NASA SEDAC Data and Applications for Disaster Risk Reduction and Resilience, COVID-19

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Abstract

The NASA Socioeconomic Data and Applications Center (**SEDAC**) mission is to develop and operate applications that support the integration of socioeconomic and earth science data and to serve as an "Information Gateway" between earth sciences and social sciences. The diverse data and applications from the data center support disaster risk reduction and resilience by making complex analysis routines accessible through **Application Programming Interfaces (APIs), and browser based web applications.** The Global COVID-19 Viewer with Population Estimates by Age Group and Sex leverages more than 80 raster based demographic datasets on the server to provide users with important Age, Sex, and Urbanization data for planning and responding to this worldwide risk. It incorporates data on cases and deaths from Johns Hopkins University so that users might evaluate trends over time.

Introduction

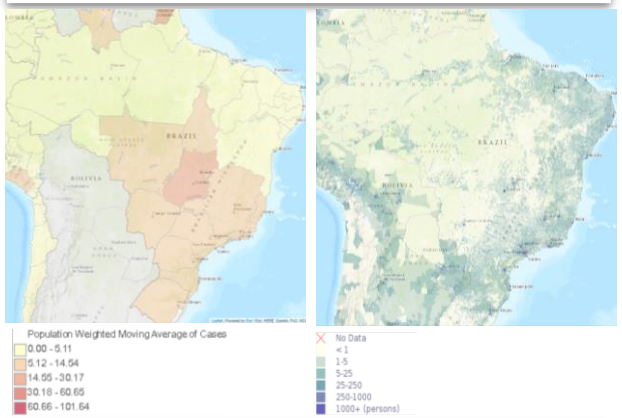
SEDAC's **Global COVID-19 Viewer generates summary statistics and visualizations** that capture the global prevalence and mortality rates associated with the novel coronavirus disease (COVID-19). **Daily COVID-19 data** is mapped alongside **spatially-explicit COVID-19 risk factor information**. These additional informational layers include overall population counts, as well as several transmission and mortality risks such as population density, demographics, air pollution exposure, and local elevation data. COVID-19 data and contextual layers are integrated in a single portal to facilitate situational assessments at varying scales. Users can monitor the continuously evolving global pandemic in its fuller spatiotemporal, sociodemographic, and environmental health context.

COVID-19 Prevalence and Mortality Rates

The mapper presents **population-weighted COVID-19 case and mortality data at national, provincial, and county levels** - to the extent of data availability. The COVID-19 database is geographically and temporally comprehensive, capturing the full history of official COVID-19 data. The mapper measures the following variables:

- Prevalence (rates of confirmed cases per 100,000 people)
- Prevalence 7-day Moving Average
- Mortality (deaths of confirmed coronavirus cases per 100,000 people)
- Mortality 7-Day Moving Average

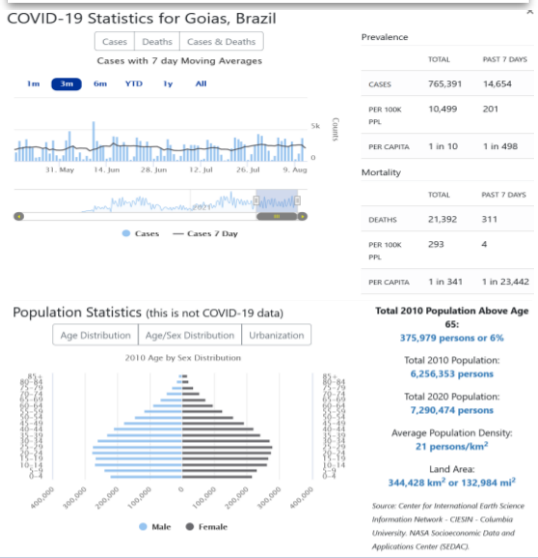
These are calculated using daily cases from JHU&M Coronavirus Resource Center and adjusted with 2020 population data from SEDAC's GPWv411 UNWPP-Adjusted Population Totals.



Population-weighted 7-day Moving Average of Cases (left) and Total 2010 Population Count for Brazil. COVID-19 trends, summary statistics (far-right, top) and age pyramid (far-right, bottom) for the State of Goiás. Captured from SEDAC COVID-19 Viewer on August, 12th 2021

Population and Demographic Variables

The SEDAC COVID-19 Mapper uses **population data from SEDAC's Gridded Population of the World (GPW) version 4**, Revision 11 collection. Most notably, the mapper relies on 80 raster datasets from the GPW v 4.11's Basic Demographic Characteristics dataset to disaggregate population **by age and sex**. Users can perform spatial queries for a region's population and demographic makeup. As a result of GPW's continuous raster format, population and demographic queries can cut across national and subnational borders. COVID-19 poses pronounced age-associated mortality risk and disproportionate mortality risk for men (Williamson et.al). As such, population demographics are critical information in understanding local COVID-19 mortality risk.



Environmental and Geographic Variables

The COVID-19 mapper presents data on environmental and geographic factors that may be associated with increased transmission and mortality. This includes local **air pollution, degree of urbanization, and altitude**. Long-term exposure to air pollution is an environmental health hazard linked to increased COVID-19 mortality (Pertroni et al., Vasquez-Apestegui et al). Population density influences transmission dynamics (Pequeno et al.) and should inform a locally appropriate public health response. Spatial data on urban form was sourced from the Global Human Settlement - "Degree of Urbanization" model Grid r2019a v2 (Florczyk, et.al). Population density is calculated using the Global Human Settlement - Population Grid (GHS-POP) Higher altitudes have shown to offer some protection from COVID-19 transmission (Segovia-Juarez, et al).

Acknowledgements

This web app draws on data from: SEDAC, John Hopkins University & Medicine's Coronavirus Resource Center, Joint Research Centre of the European Commission, and NASA's Land, Atmosphere Near real-time Capability for EOS (LANCE).

https://sedac.ciesin.columbia.edu/mapping/popest/covid-19

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