnutrition reduces immunity	0	IPC AMN P1	IPC South Sudan Jan 2020
			2.5	IPC AMN P2	
			5	IPC AMN P3	
			7.5	IPC AMN P4	
			10	IPC AMN P5	
Disease (0-10)	Presence of malaria 'epidemic', malaria 'alert' or other confirmed disease outbreak	The dual burden of malaria or other infectious diseases and COVID-19 will likely increase morbidity and mortality as other illnesses become more difficult to treat due to competing health system resources. Especially some concerns of co-morbidity of malaria and COVID-19 ⁹ . Malaria is treated here is a proxy for infectious diseases.	0	No disease outbreak	IDSR/EWARS
			5	'Alert' level of total morbidities or malaria specific	
			10	'Epidemic' levels of total morbidities or malaria specific OR confirmed disease outbreak	
<i>Indicators aggregated by weighted geometric mean (2:1 ratio infections and chronic disease respectively)</i>	% of HHs self-reporting a household member has a chronic illness in the last 3 months	General, self-reported question for populations that may have people with chronic health issues, however some chronic health issues may not necessarily link to immune suppression or increased risk of severe/critical COVID-19 cases.	10	> 10% HH report family members with chronic illness in last month	FNSMS Round 25

⁹ Preparedness is essential for malaria-endemic regions during the COVID-19 pandemic. The Lancet. March 16th, 2020

Table 3: Lack of Coping Capacity Index

Category and Aggregation Method	Indicator	Rationale/Comments	Proposed weights and thresholds		Data sources	
WASH (0-10)	% of population travelling 30 minutes or less to a water source AND have access to soap for handwashing	Access to clean water and soap are requisite for hand-washing practices, which is an essential preventive behavior to fight COVID-19.	0	>20%	FNSMS Round 25 data ⁵	
			10	<=20%		
Health (0-10)	% of population walking more than ½ day to a functional health facility	Individuals may be asked to stay at home with suspected symptoms of COVID-19, but if case is critical, access to functional facility will impact mortality rate and containment.	0	<=10%	FNSMS Round 25 data ⁵	
			5	>10% and <=30%		
<i>Indicators aggregated with an unweighted geometric mean</i>	# of COVID-19 health pillar activities reportedly active	The more comprehensive a COVID response in a given county, the greater the coping ability of the population for the outbreak. There are 8 pillars: Coordination, Case Management, IPC, Laboratory, Logistics & Operations, Risk Communications, Screening Point of Entry, Surveillance. Should be comprehensive of Health Cluster, Health Pooled Fund, and World Bank partners commitments.	0 - 8	+1 for each COVID pillar not reportedly covered	Health Cluster	
			10	If none of the 8 pillars are reported		
Market Access (0-10)	% change in main cereal prices compared to median of previous 3 months	Lack of financial or physical access to markets can impact food security, which increases the risk of severe COVID outcomes.	0	<0%	JMMI / CLIMIS	
			2	0-20%		
<i>Indicators aggregated by weighted geometric mean (3:3:2 ratio for % change previous 3 months, percentile above national median, and walking distance to nearest market, respectively)</i>	Percentile of main cereal price in last month above the national median	Locations that have had chronically high cereal prices greater than the last 3 months may not show a price spike, however are still vulnerable due to high prices. Comparing main cereal prices to the national median will highlight areas with high prices, which reduces access to food, deteriorates household food security, and increases the risk of severe COVID outcomes.	4	20-<40%	JMMI / CLIMIS	
			6	40-<60%		
	% of assessed settlements reporting 3+ hour walk to reach nearest market	Physical distance to a market reduces the household's ability to access food, which deteriorates food security and increases the risk of severe COVID outcomes.	8	60-<80%	REACH AoK	
			10	>80%		
Humanitarian Food Assistance (0-10)	Status of GFD program cycles	Populations that are dependent on the humanitarian food assistance are vulnerable to delays in their program cycle. Counties highly dependent on HFA	May GFD Status		WFP	
						Missed Distribution in Last 3 Months
					No	Yes
Non-HFA Dependent Counties	Completed Distribution or None Planned	0	1			
	Ongoing Distribution	1.67	2			
	Missed or Late Distribution	2.5	3			
HFA Dependent Counties	Completed Distribution	4.17	5			
	Ongoing Distribution	6.25	7.5			
	Missed or Late Distribution	8.33	10			

Table 4: Other Emerging Risks or Shocks (Conflict Risk)

Category and Aggregation Method	Composite Indicator	Sub-Indicator	Rationale/Comments	Proposed weights and thresholds	Data sources	
Conflict Risk (0-10) <i>Composite indicators aggregated by weighted geometric mean (3:2 ration of exposure to coping)</i>	Exposure to Conflict (composite) (0-10)	# Incidents of conflict in the last 3 months (battles, violence against civilians, riots/protests)	Conflict and inter-communal violence can increase vulnerability and can have negative implications on access to resources, services and livelihoods.	See weights table in Annex 2		ACLED;
		# of fatalities				
	<i>Indicators aggregated by weighted geometric mean</i>	# of assessed settlements reporting the likelihood of increased conflict in the next month	Community reports from key informants can inform on the risk of continued conflict.	0	0%	Area of Knowledge (AoK)
				2	0-<20%	
				4	20-<40%	
				6	40-<60%	
				8	60-<80%	
				10	80-100	
	Impact of Conflict (composite) (0-10)	% of assessed settlements reported conflict as a barrier to accessing health services, in the last month	Conflict-affected populations need access to livelihoods or humanitarian services to cope with the impact of conflict. Without these, the population will likely suffer more severe results from the incidents.	0	0% affect market access	Area of Knowledge (AoK)
				1.25	>0% and <25% affect market access	
				2.5	>=25% affect market access	
				0	0% affect market access	
				1.25	>0% and 25% affect health access	
				2.5	>=25% affect health access	
				0	0% affect market access	
1.25				>0% and <25% affect food/livelihoods access		
2.5				>=25% affect food/livelihoods access		
0				0% affect market access		
<i>Indicators aggregated by unweighted geometric mean</i>	% of assessed settlements reported conflict as a cause for displacement in the last month		1.25	>0% and <25% cause displacement		
			2.5	>=25% cause displacement		

Table 5: Other Emerging Risks or Shocks (Locusts)

Category and Aggregation Method	Indicator	Rationale/Comments	Proposed weights and thresholds	Data sources	
Desert Locusts (0-10)	Any reported presence of desert locusts	Desert locusts will have a large impact on seasonal agriculture and likely cause food security to deteriorate in affected areas.	0	No presence	FAO
			10	If any reported presence	

Table 6: Other Emerging Risks or Shocks (Flooding)

Category and Aggregation Method	Composite Indicator	Sub-Indicator	Rationale/Comments	Proposed weights and thresholds	Data sources	
Flooding (0-10) Composite indicators aggregated by geometric mean	Flooding Vulnerability (0-10) <i>Indicators aggregated by sum of weights</i>	# of "moderate" flooding events –in 2019 (1.5 z-score in a dekad)	Flood affected counties in 2019 are already vulnerable. Additional shocks such as locusts, COVID, conflict or future flooding will much more severely impact these populations.	+0.95 for each moderate flooding event	Monthly CHIRPS rainfall data, 2019	
		# of "moderate" flooding events in 2019 (1.5 z-score in a dekad)		+ 1.9 for each heavy flooding event, summed separately		
	Flooding Exposure (0-10) <i>Indicators aggregated by weighted geometric means (3:1 ratio of recent vs forecasted rainfall)</i>	"Heavy" or "moderate" flooding event in past 3 months <i>Heavy is >2 z-scores in a dekad</i> <i>Moderate is >1.5 z-scores in a dekad</i>	High rainfall events in the recent months increases the chances that the population has lost or depleted resources due to flooding	"Light" rainfall event, with rainfall in a dekad >0.5 z-score	2.5	CHIRPS rainfall data, 2020
		"Moderate" flooding event, with rainfall in a dekad > 1.5 z-scores from the long term mean		5		
Mean z-score of 5, 10 and 15-day forecasted rainfall data	High levels of projected rainfall will increase the chance of flooding.	"Heavy" flooding event, with rainfall in a dekad > 2 z-scores from the long term mean	7.5	CHIRPS-GEFS		
		0	<0 z-score			
		0.5	0 to <0.5 z-score			
		1	0.5 to <1 z-score			
		1.5	1 to <1.5 z-score			
		2	1.5 to <2 z-score			
2.5	>2 z-score					
Flooding Coping (0-10)	% of assessed settlements reported flooding as a barrier to accessing health services, in the last month	Flooding-affected populations need access to livelihoods or humanitarian services to cope with the impact of conflict. Without these, the population will likely suffer more severe results from the incidents.	1.25	>0% and 25% affect market access	Area of Knowledge (AoK)	
2.5	>=25% affect market access					

<p><i>Indicators aggregated by unweighted geometric mean</i></p>	<p>% of assessed settlements reported flooding as a barrier to accessing markets in the last month</p>	<p>1.25</p>	<p>>0% and <25% affect health access</p>
		<p>2.5</p>	<p>>=25% affect health access</p>
	<p>% of assessed settlements reported flooding as a barrier to accessing food or livelihood activities in the last month</p>	<p>1.25</p>	<p>>0% and <25% affect food/livelihoods access</p>
		<p>2.5</p>	<p>>=25% affect food/livelihoods access</p>
	<p>% of assessed settlements reported flooding as a cause for displacement in the last month</p>	<p>1.25</p>	<p>>0% and <25% cause displacement</p>
		<p>2.5</p>	<p>>=25% cause displacement</p>

ANNEX 2: DECISION TREE FOR FLOW MONITORING DATA

Figure 1: Decision Tree for Adjusting Weights for Cross-Border Flows

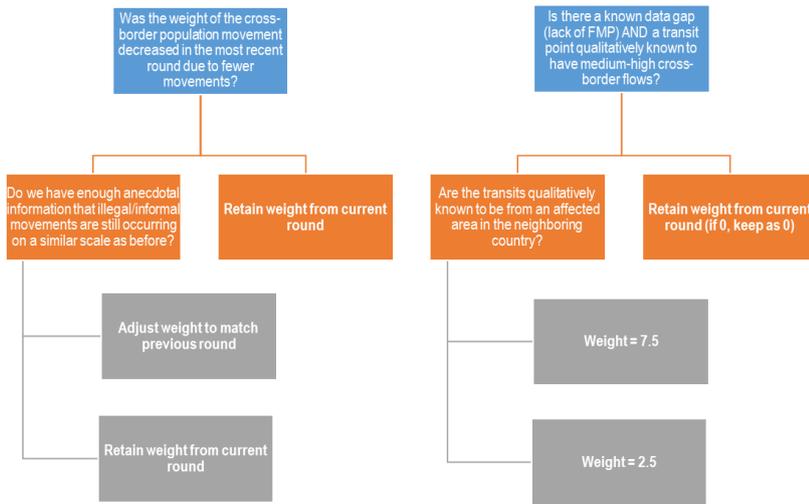
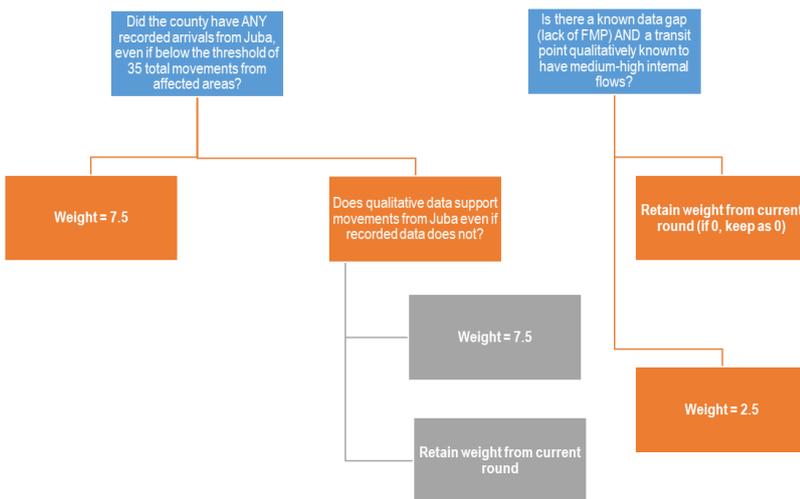


Figure 2: Decision Tree for Adjusting Weights for Internal Movement Flows



ANNEX 3: CONFLICT RISK EXPOSURE

This annex is describing in more detail the weight determination process for the “Conflict Exposure” dimension in the Conflict Index. The weight is determined from the previous 3 months of ACLED data, and based on the total number of recorded fatalities and total number of conflict related incidents in that dataset.

		Table: Conflict Exposure Weight Table				
		# of incidents (including similar/related in nearby counties)				
		1	2	3	4	>5
# of fatalities	0	1	2	3	4	5
	1-9	2	3	4	5	6
	10-49	4	5	6	7	8
	50-99	6	7	8	9	10
	=>100	8	9	10	10	10

ANNEX 4: SUMMARY OF AGGREGATION METHODS FOR MAIN RISK INDEXES

	1 Risk of Entry and Spread (RoES)	2 Intersectoral Vulnerability (IV)	3 Lack of Coping Capacity (CC)
Index Aggregation	<p>The risk of exposure of the county’s residents to COVID-19.</p> <p>Calculated by taking the geometric mean of the scores for the dimensions below; unless the score for dimension 1.1 is greater than the geometric mean, in which case the score for dimension 1.1 is taken.</p>	<p>The vulnerability of the county’s population to severe outcomes related to COVID-19 infection due to contribution intersectoral factors.</p> <p>Calculated by taking the geometric mean of the scores for the dimensions below.</p>	<p>The county population’s lack of capacity to cope with the direct or indirect impacts of a COVID-19 outbreak and/or related mitigation measures.</p> <p>Calculated by taking the geometric mean of the scores for the dimensions below.</p>
Dimension Aggregation	<p>1.1 Present COVID-19 caseload</p> <p><i>No aggregation, 1 indicator only</i></p>	<p>2.1 Household demographics (age)</p> <p><i>No aggregation, 1 indicator only</i></p>	<p>3.1 Access to water and soap</p> <p><i>No aggregation, 1 indicator only</i></p>
	<p>1.2 Levels of population movement</p> <p><i>Indicators aggregated with unweighted geometric mean</i></p> <p><i>Anecdotal reports of population movements not captured in flow monitoring data, or known information gaps can trigger a decision tree, which may alter weights. See Annex 2 for Decision Trees</i></p>	<p>2.2 Food insecurity</p> <p><i>Indicators aggregated by weighted geometric mean (2:1 ratio for IPC population estimates, % market dependent population, respectively)</i></p>	<p>3.2 Access to health services</p> <p><i>Indicators aggregated with an unweighted geometric mean</i></p>
	<p>1.3 Population density</p> <p><i>Indicators are aggregated with a weighted geometric mean. Indicators aggregated by weighted geometric mean (2:2:1:1 ratio for # of IDP/refugees, # of urban population, people/sq. km, and avg. household size, respectively)</i></p>	<p>2.3 Malnutrition</p> <p><i>No aggregation, 1 indicator only</i></p>	<p>3.3 Market access</p> <p><i>Indicators aggregated by weighted geometric mean (3:3:2 ratio for % change previous 3 months, percentile above national median, and walking distance to nearest market, respectively)</i></p>
		<p>2.4 Presence of disease</p> <p><i>Indicators aggregated by weighted geometric mean (2:1 ratio infections and chronic disease respectively)</i></p>	<p>3.4 Dependence on Humanitarian Food Assistance</p> <p><i>No aggregation, 1 indicator only</i></p>

ANNEX 5: SUMMARY OF AGGREGATION METHODS FOR EMERGING SHOCKS INDEXES

	4 Conflict Index	5 Flooding Index	6 Locusts
Index Aggregation	The risk of conflict impacting humanitarian needs. Calculated by taking the geometric mean (3:2 ration of exposure to coping)	The risk of flooding impacting humanitarian needs. Calculated by taking the geometric mean of the scores for the dimensions below.	Exposure to locusts. No aggregation. Based solely off the reported presence of locusts in the county.
Dimension Aggregation	4.1 Conflict Exposure <i>Indicators are aggregated with a weighted geometric mean (3:1 ratio for reported ACLED fatalities/deaths, % of assessed settlements reporting likelihood of increased conflict in the coming month, respectively)</i>	5.1 Flood Exposure <i>Indicators are aggregated with a weighted geometric mean (3:1 ratio for rainfall events in the past 3 months, and forecasted rainfall, respectively)</i>	NA
	4.2 Conflict coping <i>Results are aggregated for assessed settlements reporting conflict as a barrier to markets, food, healthcare or causing displacement. There are several AoK indicators for each of these categories. The highest reported indicator within each of those 4 categories is taken as the value for that category, and used for weighting.</i> <i>These categories are aggregated using an unweighted geometric mean.</i>	4.3 Flood vulnerability <i>No aggregation, 1 indicator only</i>	NA
	NA	4.4 Flood coping <i>Results are aggregated for assessed settlements reporting flooding as a barrier to markets, food, healthcare or causing displacement. There are several AoK indicators for each of these categories. The highest reported indicator within each of those 4 categories is taken as the value for that category, and used for weighting.</i> <i>These categories are aggregated using an unweighted geometric mean.</i>	NA