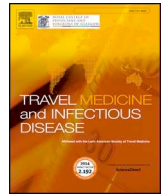




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COVID-19 in Brazil: Historical cases, disease milestones, and estimated outbreak peak



To the Editor,

The Coronavirus Disease 2019 (COVID-19) pandemic emerged in Sao Paulo, the largest Brazilian city, on Feb 26 [1], when a 61 years-old man presented Severe Acute Respiratory Syndrome, after returning from Turin, Italy. Until March 7, the Brazilian Ministry of Health (BMH) reported 19 cases: 11 cases in people coming from Italy, 3 from Italy and another country (German, Spain, and Australia), 3 from other countries (USA, UK, and Iran), and 2 cases of local transmission (associated with the first case). On March 13 (98 cases), the first cases of community transmission of Sars-CoV-2 occurred in Sao Paulo and Rio de Janeiro cities, the two main Brazilian COVID-19 epicenters. Confirmed cases continued to grow fast in a classical exponential curve ($r^2 = 0.95$), with a rapid rate per day ($\sim 25\%$), similarly to those initially observed in other European countries, including Italy, Spain, and France [2]. On April 15, 28,320 patients tested positive, and 1,736 deaths were reported ($\sim 6.1\%$ mortality).

Brazilian authorities made several fast and emergency decisions to reduce the velocity of the fast-growing number of infected people in the country and the number of casualties. For instance, in the Sao Paulo State, the main COVID-19 Brazilian epicenter, the timeline of the positive cases and the emergency decisions [3] are summarized in Fig. 1. According to the previous reports [2,4], these decisions purpose to protect elderly patients and people with comorbidities, to promote social distancing for avoiding fast Sars-CoV-2 dissemination, and c) to improve the health services related to the pandemic COVID-19.

After 3 weeks of quarantine exclusion, it is clear that governmental decisions in the Sao Paulo State have significant effect on pandemic COVID-19 growing; average of increasing was 9.1% in the last week against 26.1% in the week before quarantine exclusion. However, it is still early to have precise conclusions and further emergency decisions

can be required to reduce the COVID-19 growing spread. The Imperial College London [5] estimated the COVID-19 impact in several countries, including Brazil, according to different strategies for social distancing. Based on this report, specifically for the State of Sao Paulo (~ 46 million people, $\sim 21.7\%$ of the Brazilian population), considering early suppression and a transmissibility index (R_0) of 3, by the end of the pandemic, we can find the following estimates: infected people = 2,475,090; individuals requiring hospitalisation = 54,047; patients requiring critical care = 12,0405; and total of deaths = 9,551. Because health system has a limited capacity to attend all COVID-19 patients, it is important to flatten the pandemic COVID-19 curve to avoid the system overload. Assuming different effectiveness of the emergency decisions imposed by the government in reducing the growing spread of the Sars-CoV-2 by 25, 50, or 75% (E_{25} , E_{50} , and E_{75} , respectively), we were able to calculate the peak of pandemic COVID-19 in Sao Paulo State (when 50% of the infected people will be reached, that is 1,237,545). For E_{25} , E_{50} , and E_{75} , the outbreak peak will occur on May 18–19, June 3–4, and July 20–21, respectively. The next days will be crucial to evaluate the effectiveness of the emergency decisions and to held and to direct important and further emergency decisions to avoid the fast advance of the pandemic COVID-19 and the health system collapse.

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Declaration of competing interest

All authors declare no conflict of interest.

COVID-19 CASES AND EMERGENCY DECISIONS IN SAO PAULO STATE, BRAZIL

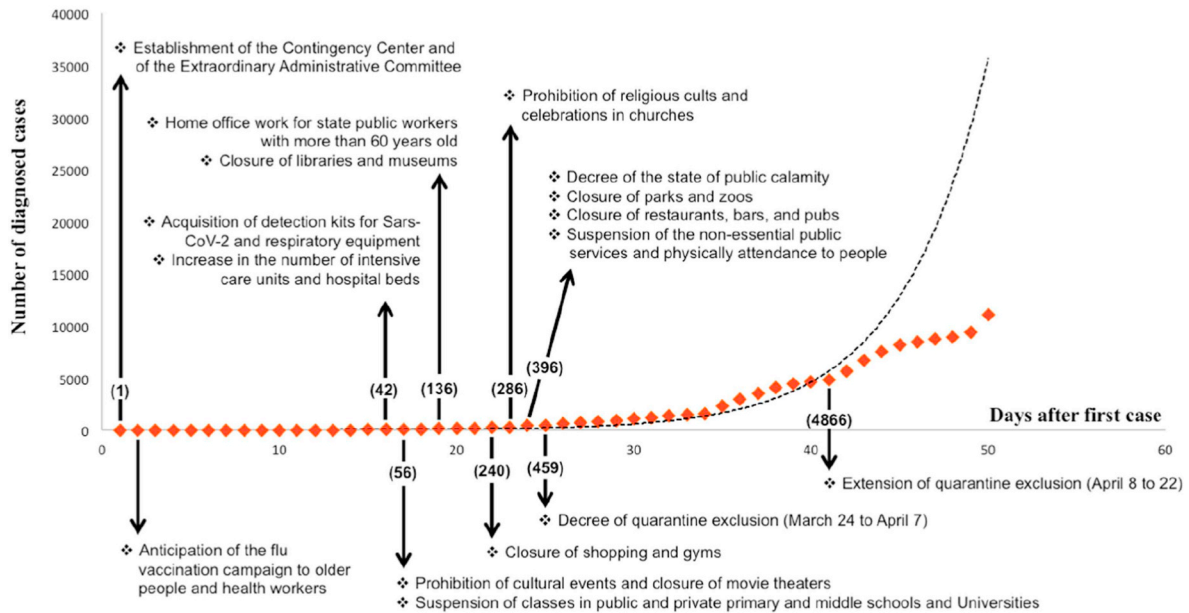


Fig. 1. Timeline of the COVID-19 cases and emergency decisions made in Sao Paulo State, Brazil. Source: Brazilian Ministry of Health and Government of the Sao Paulo State.

References

[1] Brazilian Ministry of Health. Coronavirus – COVID-19. <https://coronavirus.saude.gov.br> April 15, 2020.

[2] WHO. Coronavirus Disease (COVID19) pandemic. <https://www.who.int/emergencies/diseases/novel-coronavirus-2019> April 2, 2020.

[3] Government of the Sao Paulo State. Coronavirus: actions in SP. <https://www.saopaulo.sp.gov.br/coronavirus/> April 15, 2020.

[4] Lewnard JA, Lo NC. Scientific and ethical basis for social-distancing interventions against COVID-19. *Lancet Infect Dis* 2020. [https://doi.org/10.1016/S1473-3099\(20\)30190-0](https://doi.org/10.1016/S1473-3099(20)30190-0). pii: S1473-3099(20)30190-0 (published online March 23).

[5] Imperial College London. MRC centre for global infectious Disease analysis. <https://www.imperial.ac.uk/mrc-global-infectious-disease-analysis/covid-19/> March 27, 2020.

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