COVID-19 Vulnerability Ranking

COVID-19 is an international public health emergency on a previously unforeseen scale, and while only a handful of cases have been confirmed in Sudan, the rapid spread in other countries suggests that it poses a threat due to the extreme vulnerability of the population. In order to assist in “containing the spread of COVID-19 pandemic, decrease morbidity and mortality,” there is a need for prioritization of vulnerable areas where COVID-19 may first enter the country, and which areas have populations at greater risk for severe COVID-19 outcomes. Factors such as migration and displacement, food insecurity, acute malnutrition, access to WASH services, co-morbidities, and demographics should be considered in assessing population vulnerability for the pandemic in South Sudan.

Analysis

Each county will be given a composite score in two main areas: (1) for their assessed risk of entry and COVID-19 spread, and (2) intersectoral vulnerability. In an attempt to prioritize areas at the COUNTY level for response, two composite scores have been drafted:

Risk of Entry and COVID-19 Spread: This is a composite score from 0-12 representing the risk of COVID-19 entering the country and creating potentially large spread events in areas of high population density, such as urban areas and IDP/refugee camp sites. The composite score is comprised of three factors:
1) Population movement from neighbouring countries, including the size of the flow and whether the departure location is a COVID-19 affected area (maximum weight 6)
2) Population density, including presence of urban centers, IDP informal or camp settings, average household size, and population density at county level (maximum weight 6)

Intersectoral Vulnerability to COVID-19: Individuals with compromised immune systems, or other health vulnerabilities, are known to have a greater risk of ‘severe’ or ‘critical’ COVID-19 outcomes. This is a composite score from 0-25 comprised of food security, health, WASH and nutrition indicators which may increase the vulnerability of a population to these more serious outcomes. The composite score is derived from a number of data sources (FSNMS, IDSIR, IPC, and others) and comprised of:
- Population density, including presence of urban centers, IDP informal or camp settings, average household size, and population density at county level (maximum weight 6)
- Age demographics (maximum weight 2)
- Food insecurity, including IPC Phase Classifications Acute Food Insecurity and market dependency in the lean season (Maximum Weight 6)
- IPC Phase Classifications Acute Malnutrition (Maximum Weight 4)
- Health and WASH (maximum weight 7)

Data sources, indicator thresholds, weights are summarized in the table below. Limitations of this analysis include lack of more reliable data sources on chronic illnesses in South Sudan, which has been shown to be associated with severe COVID-19 disease status, as well as access to other more relevant health datasets or more timely data in some instances. In instances where no data is available for an indicator, the weight is treated as 0.

This summary of vulnerability criteria and indicators should be considered a living document, and as the situation with COVID-19 evolves in South Sudan, or higher quality information on risk or vulnerabilities become available, indicators and results of this analysis may change.

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### Proposed Vulnerability Indicators and Thresholds

<table>
<thead>
<tr>
<th>Type of Vulnerability</th>
<th>Category</th>
<th>Indicator</th>
<th>Rationale/Comments</th>
<th>Proposed weights and thresholds</th>
<th>Data sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk of entry and spread of virus</td>
<td>High levels of population movement</td>
<td># of individuals reported arriving from neighboring countries/camps within the last month</td>
<td>Migration from neighboring countries with confirmed COVID-19 cases may increase the risk for cross-country transmission</td>
<td>1.5</td>
<td>IOM Flow Monitoring; REACH PRM; UNHCR Flow Monitoring; UNICEF</td>
</tr>
<tr>
<td></td>
<td>Risk of entry and spread of virus</td>
<td>Presence of IDP/Refugee sites (not in host community)</td>
<td>Informal camps, IDPs/Refugees not integrated in the host community</td>
<td>0.5</td>
<td>CCCM Cluster – Camp-like settings in SSD; UNHCR</td>
</tr>
<tr>
<td></td>
<td>Risk of entry and spread of virus</td>
<td>Presence of large urban centres</td>
<td>Large urban centres may lead to increased transmission; consider urban centres and POC sites</td>
<td>1</td>
<td>European Commission Global Human Settlement Layer</td>
</tr>
<tr>
<td></td>
<td>Population density</td>
<td>Avg. # people/km²</td>
<td>Increased population density may lead to increased transmission; consider urban centres and POC sites</td>
<td>0.5</td>
<td>OCHA CDD-PS</td>
</tr>
<tr>
<td></td>
<td>Household size</td>
<td></td>
<td></td>
<td></td>
<td>FSNMS Round 25 data²</td>
</tr>
<tr>
<td>Intersectoral Vulnerability (Risk of severity of the outbreak - known factors which could increase the proportion of severe COVID cases in an area)</td>
<td>Population density</td>
<td>Presence of IDP/Refugee sites (not in host community)</td>
<td>Informal camps, IDPs/Refugees not integrated in the host community</td>
<td>0.5</td>
<td>OCHA – Camp-like settings in SSD; UNHCR</td>
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<td></td>
<td>Intersectoral Vulnerability (Risk of severity of the outbreak - known factors which could increase the proportion of severe COVID cases in an area)</td>
<td>Presence of large urban centres</td>
<td>Large urban centres may lead to increased transmission given they are often key transit hubs, markets, and have high population density.</td>
<td>1</td>
<td>European Commission Global Human Settlement Layer</td>
</tr>
</tbody>
</table>

### Notes

2 Median number of individual arrivals into counties in South Sudan from neighbouring countries per county was 91.5 in March 2020.
3 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.
4 FNSMS is representative of rural areas only
<table>
<thead>
<tr>
<th><strong>Vulnerability Memo</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased population density may lead to increased transmission; consider urban centres and POC sites</td>
<td>0.5  &gt;75 to 90th percentile  0.75  &gt;90 to 95th percentile  1  &gt;95th percentile</td>
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<td></td>
<td>FNSMS Round 24</td>
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<tr>
<td>Household size</td>
<td></td>
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<tr>
<td>Counties with larger household size may have higher likelihood for increased transmission due to closer proximity of household members</td>
<td>0  Avg. HH size is below the 50th percentile of national average  0.5  Avg. HH size is in the 50-75th percentile of national average  1  Avg. HH size is in the 75-100th percentile of national average</td>
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<tr>
<td><strong>Demographics</strong></td>
<td></td>
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<tr>
<td>Avg. # of elderly (60+) in the HH</td>
<td>0  &lt;0.69  1  &gt;0.7 and &lt;0.89  2  &gt;= 0.9</td>
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<tr>
<td>Due to elderly vulnerability to COVID</td>
<td>0  P3 &lt; 20%  1  P3+ &gt;=20% AND P3+ &lt;50%  2  P3+ &gt;=50%  3  P3+ &gt;= 75% OR P4+ &gt;= 20%  4  P5+0 OR P4+ &gt;= 30%</td>
</tr>
<tr>
<td>% of HHs by IPC Phase classification from Projection 1 (Feb – April 2020)</td>
<td></td>
</tr>
<tr>
<td>Greater food insecurity means a greater likelihood of reduced quantity or quality of the household diet, which could lead to a weakened immune system.</td>
<td>0  IPC AMN P2  1  IPC AMN P3  2  IPC AMN P4</td>
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<tr>
<td>Food insecurity, reliance on GFD can reduce immunity</td>
<td></td>
</tr>
<tr>
<td>% of HH reportedly main source of food is markets in lean season</td>
<td>2 if &gt;30% in lean season</td>
</tr>
<tr>
<td>Households that are dependent on markets for their main food source may be unable to access food as prices increase from border closures. Greater food insecurity may lead to weakening immune system.</td>
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<tr>
<td><strong>High malnutrition</strong></td>
<td></td>
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<tr>
<td>IPC AMN Phase classification Projection (May-August 2020)</td>
<td>1  IPC AMN P2  2  IPC AMN P3  4  IPC AMN P4</td>
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<tr>
<td>Acute malnutrition reduces immunity</td>
<td></td>
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<tr>
<td>% of population travelling 30 minutes or less to a water source AND have access to soap for handwashing</td>
<td>0  &gt;20%  2  &lt;=20%</td>
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<tr>
<td>Access to clean water and soap are requisite for hand-washing practices, which is an essential preventive behavior to fight COVID-19.</td>
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<tr>
<td><strong>WASH</strong></td>
<td></td>
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<tr>
<td>% of population walking more than 1/2 day to a functional health facility</td>
<td>0  &lt;=10%  1  &gt;10% and &lt;=30%  2  &gt;30%</td>
</tr>
<tr>
<td>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.</td>
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<tr>
<td>Chronic Disease</td>
<td></td>
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<tr>
<td>% of HHs self-reporting a household member has a chronic illness in the last 3 months</td>
<td>0  No disease outbreak  1  Welf level of total morbidities or malaria specific  2  Epidemic levels of total morbidities or malaria specific OR confirmed disease outbreak</td>
</tr>
<tr>
<td>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.</td>
<td>1  &gt;10% HH report family members with chronic illness in last month</td>
</tr>
</tbody>
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5 FNSMS is representative of rural areas only

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