A Resource for Fighting COVID-19 in Sub-Saharan Africa
Baseline Risk Model Maps

Globally, COVID19 has already claimed hundreds of thousands of lives and infected millions of others. Government and health authorities are striving to limit widespread infections and deaths. In Africa, the virus has now spread to most countries in relatively short order and each day more cases and deaths are being announced.

In an attempt to help countries and partners in sub-Saharan Africa understand where inherent risk lies at high geographic resolutions, we generated baseline risk model maps, which can be used to inform the development of decision making tools, the design of policy initiatives, and as one of many data sources to inform resource allocation and planning.

Data Sets included in Baseline Risk Model Maps:

The following data was brought in through publicly available sources to develop our analysis, resulting in the maps which are now available on GitHub.

1. Total Population Data (Country Specific) – World Pop 2020 population estimate raster layers (.tif files) -(https://www.worldpop.org/geodata/listing?id=29)
2. Population > 60 years of age (Country Specific) – World Pop 2020 population age band estimate raster layers (.tif files) – (https://www.worldpop.org/geodata/listing?id=30)
    a. Note: Age Band Raster Layers: 60-65, 65-70, 70-75, 80+ for both Male & Female were used for each country
3. Country Specific Shapefiles – Lowest administrative layer shapefiles were used to overlay the above datasets. These are polygon shapes that define a specific region or area in a given country. Example administrative layers include: District, Province, Traditional Authority, etc. – (https://data.humdata.org/)

Note: The initial aim was to define risk at the lowest available administrative unit (e.g. District, Traditional Authority, City, Village), however, population estimates, age bands, and administrative levels can all be altered and re-produced depending on country preference.

Risk Factors Developed

These data sets were brought together to develop a set of risk factors inherent to COVID-19 transmission and severity at a high geographic resolution. The resulting maps include the below considerations for each country as baseline risk factors, which can be expanded upon or modified based on the availability of country level data.

See our Risk Model effort in Malawi as an example.

1. Population Density. Each countries' population density was calculated as the number of people within a given administrative unit divided by the land area of the administrative unit in square kilometers. Each administrative unit was then given a Population Density Ranking, which was established by taking the administrative unit population density and dividing it by the sum of population densities of all administrative units in the country.
    a. Data Sets included: 2020 Population Estimates (World Pop) & Administrative Shapefile Layers (Humanitarian Data Exchange)

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2. Percent of Elderly Population. Each countries' percentage of elderly population was calculated as the count of people ≥ 60 years of age in a given administrative unit. Each administrative unit was then given an Elderly Population Ranking, which was established by taking the number of people ≥ 60 years in the administrative unit and dividing by the total number of people ≥ 60 years in the country.
    a. Data Sets included: 2020 Population Age Band Estimates (World Pop) & Administrative Shapefile Layers (Humanitarian Data Exchange)

3. Final Ranking – The calculated Population Density Ranking & Percent of Elderly Population Ranking were summed by administrative unit to identify those areas across the country at highest risk given the two input factors (population density & percent of elderly population).

Note: This model is intended to be used for country specific decision making, resource planning and analysis.

The resulting output and rankings will give each country a visual depiction and a flat file of where risk lies at the lowest, publicly available administrative unit. The components included for each country are detailed below.

Accessing Country Specific Files

In line with our commitment to democratize data and support key decision makers as well as local partners in their efforts to fight COVID-19, Cooper/Smith has published these data files on GitHub for organizations to access, download, and use as a baseline tool or supplementary data source. To access the risk model maps, navigate to the following GitHub repository: https://github.com/CooperSmith-org/ssa-risk-models.git

Once open, you will see country specific .zip files (e.g. "Angola Trimmed.zip"). To download the relevant country folder, click the .zip file and click the download button on the right-hand side. Once downloaded you will find the following contents (not necessarily in this order):

1. QGIS Project File (.qgz file) – This is the QGIS project that contains the following shapefiles: final risk ranking, population density ranking, elderly population ranking & administrative levels along with an output csv. In order to open the project, first download QGIS.

2. Individual Risk Factor Shapefiles (.shp files) – Three shapefiles layers that can be uploaded within a QGIS or ArcGIS project to show each administrative units' relative risk of COVID-19: Population Density.shp | Elderly Population.shp |Final Rank.shp. Files can be imported separately or all-together depending on the need.

    Note: Once uploaded, you may need to redo the layer symbology.

4. Administrative Layer Shapefile folder – Contains the country's administrative boundary shapefile that the risk model map was built from.

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Note: Shapefiles with the lowest-level administrative boundaries (i.e., most granular) were downloaded from humanitarian data exchange and used as the underlying layer of the map (Population_Layer). The levels of the publicly available shapefiles differed by country, which is why some countries' risk model maps offer more granular information than others.

5. CSV Output (.csv)– A final output .csv file displays the numeric data visually depicted within the risk model map. Within this file, you will find the figures for population density, elderly population, and the relative ranks of these variables by region, including the final risk ranking. Other variables include the administrative layer names, their size (square kilometers) and unique geospatial identifiers.

<u>Technical Assistance</u>

For any technical assistance or guidance on how to properly use this data or add additional data being layered on, please reach out to contact@coopersmith.org and include "Inquiry on Baseline Risk Maps" in the subject line.