

COVID-19 Projections: Sudan

Report Date: 07 Oct 2020

This report summarizes the COVID-19 model results for Afghanistan, developed by the OCHA Centre for Humanitarian Data in partnership with the Johns Hopkins University Applied Physics Laboratory. These projections are based on COVID-19 cases and deaths data up to 07 October 2020. The data is sourced from World Health Organization (WHO) and the country's Ministry of Public Health (MOPH). For dynamic updates to this data and more, see the [HDX COVID-19 Map Explorer](#). For additional information, please contact Leonardo Milano at: leonardo.milano@un.org.

1. Key Messages¹²

Current Situation (as of 07 Oct 2020)

- A total of 13,668 cases and 836 deaths have been reported by the WHO.
- The current number of severe cases requiring healthcare support is estimated at 457 - 708.
- Case Fatality Rate remains high at 6.1%.
- Regions vary in their progress towards containment and therefore in the intensity of control effort needed. Some regions are in the red zone (= highest level of risk) and could require stay-at-home orders (see section 2).
- The data reported by the WHO suffers from severe gaps in the last four weeks and displays significant variation from day-to-day. This might reflect challenges in data collection and/or batching where multiple days' worth of data are reported at once. For these reasons it is difficult to assess the stability of trends.
- The case fatality rate remains still significantly higher than expected, suggesting a severe underreporting of COVID-19 cases. We estimate that only around 3% of the daily COVID-19 cases are reported by the authorities.
- Based on available data, the country saw a peak in cases late May - early June.

National Projections (in the next 4 weeks or by 04 Nov 2020)

- In the next 4 weeks, the total number of cases is projected to reach 15,224 - 15,939 and the total number of deaths is projected to reach 969 - 1,041 if current NPIs are maintained.
- Lifting of NPIs would lead to a significantly larger increase in cases and deaths (up to 7144 more cases and up to 406 more deaths; see sections 2 and 3 for details).
- The number of severe cases requiring healthcare is projected to increase drastically if NPIs are lifted (see section 3).

Subnational Projections (in the next 2 weeks or by 21 Oct 2020)

- Fewer regions are expected to be at a Tipping Point in 2 weeks however many regions will still be battling community spread even if current NPIs are maintained (see section 4).
- The ratio of active cases per 100,000 people is expected to increase in all regions but Red Sea assuming all current NPIs are maintained. We note that Karthoum is projected to reach an alarmingly high incidence rate and may require a more intense control effort (see section 4).

¹**Reported cases** refers to the number of infections expected to be reported. It takes into account the **case reporting rate** which corresponds to the estimated number of COVID-19 infections that are actually tested, confirmed and reported. The case reporting rate is calculated based on the reported number of deaths and cases in the last 30 days.

²**Severe cases** refers to the number of people which will have severe symptoms and may require healthcare support. It is calculated as a proportion of the reported cases, and is based on planning parameters for case severity and the vulnerability of a given region.

2. Current Situation (as of 07 Oct 2020)

Containment Progress

The key performance indicators below can be used to evaluate how effective the response has been in containing the spread of the virus. The map on the left illustrates risk levels to help decision-makers and community members know where they are. The levels communicate whether a region is on track for containment and what intensity of effort is needed to control COVID at varying levels of community spread. The map on the right represents the current need for healthcare support.

Current Estimated Daily New Cases Per 100,000 People



Risk Level	Case Incidence*	Intensity of Control Effort Needed
Red	25+	Stay-at-home orders necessary
Orange	10-25	Strategic choices must be made about which package of non-pharmaceutical interventions to use for control. Stay-at-home orders are advised, unless viral testing and contact tracing capacity are implementable at levels meeting surge indicator standards.
Yellow	1-10	Strategic choices must be made about which package of non-pharmaceutical interventions to use for control
Green	<1	On track for containment, conditional on continuing use of viral testing and contact tracing for surveillance and to contain spikes and outbreaks.

*Daily new cases per 100,000 people as reported by WHO

See [Key Metrics for COVID Suppression](#) for additional guidance on control effort needed.

Key Figures: Cumulative Cases and Deaths

	Cumulative Cases	Cumulative Deaths
Based on WHO reports	13,668	836
Based on MOPH data	13,437	822

Case Fatality Rate: 6.1%

Most recent data from MOPH dated: 2020-09-05

Key Figures: Current Severe Cases

	Current Hospitalizations
Estimate	457 - 708

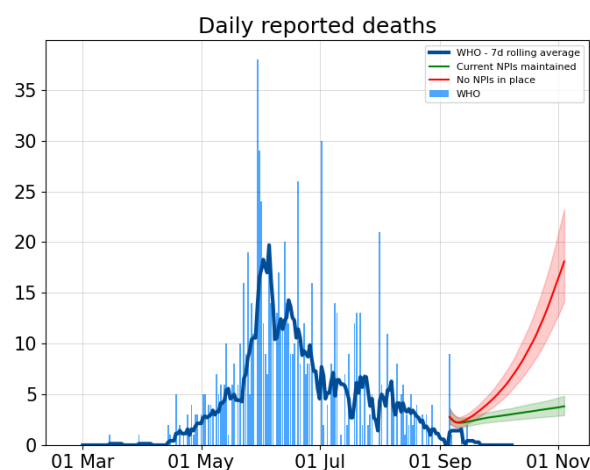
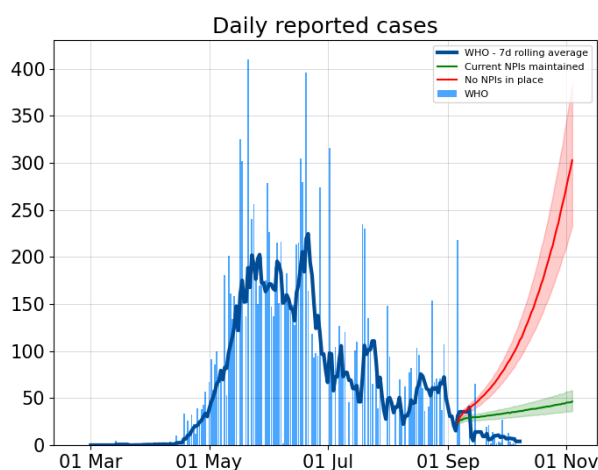
3. National Projections (for the next 4 weeks or by 04 Nov 2020)

The regional data provided by the Ministry of Public Health was used to generate projections at the subnational level, which were then aggregated to the national level.

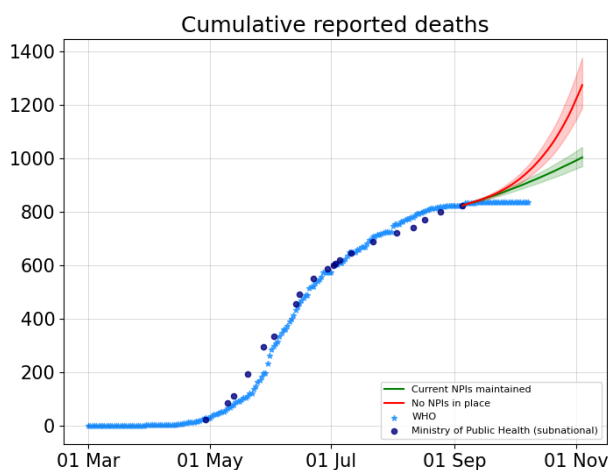
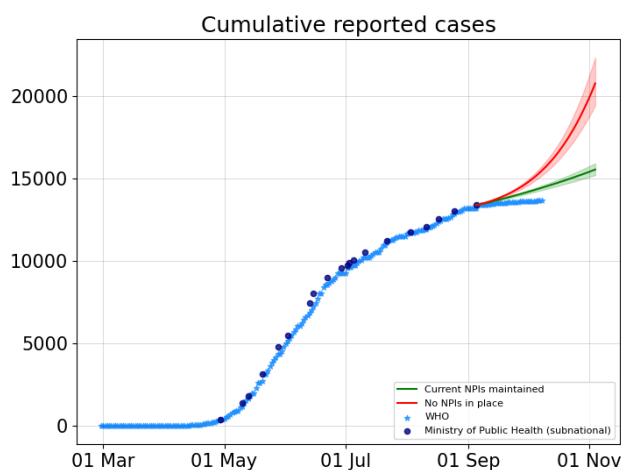
Projected Cases and Deaths

	Projected Cases	Projected Deaths
With current NPIs maintained	15,224 - 15,939	969 - 1,041
With no NPIs	19,464 - 22,368	1,187 - 1,375

The figures below present the historical data on daily counts of cases and deaths, and their projected trends. Trends are represented by a green line for the “Current NPIs maintained” scenario and a red line for the “No NPIs in place” scenario. Note that deaths typically lag reported cases by 2-8 weeks.



The figures below furthermore show the comparison between the reported data from two different sources: national level data from WHO in light blue and subnational data from the Ministry of Public Health in dark blue.



Projected Severe Cases

The figures below show the projected trends for severe cases requiring hospitalizations. In green are the projections under the “Current NPIs maintained” scenario while in red are the projections under “No NPIs in place” scenario.

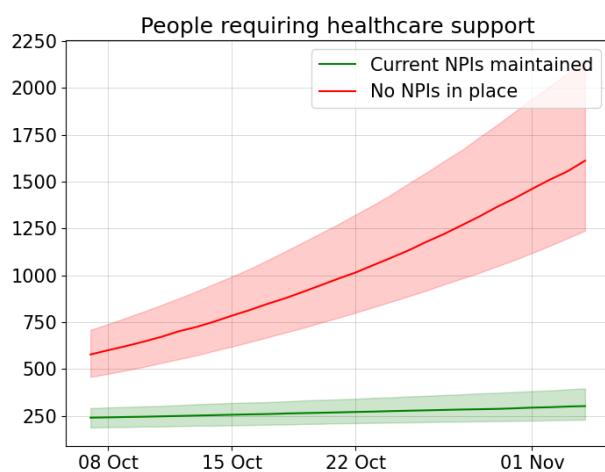
Severe Cases

With current NPIs maintained

229 - 396

With no NPIs

1,238 - 2,156

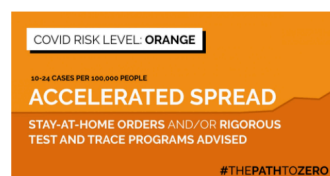
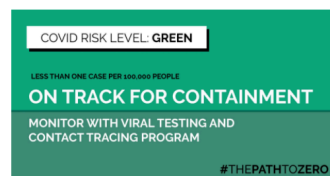
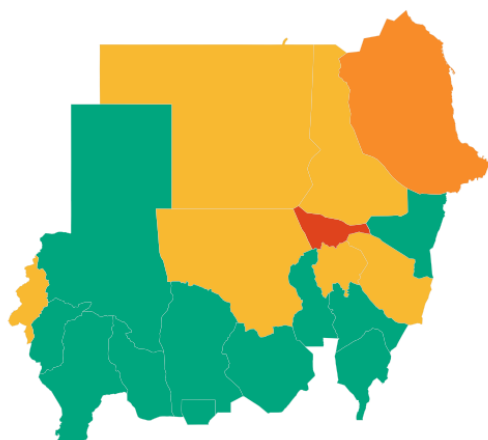


4. Subnational Projections (for the next 2 weeks or by 21 Oct 2020)

Projected Incidence

Assuming current NPIs³ are maintained.

Projected Reported Daily New Cases Per 100,000 People



Projected Changes In Incidence

Regions ordered in decreasing order of change magnitude, from largest increase (more concerning) to largest decrease (less concerning). While the magnitude of change may signal how successful mitigation strategies are projected to be, it should be evaluated in conjunction with regional incidence (cases per 100k people) when considering adding or lifting containment measures.

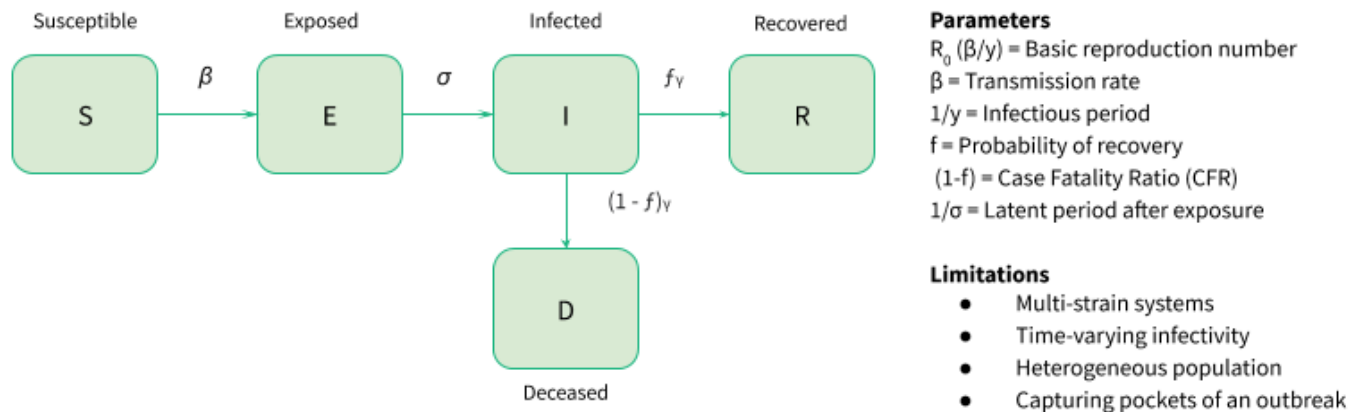
³Non-pharmaceutical interventions - NPIs are all measures implemented by different actors with the aim of reducing the spread and the impact of COVID-19. The NPIs currently in place in Afghanistan are extracted from the [ACAPS database](#) and complemented with additional contextual information provided by our partners in the country.

Region	Change (%)	Projected Cases per 100k People
Increasing or Stable		
Khartoum	12.48	97.478
Aj Jazirah	1.14	5.319
White Nile	0.35	0.919
Gedaref	0.33	5.794
River Nile	0.32	6.758
North Kordofan	0.11	2.895
Sennar	0.04	0.101
West Darfur	0.03	2.087
Kassala	0.02	0.071
Northern	0.02	8.019
South Kordofan	0.02	0.046
Central Darfur	0.01	0.034
North Darfur	0.00	0.001
South Darfur	0.00	0.000
East Darfur	0.00	0.000
Blue Nile	0.00	0.000
West Kordofan	0.00	0.009
Abyei PCA	0.00	0.000
Decreasing		
Red Sea	-0.03	12.415

Background on Model Methodology

The Centre established a partnership with the Johns Hopkins University Applied Physics Laboratory to develop a COVID-19 model which provides projections and insights related to the **scale** of the crisis, the **duration** of the crisis in a specific location, and how different response **interventions** are expected to impact the epidemic curve.

The team is using an **SEIR (Susceptible, Exposed, Infectious, Recovered)** model of infectious disease dynamics which is considered the simplest and most effective technique used in the literature. The model is based on a progression from susceptible to either recovered or dead. Inputs include the reproduction rate (R_0), case fatality rate (CFR), and estimated probabilities that an individual person may contract COVID-19. The model then simulates an outbreak and provides estimates for cases, hospitalizations, and deaths.



The key features of the model include:

- **Tuning on reported data** The estimation of the main parameters (mainly the reproduction rate R_0 and the case reporting rate) is tuned according to the observed recent trends in reported COVID-19 cases.
- **Subnational** The model provides COVID-19 projections at the subnational level, matching the administrative level at which COVID-19 cases are reported.
- **Spatial spread** The density of roads is used to estimate the expected mobility patterns and to simulate the spread of COVID-19 between administrative units.
- **Population stratification** The model fidelity is increased by taking into consideration:
 - The age structure of the population at the subnational level
 - The expected probability of contact between populations of different age groups, including contacts expected to happen at work, school, home and everywhere else (social mixing)
 - Vulnerability factors such as food insecurity, household air pollution and access to handwashing facilities.
- **Non-pharmaceutical interventions (NPIs)** The model simulates the expected impact of NPIs at the subnational level, and also how the outbreaks is influenced by changing NPIs implemented over time. The NPIs currently implemented can be categorised in three main groups:
 - Mobility based NPIs, which would limit the spread of disease between administrative units (e.g. border closures)
 - Contact based NPIs, which reduce the probability of contact between specific groups (e.g. shielding of the elderly, closing schools)
 - R_0 based NPIs, which reduce the overall reproduction rate (e.g. awareness campaigns, curfews)