COVID-19 Projections: Democratic Republic of the Congo

Report Date: 08 Nov 2020

This report summarizes the COVID-19 model results for Democratic Republic of the Congo, 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 08 November 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 Messages

Current Situation (as of 08 Nov 2020)

- Per the WHO, a total of 11,173 cases and 305 deaths have been reported with the current number of daily new cases standing at 17.4 (7-day average).
- The current number of active severe cases requiring healthcare support is estimated at 26 - 32.
- We note that the only mitigation measure currently in place is face mask wearing (50% compliance). Please email us (leonardo.milano@un.org) if this information is inaccurate or incomplete as it affects the accuracy of projections.
- According to the data reported by the WHO and the MOPH as well as estimates of non-reported cases, the country is on track for containment of COVID-19 (see section 2 for detail).
- Cases had a first peak in June.
- We note that the WHO tend to report fewer deaths than the Ministry of Public Health while the two organizations report comparable case counts.
- Please keep mind that the current assessment of the situation and all projections depend on complete, accurate data. The model might underestimate the crisis even after accounting for some underreporting.

National Projections (in the next 4 weeks or by 06 Dec 2020)

- In 4 weeks, we project that an additional 280 - 425 cases and 19 - 25 deaths will be reported if current NPIs are maintained.
- The trajectory of the outbreak is projected to change based on whether NPIs are maintained: daily new cases are expected to continue to decline if NPIs are maintained and to start climbing if NPIs are lifted.
- Lifting the NPIs would lead to a larger number of additional cases and deaths in 4 weeks: up to 648 more cases and up to 23 more deaths (see sections 2 and 3 for details). Due to the lag between cases and deaths, a larger number of cases will ultimately result in higher deaths 2 - 8 weeks later.
- The number of active severe cases requiring hospitalization is projected to be between 14 and 21, and more than twice as high if NPIs are lifted (see section 3).

Subnational Projections (in the next 2 weeks or by 22 Nov 2020)

- Assuming all current NPIs are maintained, the number of cases is expected to stay stable or decrease across the country over the next 2 weeks (see section 4).
- Every region is projected to remain in On Track for Containement (green risk level).

2. Current Situation (as of 08 Nov 2020)

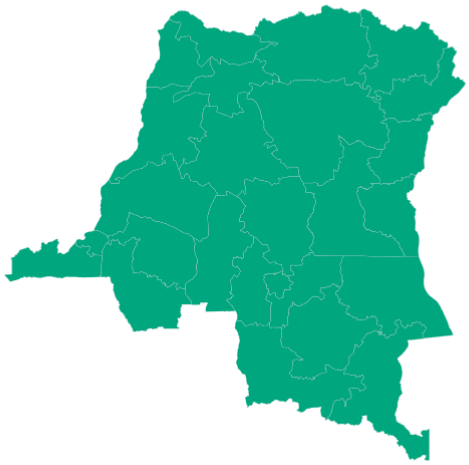
Containment Progress

This report leverages a framework to provide guidance in the interpretation of incidence rates so decision-makers can more readily understand how effective the response has been in containing the virus. The framework was devised by experts from the Harvard Global Health Institute, Harvard's Edmond J. Safra Center for Ethics, and a network of research and policy organizations (more about the collaborative framework here).

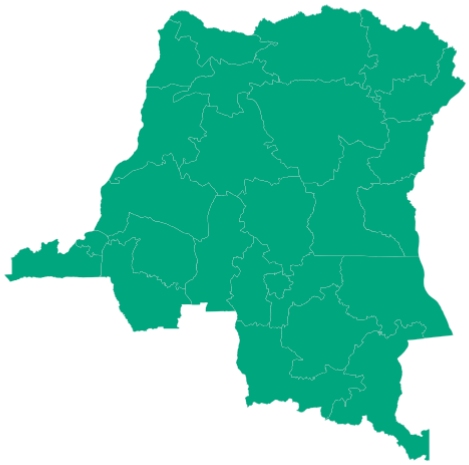
The framework defines risk levels that indicate whether a region is on track for containment and can help decision-makers know where they are at the moment. The levels do not in themselves provide information about how to respond but do communicate the intensity of effort needed for control of COVID at varying levels of community spread. In addition to paying attention to the levels, decision-makers should pay close attention to direction of trend and rate of change (see section 4 for those metrics at the subnational level).

The maps below illustrate regional risk levels as defined by today's incidence rate (daily new cases per 100,000 people as of 08 Nov 2020). On the left are the reported cases while on the right are the total cases as estimated from case reporting rate to adjust for underreporting. The table details the cutoffs for each risk level along with strategies of disease response needed for containment.

Current Reported New Daily Cases
Per 100,000 People



Current Estimated Total New Daily Cases
Per 100,000 People



Risk Level	Case Incidence*	Status	Intensity of Control Effort Needed
Red	25+	Tipping Point	Stay-at-home orders necessary
Orange	10-25	Accelerated Spread	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	Community Spread	Strategic choices must be made about which package of non-pharmaceutical interventions to use for control
Green	<1	On Track for Containment	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 MOPH
See Key Metrics for COVID Suppression for additional guidance on control effort needed.

Key Figures: Current Cases and Deaths[1][2][3]

	Cases		Deaths	
	Daily New Cases	Cumulative	Daily New Cases	Cumulative
Based on MOPH data	NA	10,820	NA	292
Based on WHO data	30.1	11,516	1.1	315

Case Reporting Rate: 55.5% | Case Fatality Rate: 2.7%

"Daily new cases" in this table is the average over the last 7 days.

Most recent data from MOPH: 2020-10-07

Key Figures: Current Severe Cases

	Active
	Severe Cases Requiring Hospitalization
Estimate	21 - 27

Note on data reliability

The limitations of COVID-19 reported data should be taken into consideration when interpreting metrics and projections. Sources may diverge in the counts they report (see WHO vs MOPH figures above); data reports may lag by several days or be missing altogether on certain days (see date of latest data above); cases and deaths are almost certainly underreported and their numbers are affected by testing practices. Scenario modelling (NPI vs non-NPI projections) relies on the freshness and accuracy of the information provided in the ACAPS database (see footnote 3). We strongly encourage the reader to ensure the database is up to date and to contact the Centre for Humanitarian Data with any suggestions of additional data sources or improvements to existing ones.

These are common limitations. This report aims to help the reader understand the situation on the ground through comparing and contrasting multiple data sources and estimates. For instance, we present side-by-side the incidence maps of reported cases and total cases, the latter being an estimate of the true number of cases on the ground considering the case reporting rate (ie., how many cases are likely unreported.) The projections are best estimates based on available data.

[1] **Reported cases** refers to the number of infections expected (current situation) or expected to be reported (projections). Projections take 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 number of deaths and cases reported by the WHO in the last 30 days.

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

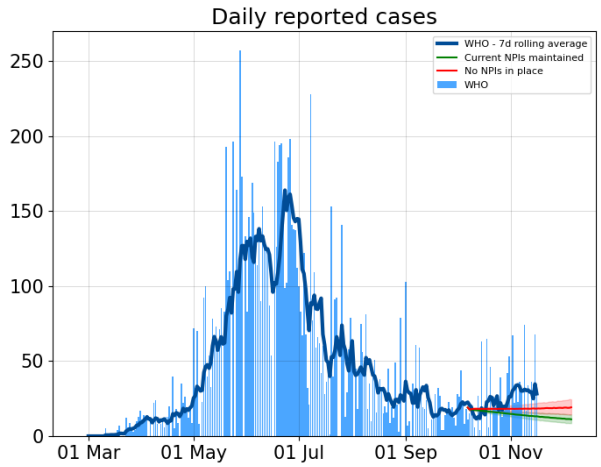
[3] **Case Fatality Rate** refers to the estimated proportion of deaths compared to the total number of people diagnosed with the disease.

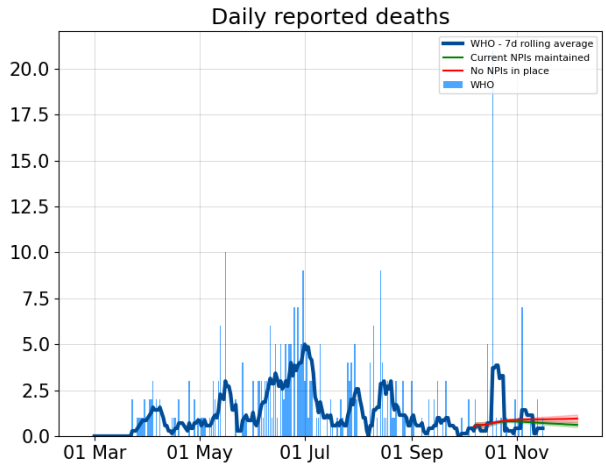
3. National Projections[4][5] (for the next 4 weeks or by 06 Dec 2020)

Projected Cases and Deaths

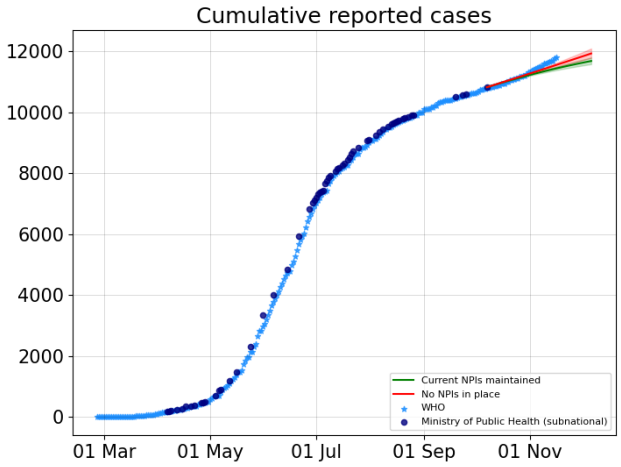
	Change	
	Added Cases	Added Deaths
With current NPIs maintained	248 - 467	15 - 24
With no NPIs	454 - 761	22 - 34

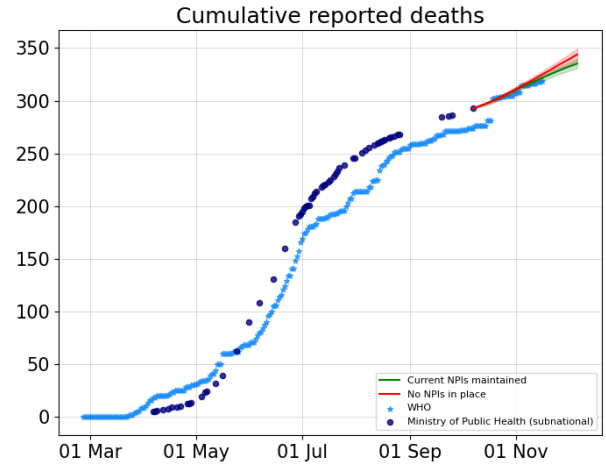
The figures below present the historical data on daily new cases and deaths, and their projected trends. Trends are represented by a green line for the "Current NPIs maintained" scenario and a red line for the "No NPIs in place" scenario. Note that deaths typically lag reported cases by 2-4 weeks.





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





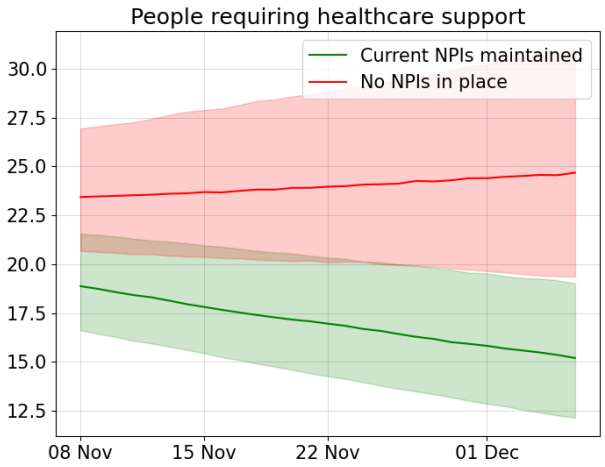
[4]The regional data provided by the Ministry of Public Health are used to generate projections at the subnational level, which are then aggregated to the national level.

[5]**Non-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 are extracted from the ACAPS database and complemented with additional contextual information provided by our partners in the country.

Projected Severe Cases

The figures below show the projected trends for active 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.

	Active Severe Cases
With current NPIs maintained	12 - 19
With no NPIs	19 - 31

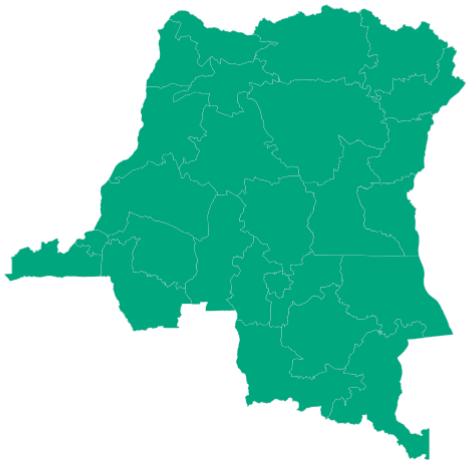


4. Subnational Projections (for the next 2 weeks or by 22 Nov 2020)

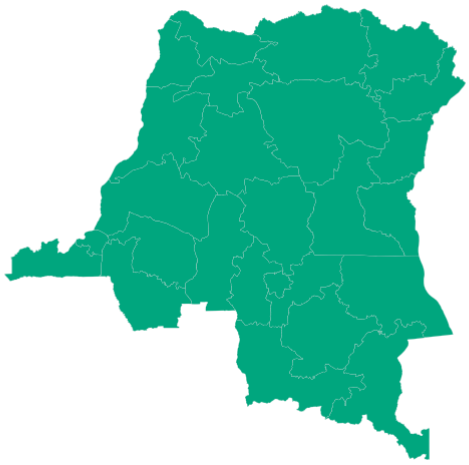
Projected Incidence

The maps below represent the projected risk level of every ADMIN1 region, assuming the current NPIs are maintained. On the left are the cases projected to be reported while on the right are the projected total cases as estimated from case reporting rate to adjust for underreporting. See Section 1 for detail on the relationship between risk level and progress towards virus containment.

Projected Reported New Daily Cases Per 100,000 People



Projected Estimated Total New Daily Cases Per 100,000 People



Risk Level	Status
Red	Tipping Point
Orange	Accelerated Spread
Yellow	Community Spread
Green	On Track for Containment

Projected Changes In Incidence

Below are the projected incidence rates (= projected daily new cases per 100k people on 22 Nov 2020) and projected absolute changes in incidence between then and today for every region. These metrics do not include adjustments for underreporting.

Regions are ordered in decreasing order of change magnitude, from largest increase to largest decrease. Note that Incidence Rates are rounded to the third decimal; therefore a 0.000 incidence rate may mean that no new daily cases are projected or that fewer than 1 cases per 100 million people are projected.

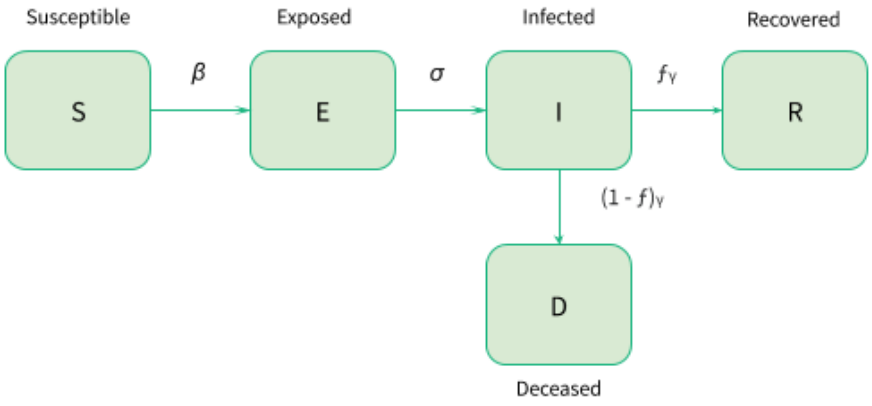
While the magnitude of change may signal how successful mitigation strategies are projected to be, it should be evaluated in conjunction with incidence when considering adding or lifting suppression strategies. For instance, a region may be projected to show a large decrease but remain at a concerning high level of incidence that require intense control efforts.

Region	Projections in cases per 100k people	
	Change	Incidence
Increasing or Stable		
Kwango	0.00	0.000
Kwilu	0.00	0.000
Maï-Ndombe	0.00	0.000
Equateur	0.00	0.000
Sud-Ubangi	0.00	0.000
Nord-Ubangi	0.00	0.040
Mongala	0.00	0.000
Tshuapa	0.00	0.000
Tshopo	0.00	0.022
Bas-Uele	0.00	0.000
Haut-Uele	0.00	0.036
Ituri	0.00	0.009
Nord-Kivu	0.00	0.036
Sud-Kivu	0.00	0.005
Maniema	0.00	0.000
Haut-Katanga	0.00	0.003
Lualaba	0.00	0.030
Haut- Lomami	0.00	0.000
Tanganyika	0.00	0.000
Lomami	0.00	0.000
Kasaï-Oriental	0.00	0.003
Sankuru	0.00	0.000
Kasaï-Central	0.00	0.002
Kasaï	0.00	0.000
Decreasing		
Kinshasa	-0.01	0.055
Kongo-Central	-0.01	0.118

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 (Ro), 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, severe cases/hospitalizations, and deaths.



Parameters
R_0 (β/γ) = Basic reproduction number
β = Transmission rate
1/γ = Infectious period
f = Probability of recovery
(1-f) = Case Fatality Ratio (CFR)
1/σ = Latent period after exposure

Limitations
- Multi-strain systems
- Time-varying infectivity
- Heterogeneous population
- Capturing pockets of an outbreak

The key features of the model include:

- **Tuning on reported data** The estimation of the main parameters (mainly the reproduction rate R0 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 and household air pollution.
- **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)
  - R0 based NPIs, which reduce the overall reproduction rate (e.g. awareness campaigns, curfews)