COVID-19

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BRIEF #2 | MAY 2020

How To Measure and Interpret COVID-19 Surveillance Indicators

Public health departments and ministries of health use surveillance data to monitor and report the daily number of COVID-19 cases and deaths. Although these indicators are fundamental to understanding COVID-19 transmission, there are several other essential indicators, which can be calculated using only daily counts of cases and deaths, that signal important changes in the trajectory of the epidemic and are useful benchmarks for taking action.

Analytic staff in ministries of health who are responsible for producing data-driven insights to inform action should routinely calculate and interpret these indicators as soon as monitoring of COVID-19 cases and deaths begins. This will enable them to provide decision-makers with data to understand the status of the epidemic in their country, state or city, to track the effects of public health and social measures, and, in conjunction with other information, guide when these measures should be loosened and tightened.

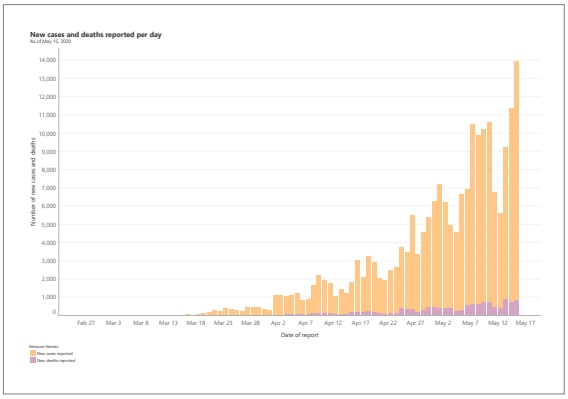
In this brief, the following essential indicators will be described: number of new cases, deaths, or hospitalizations; total number of cases or deaths; three consecutive days with 10% or more increase in new cases; doubling time; case fatality rate; and, three-day moving average.

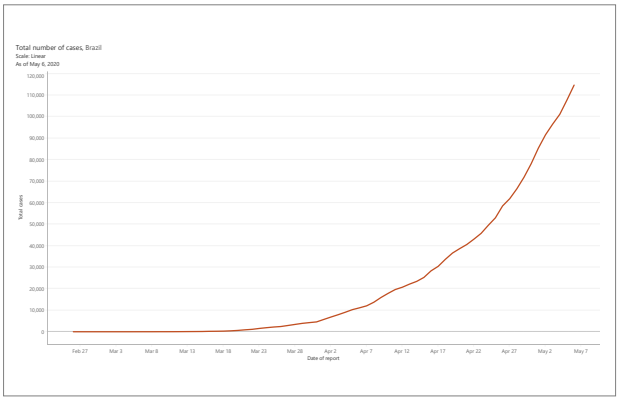
Essential indicators

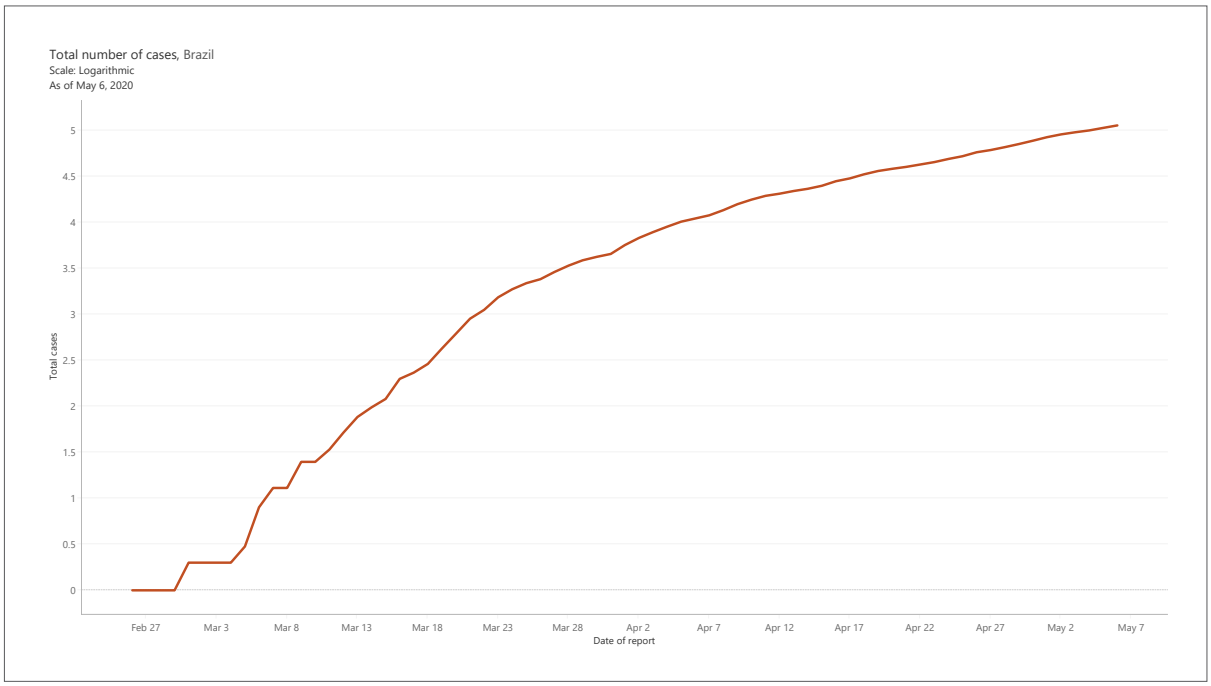
Number of new cases, deaths, or hospitalizations. The number of new cases, deaths, or hospitalizations reported in a jurisdiction per day is used to form the basic epidemic curve.

The "case" definition should be categorized according to criteria for diagnosis (e.g., confirmed, probable, suspected); the definition for each category should be explicit, and any changes in definition or reporting should be noted. Similarly, deaths attributable to COVID-19 should follow the guidelines for certification and coding of COVID-19 as cause of death based on the International Statistical Classification of Diseases.

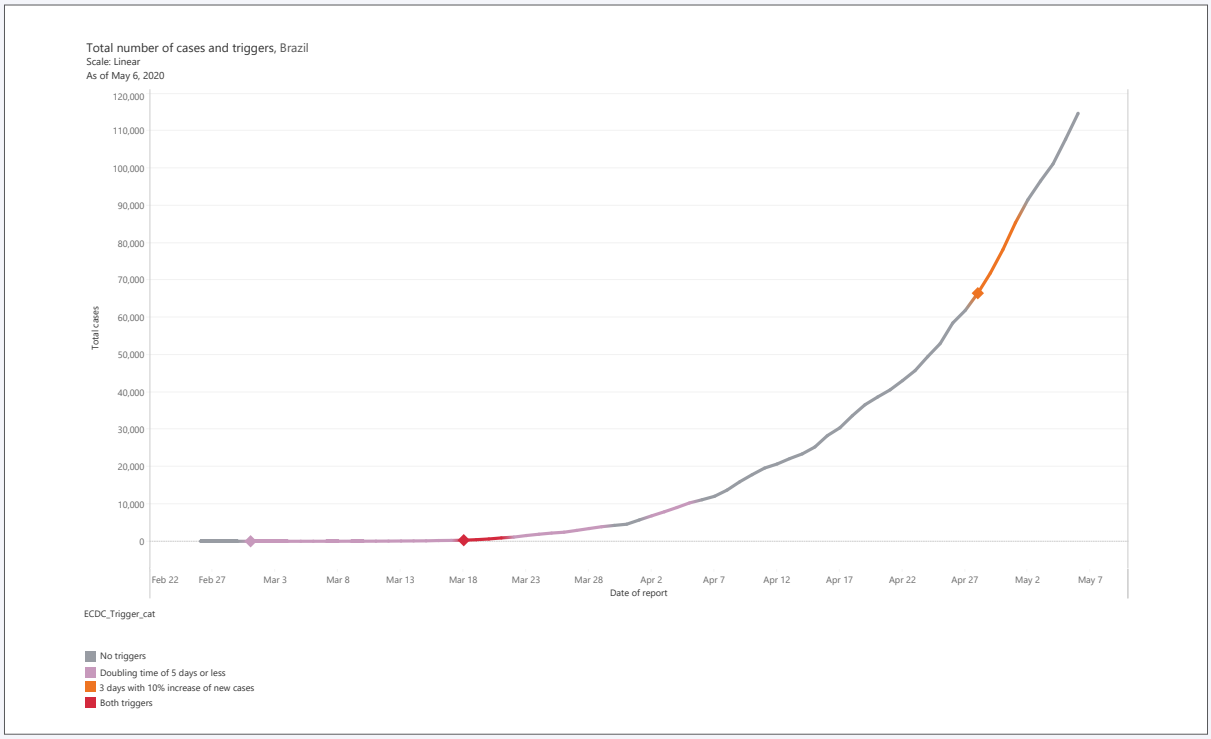
Total number of cases or deaths is the running total of cases or deaths to date, also known as the cumulative number of cases or deaths. This measure is reported in conjunction with the number of new cases or deaths each day. Graphing the total number of cases can highlight the general trend (e.g., a flattening curve).



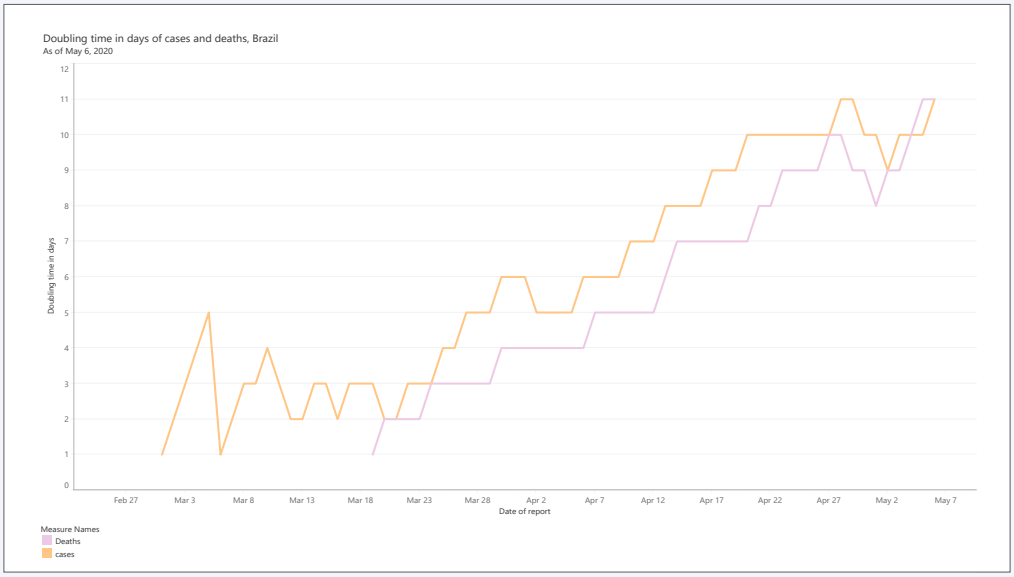




NOTE A linear graph is scaled so that each vertical distance represents the same absolute change in value; a logarithmic scale shows the rate of change. A logarithmic scale is useful for visualizing how quickly the epidemic is growing, especially as the numbers get larger.

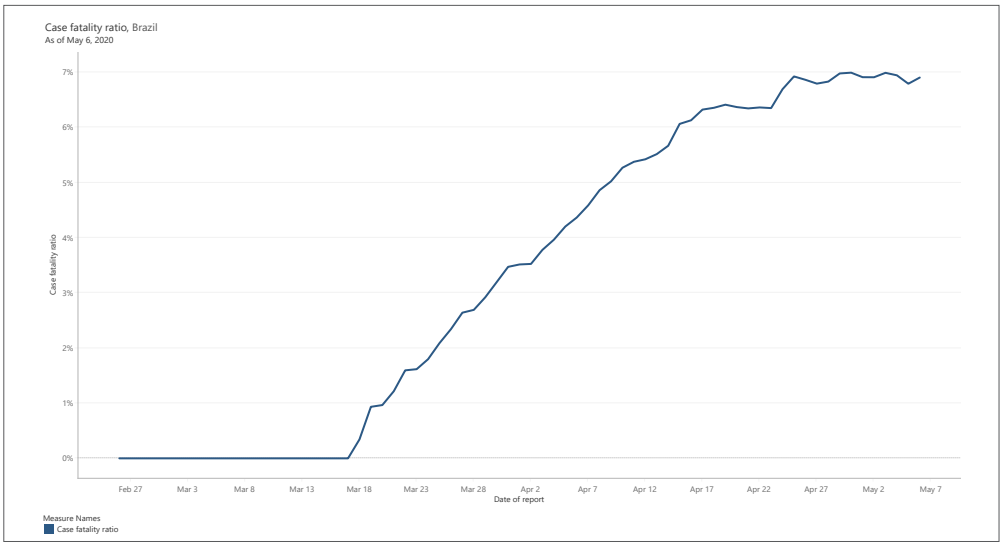


Three consecutive days with 10% or more increase in new cases. This indicator captures relative growth in new cases and serves as a trigger for implementing tighter physical distancing measures (See: When and How to Tighten the Faucet, https://preventepidemics.org/wp-content/uploads/2020/04/COV020_WhenHowTightenFaucet_v3.pdf



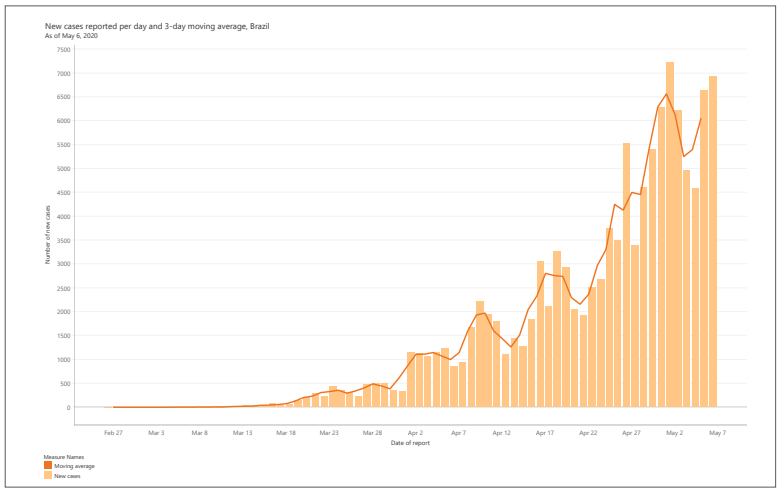
Doubling time is the number of days it takes for the number of cases or deaths to double in value. The lower the doubling time, the more rapidly new cases or deaths are occurring. A doubling time of less than five days is a trigger for tightening public health and social measures.

A doubling time greater than 14 days—in conjunction with other evidence of decreasing numbers of new cases, hospitalizations and deaths—indicates that the growth in cases is slowing and that selected measures may be judiciously loosened, with continued close monitoring for an increase in cases or deaths and readiness to tighten public health and social measures anew, as needed. (See: When and How to Reopen After COVID-19, https://preventepidemics.org/wp-content/uploads/2020/04/COV020_WhenHowLoosenFaucet_v4.pdf)



Case fatality rate, or CFR, is the proportion of people who die from COVID-19 among all individuals who are diagnosed with the disease over a certain period. In the context of a functioning surveillance system with capacity for COVID-19 testing, the CFR is a measure of disease severity, poor quality of care or, lack of access to care. However, in the context of a poorly functioning surveillance system, a high CFR can be a function of the denominator being artificially small, such as would occur if testing is insufficient, and a low proportion of cases are being identified.

Three-day moving average.
A rolling average of a given indicator is used to smooth short-term fluctuations and highlight the long-term trend.



It can be calculated by averaging three figures: the current day's value, the value one day before, and the value two days before.

This indicator should be used when the number of new cases or deaths fluctuates widely from day to day.

Stratify according to age group, sex and geographic area

Whenever possible , analysts should disaggregate case and death data according to age group, sex and geographic area. The essential indicators described above are easy to calculate and to communicate. I In addition, the effective reproductive rate (R) is another, though more complex, calculation that can also be used to monitor transmission. R is a measure of the transmission potential of a disease. For example, if the effective reproduction rate is equal to two, it means that, on average, two people will catch the disease from one infected person. If the reproductive rate can be brought below one, the epidemic will eventually subside. Additional information on the use of R can be found here: https://epiforecasts.io/covid/posts/global/

Where are additional resources that can help you with this analysis?

Below are links to resources that provide additional information on data used to monitor COVID-19 and understanding it in context to guide action.

COVID-19 PLAYBOOK provides quick, practical access to key principles and tools to implement COVID-19 public health response activities; it describes an adaptive response approach which is the practice of dynamically adapting response activities as the epidemic progresses along the epidemic curve.
https://preventepidemics.org/covid19/playbook/

Our World in Data is a collaborative effort between researchers at the University of Oxford, and the non-profit organization Global Change Data Lab. It presents CoVID-19 statistics and research in country-specific profiles.
https://ourworldindata.org/coronavirus

A brief guide to understanding and interpreting the various forms of data being reported on COVID-19
https://medium.com/swlh/how-will-we-know-when-the-covid-19-pandemic-is-getting-better-be2bdce734a4