Brazil physical distancing policies and epidemiology from January – August 2020: A case report

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Conflicts of Interest

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Study proposal
Informed consent
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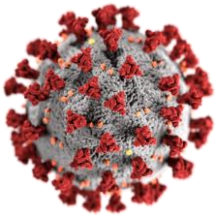
COVID-19 Country characteristics database

I. Introduction and project description

A new disease that spread around the world

On December 31, 2019, the World Health Organization (WHO) was notified of a cluster of individuals with pneumonia of unknown cause in Wuhan, China. (1) On January 12, 2020, China shared the genetic sequence of the novel coronavirus with other countries to help develop diagnostic tests. (1) Thailand reported the first known case of the novel coronavirus outside of China on January 13, 2020. WHO declared the novel coronavirus (2019-nCoV) outbreak a Public Health Emergency of International Concern on January 30, 2020 with 7,711 confirmed cases, 12,167 suspected cases, and 170 deaths in China and 83 cases in 18 countries outside of China. (1,2) The disease was later named COVID-19 for coronavirus disease 2019 and the virus referred to as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). (1) WHO declared COVID-19 a pandemic on March 11, 2020. (1)



Physical distancing policies and knowledge gaps

As an emerging infectious disease, there were initially no effective vaccines or preventive treatments for SARS-CoV-2 on a wide scale. Therefore, governments have had to rely on the use of public policies to combat the spread of the virus. (1-4) Creating policies has been difficult due to the large amount of information and ongoing uncertainty around the characteristics of the virus and who it affects. (4) One of the most commonly used policies to mitigate (slow) the spread of the virus that causes COVID-19 centres on physical or social distancing, which relies on separating people to reduce the transmission of the virus. (5) However, it is still unclear when is the best time to institute such policies and what happens when distancing policies are eased in which contexts. There are many aspects of distancing, such as recommendations for maintaining a physical distance in public, banning group gatherings, or complete lockdowns, that complicate their assessment. (5) There are also many factors that have been attributed to people acquiring or having a worse outcome from COVID-19. (6-11) However, there is no harmonized database available with all the policies, epidemiology and contextual information that is needed in order to perform comparative analyses useful to informing policymaking.

About this project

The Policy Frameworks and Epidemiology of COVID-19 Working Group was developed after a "CONVERGE Virtual Forum: COVID-19 Working Groups for Public Health and Social Sciences Research." A group of international researchers convened to explore what physical distancing policies countries implemented and their effects on the epidemiology of COVID-19. The Working Group was further supported through an award from CONVERGE and the Social Science Extreme Events Research (SSEER) Network. CONVERGE is a National Science Foundation-funded initiative headquartered at the Natural Hazards Center at the University of Colorado Boulder.

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II. Methods

Research design

A qualitative embedded multiple case study research design was used to compare countries (or subnational jurisdictions, such as provinces, states or territories). The suite of public policies and resulting changes in the epidemiology of COVID-19 are examined within their specific country setting. Our cases start in January 2020 and end in August 2020. (Please see full study proposal). Research ethics approval was obtained by the Hamilton Integrated Research Ethics Board (HIREB) (Project # 11243).

Data collection

For each country, the setting, such as health systems, political systems and demographics were described to help with interpretation of findings and potential transferability, or the degree to which findings are applicable to other sites or future research.

Publicly available data was first collected on the jurisdiction following a standardized data collection form. Epidemiological data was drawn from publicly available data. WHO, World Bank, Central Intelligence Agency and other publicly available sources were used for timelines and country characteristics, where possible. Other sources of information included governmental and non-governmental websites, news articles, government reports, and peer-reviewed journals.

Next, key informant interviews were conducted to fill in gaps, verify information found through the documentary searches, and identify further participants and documentary sources of relevant information. (See informed consent and interview guide) Key informant interviews were conducted with policymakers, health workers, researchers and other stakeholders as appropriate to fill in knowledge gaps.

Data analysis and presentation

Our COVID-19 policies and epidemiology databases harmonize data on setting characteristics, policies, demographic characteristics and epidemiological risk factors and outcome metrics. These will further be described in single country or jurisdiction case reports. Comparisons will be selected based on both literal and theoretical replication. Countries that have similarities in either policies or epidemiological trends can be considered literal comparisons, whereas countries that differ will be used as theoretical comparisons. These comparisons will be submitted to peer-reviewed journals for publication.

III. Findings

A. Setting characteristics

Geographic, environmental, social and economic contextual factors

Brazil is in the WHO Region of the Americas with a population of 213 million people. (12, 13) Within Brazil, 81% of people live in large urban centres. Most of the population lives between the states of São Paulo, Rio de Janeiro, Minas Gerais and Bahia. (14) These cities are also known as high-density cities also with the highest numbers of COVID cases. (15)

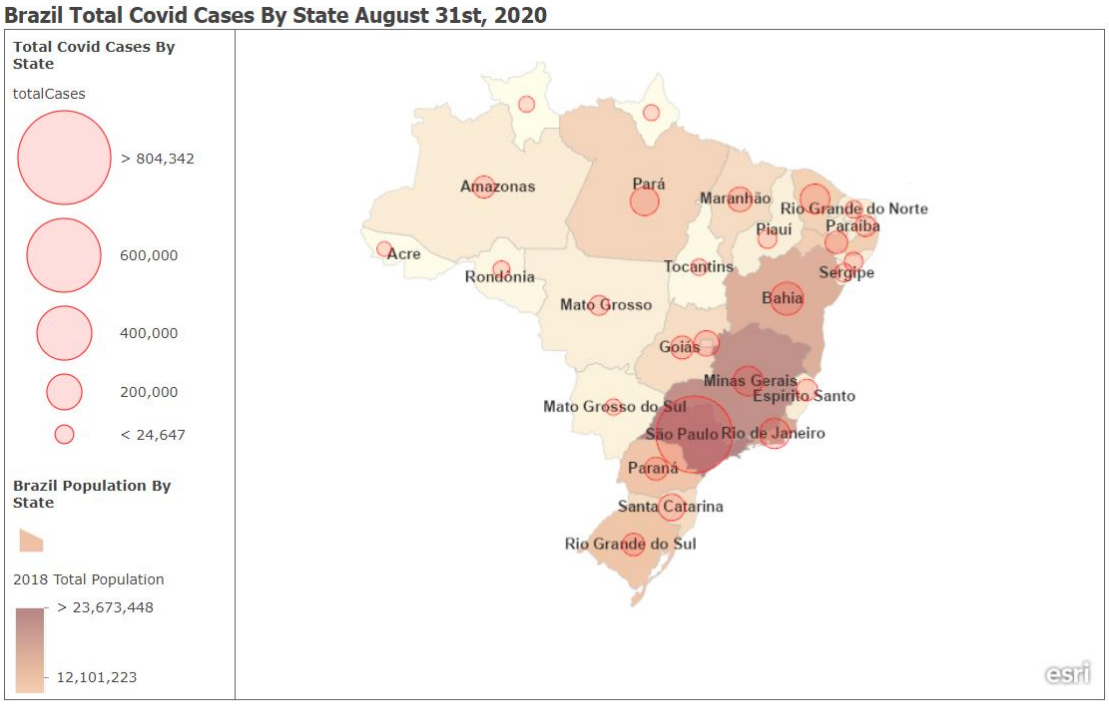


Figure 1. Map of Brazil with total COVID-19 cases, as of 31 August 2020 (15)

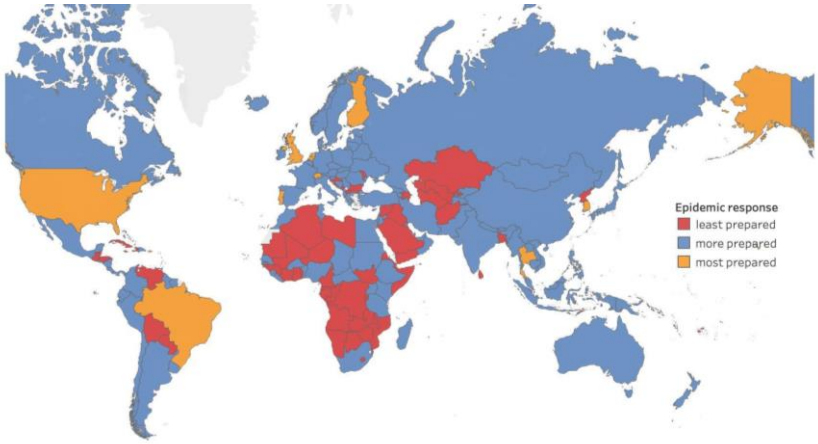


Figure 2. Global Health Security epidemic preparedness rank category (ghsindex.org)

Table 1. COVID-19 relevant contextual factors for Brazil

Global Health Security, 2019 (Overall Index Score out of 100 and category) (16)	59.7 - More prepared
Global Health Security, 2019 (Epidemic Preparedness Index Score out of 100 and category) (16)	67.1 - Most prepared
Cities in Brazil with the highest air particulate matter (PM2.5 per cubic meter) or air pollution, 2019 (micrograms per cubic meter) include two cities in São Paulo state, Brazil (17)	20 (Campinas, SP, Brazil) 15.3 (São Paulo, SP, Brazil)
PM2.5 air pollution, population exposed to levels exceeding WHO guideline value, 2017 (% of total) (18)	68.1
International migrant stock, 2015 (% of population) (19)	0.34
Trust in national government, 2018 (% of population) (20)	14.5
Mobile cellular subscriptions, 2018 (per 100 people) (21)	98.84
Individuals using the internet, 2018 (% of population) (22)	70.43
Index of economic freedom, 2020 (Rank and category) (23)	53.7 - Mostly unfree
World Bank classification, 2020 (24)	Upper middle income
Gini Index, 2018 (25)	53.9
GDP per capita, PPP, 2019 (Current international $) (26)	15,258.85
GNI per capita, PPP, 2019 (Current international $) (27)	14,850
Current health expenditure, 2017 (%) (28)	9.5
Vulnerable employment, total, 2020 (% of total employment) (29)	27.89
Vulnerable employment, female, 2020 (% of female employment) (30)	23.72
Vulnerable employment, male, 2020 (% of male employment) (31)	30.97
Homelessness, 2015 (%) (32)	0.05
Adult literacy rate, 2018 (%) (33)	93.23
Literacy rate, adult female, 2018 (% of females 15 and above) (34)	93.43
Literacy rate, adult male, 2018 (% of males 15 and above) (35)	93.01
Primary school enrollment, 2017 (% net) (36)	96.3

GDP - gross domestic product; **GNI** - gross national income; **PPP** - purchasing power parity

Population health characteristics

Life expectancy at birth in Brazil is 76 years (2018). (37) For males, life expectancy at birth is 72 years, and 79 years for females. (38, 39) Non-communicable diseases are believed to play a role in who develops severe symptoms of COVID-19. In 2016, the proportional mortality from cardiovascular diseases was 28%, cancers 18%, chronic respiratory diseases 6%, and diabetes 5%. (40) (See Figure 3.) The probability of dying between ages 30-70 from cardiovascular disease, cancer, diabetes, or chronic respiratory disease was 17% for all adults, and 20% and 13.5% for males and females, respectively. (41)

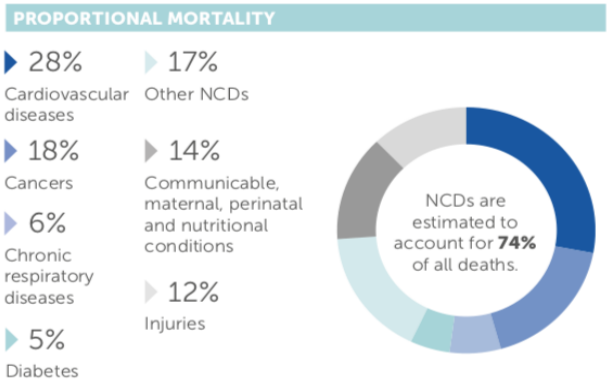


Figure 3. Proportional mortality from non-communicable diseases (NCDs) – BRAZIL, 2016 (40)

Table 2. Age and health characteristics for Brazil

	Male	Female	Total
Population ages 0-14, total, 2019 (% of total population) (42-45)	22,651,126 (10.73)	21,688,645 (10.28)	44,339,804 (21.01)
Population ages 15-64, total (% of total population) (46-49)	72,673,036 (34.43)	74,511,199 (35.31)	147,184,250 (69.74)
Population ages 65 and above, total (% of total population) (50-53)	8,409,002 (3.98)	11,116,519 (5.27)	19,525,475 (9.25)
Current tobacco use prevalence, total, 2018 (%) (54)	21.5	11.5	16.5
Raised blood pressure (Systolic blood pressure ≥140 or Diastolic Blood Pressure ≥90), ages 18+, 2015 (%) (55)	26	20.4	23.1
Raised fasting blood glucose (>7.0mmol/L or on medication), ages 18+, 2014 (%) (56)	7.4	8.8	8.1
Prevalence of obesity among adults (Body Mass Index ≥30), 2016 (%) (57)	18.5	25.9	22.3
Prevalence of Human Immunodeficiency Virus (HIV), 2019 (% of population ages 15-49) (58)			0.5%
Bacillus Calmette-Guérin (BCG) Immunization coverage estimates (%) (59)			79
Prevalence of undernourishment, 2018 (% of population) (60)			2.5

Governance and health systems

Brazil supports a national health care system (SUS, or Sistema Único de Saúde) that was established in the Constitution and functions under the guidelines of decentralization. However, regionalization is also in function as an organizing structure of SUS, as is the guarantee of social participation. The Brazilian Unified Health System (SUS) provides universal health coverage, and within the system, both high complexity treatments (e.g., cancer, transplants) and immunization services are 100% publicly funded. The system is used exclusively by approximately 79% of the Brazilian population and the rest of the population uses the private care system. Approximately 70% of hospitalizations in the private sector are financed by the public sector. (61)

Another way to comprehend the nuances of the Brazilian health care system is to scrutinize the ways through which the Brazilian state functions at the national level. To summarize, the country is a “Presidential Federated Republic'' and is composed of the Union (Legislative, Executive and Judicial Branches), State, Federal District and municipalities, all of which have distinct functions. The word ‘federated’ indicates that states have political autonomy, thus the Governor of São Paulo, for example, during the COVID-19 pandemic of 2020—Governor João Agripino da Costa Doria Júnior—had significant autonomy to create health guidelines for the state of São Paulo, as did each governor in each of the 26 states. It is assumed that it was and continues to be state governments and mayors at the municipal level in Brazil who took the first and ongoing measures to limit infections by closing schools, encouraging physical distancing and restricting non-essential services. (62)

Additional context regarding public health expenditures at the national level ought to be considered here. In 2016, federal expenditures on public health in Brazil were frozen for 20 years, thus creating a scarcity of funding in this sector. (63) So while public health is financed at federal, state and municipal levels, with the freeze at the national level, public health expenditures have since then become ever more reliant on state and municipal funding. This federal funding stagnation puts wealthier states and cities in a *comparatively* stronger position as compared with other less resourced states and municipalities depending more heavily on national funding. As an example, both the state and city of São Paulo are among the wealthiest in the nation, but other states are considered to be much weaker economically and they have fewer public health and hospital resources.

Table 3. Political and health system indicators for Brazil

Fragile States Index score, 2020 (maximum 120, higher is worse) (64)	73
Fragile States Index rank, 2020 (out of 178 countries, higher is better) (64)	75
Global Freedom score and status, 2020 (65)	75 - Free
Internet Freedom score and status, 2020 (66)	63 – Partly Free
World press freedom index, 2020, global score (0-100, lower is better) and rank (out of 180 countries, lower is better) (67)	33.92 - 107
Physician density, 2018 (physician/1,000 pop) (68)	2.16
Hospital bed density, 2014 (beds/1,000 pop) (69)	2.2

Pandemic experience and preparedness

Brazil is characterized as having an established and recognized history of dealing with public health and infectious disease crises, the most recent ones being the H1N1 (influenza A) epidemic in 2009 (46,355 cases until March 2010 and 557 deaths recorded in August 2010 in Brazil) and then the Zika epidemic in 2015-16. (70,71) Brazil has also gained experience and recognition for its approach to influenza, yellow fever, and Severe Acute Respiratory Syndrome. These earlier public health challenges (prior to COVID-19) led to much positive international recognition, with publications and praise highlighting the efforts made by Brazil's scientific and public health communities. There have been no cases of MERS or Ebola found in Brazil. (72)

On December 31, the WHO was alerted to a cluster of pneumonia patients in Wuhan City, Hubei Province of China and on January 7, 2020, a novel coronavirus was identified as the cause of the pneumonia. On January 22, the Ministry of Health of Brazil deployed the Emergency (Health) Operations Center (COEs or EHOCs) to coordinate actions, prepare the health care system, and to lead the technical capacity both in Brazil and Latin America more broadly. On January 28th, the first EHOC-nCoV Epidemiologic Bulletin, an epidemiological surveillance guideline and National Contingency Plan (NCP) for COVID-19 with alert levels was published, and Health Minister Mandetta declared a Public Health Emergency of National Importance through Decree No. 188 on February 3rd. (73; published publicly on February 4) The important point to note is that Brazil had both the national-level structures and the legal means in place to deal with a public health emergency. Unfortunately, it soon became clear that the response to COVID-19—via the Ministry of Health and the messaging from the President—would not be a fully coordinated national response, but instead a response that devolved back to the 26 states and over 5,570 municipalities across a vast and diverse country.

Brazil contains a decentralized network of central laboratories in each state (LACENs, Laboratório Central de Saúde Pública) and a public manufacture chain of laboratory supplies for diagnostic RT-PCR, e.g., at the Oswaldo Cruz Foundation or Fiocruz (Biomanguinhos). Brazil can therefore be characterized as having a mix of laboratory systems, including diagnostic laboratories, blood banks, hospitals, academic centres, and private laboratories. (71,74) The best health and laboratory facilities in the country are located in São Paulo. There are vastly different estimates for the overall number of laboratories in Brazil. The Brazilian Institute of Geography and Statistics (Instituto Brasileiro de Geografia e Estatística, IBGE), however, indicated the existence of almost 13,000 laboratories (greater than 3000 public, 9700 private and approximately 4000 that are both public and private). These numbers reflect the many estimates that can be found to reflect the total number of laboratories in Brazil. Nevertheless, the distribution of laboratories that can do RT-PCR tests together with the lack of ICU beds—particularly in the public system—are lacking in low density areas throughout Brazil. (74)

B. Policies and epidemiology

Cases and social distancing policies

Brazil's first case of COVID-19 was originally recorded on February 26, 2020, although molecular tests indicate that the first case may have been earlier in January. (75, 76) Brazil had 98 cases on March 13, 2020 and 121 cases on March 14th (76) with 56 of those first 98 cases being in São Paulo (March 13th) as well as 65 of those first 121 cases (March 14th). A state of national emergency was declared on March 20, 2020 when the Ministry of Health recognized community transmission. (76) At that time, there were 904 cases and 11 deaths. (76) **Figure 4** shows the number of daily cases and deaths in Brazil and dates for selected policies extending from January to August 31, 2020. As of August 31, 2020, there were 3,910,901 cases recorded in Brazil and 121,515 deaths. (76) At the time of this publishing, September 27, 2021, Brazil's total number of cases have reached 21,351,972 and 594,484 deaths. While Brazil recognized a public health emergency early in the pandemic, it was left to each individual state and city to devise its own strategy for implementing physical distancing and other mitigation policies.

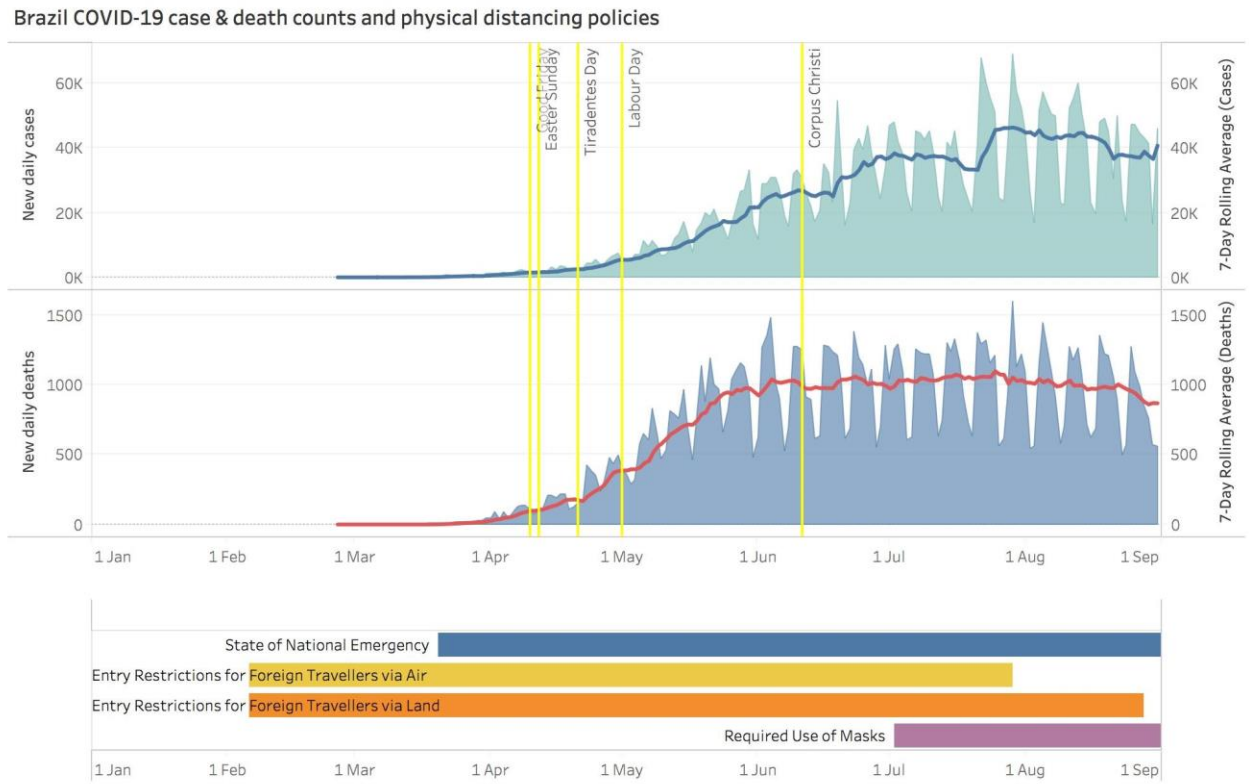


Figure 4. Number of reported COVID-19 cases and deaths in Brazil with select policies from January 1 to September 1, 2020

Description of events in Brazil

Brazil at first reported its (seemingly) very first case in São Paulo on February 26, 2020—of a 61-year-old man who had travelled to the Lombardy region of Italy and then returned to Brazil. But scientists at Brazil's premier public health foundation, the Oswaldo Cruz Foundation (located in the city of Rio de Janeiro), claim that one patient who died in Rio de Janeiro between January 19th and 25th already had COVID-19, or at least molecular tests now suggest this possibility. (75) Soon after the recognition of the February 26th case, Brazil experienced an increase in community transmission. The combination of high-density cities and the population structure—with high numbers of young adults—is one set of characteristics that favour rapid spread. Brazil is also home to many populations with high levels of poverty living in high physical density (e.g., the urban shantytowns of Rio), while also harbouring the attendant co-morbidities and co-infections including diabetes, hypertension, HIV, tuberculosis, and obesity—more typical of wealthier countries. Less dense and more rural areas have less density for facilitating spread but also fewer health care resources and fewer ICU beds, creating a differently catastrophic situation. All of these factors create an optimal broad environment for virus spread and uneven care. (70, 71)

Healthcare in Brazil is constitutionally protected and the Health Minister administers national policy. The current president, President Bolsonaro, also known as "Tropical Trump," downplayed the seriousness of the Coronavirus from the beginning of the pandemic and early on (April 6) fired his respected health minister at that time, Luiz Henrique Mandetta. (77, 78) Bolsonaro was widely critiqued after this dismissal and in particular for his minimizing and confusing public responses regarding COVID-19. This prompted the British medical journal, *The Lancet,* to publish an editorial condemning Bolsonaro on May 9, 2020. (77) Mandetta and Bolsonaro had indeed sparred publicly over the need for social distancing, with Mandetta supporting the social distancing measures that some governors had imposed in mid-March. (78) In the editorial published in May of 2020, *The Lancet* stated that the Brazilian president, "not only continues to sow confusion by openly flouting and discouraging the sensible measures of physical distancing and lockdown brought in by state governors and city mayors but has lost two important and influential ministers in the past 3 weeks."(77)

Instead of social distancing measures and quarantine restrictions, Bolsonaro primarily supported keeping the economy open or opening quickly, and saw mitigation policies put in place at more local levels as getting in the way of economic recovery. (77) Mandetta's replacement, Nelson Teich (an oncologist) quit less than a month after taking the position of health minister, when Bolsonaro signed an executive order designating gyms and beauty salons as essential services. Health Minister Teich was replaced by a military general who had no medical training, Eduardo Pazuello (78, 79, 80). Pazuello has been characterized as a person who 'militarized' the leadership of the Ministry of Health and created a protocol for

hydroxychloroquine treatment within SUS (79), which has not been proven to be an effective COVID-19 treatment.

President Bolsonaro—a far-right politician who was elected president as a member of the conservative Social Liberal Party (Partido Social Liberal or PSL), but then left and founded his own political party, Alliance for Brazil (ALIANÇA)—serves as the first line of national communication about the Brazilian approach to the pandemic. He dismissed the pandemic on March 24, 2020 as a "little flu," and has characterized Brazil's context of how to approach the virus with statements such as, "only the elderly are at risk," or "the economy must come first," and even "social isolation is an extreme measure". (81-84) He also followed US President Trump's lead early on in the pandemic, traveling to the US, meeting with the former U.S. president. Indeed, in a much-publicized meeting early in the course of the pandemic, President Bolsonaro dined with President Trump (on March 7) at Mar-a-Lago resort where Bolsonaro was accompanied by a large diplomatic contingent from Brazil. In the weeks following this meeting, various members of Bolsonaro's entourage became ill with COVID-19. Bolsonaro voiced a pattern of poorly evidenced announcements and communications where he regularly demeaned the attempts by state and municipal governments to address the pandemic. He continually attacked governors and mayors in Brazil who were taking a more aggressive approach to mitigation and spread, declaring, for example, that such physical distancing policies are useless, all of this taking place when deaths were at 1000 per day in Brazil. (82-85)

Brazil followed what can be broadly described as an uncoordinated mitigation strategy, which is a range of policies at state and municipal levels—but not at the national level—meant to slow the spread of the virus and 'flatten the curve'. The aim of this approach is not containment or elimination of the virus. Mitigation seeks to protect specific vulnerable populations through isolation. Yet mitigation is also not a herd immunity approach, where the virus is allowed to take its course while *only* seeking protection of specific vulnerable populations. The lack of national coordination and the push to reopen from the national government are what remains notable.

Additionally, messaging at the national level in Brazil has remained chaotic, dismissive of danger, and confusing. President Bolsonaro's enthusiasm for unproven treatments, such as hydroxychloroquine, has created tension with scientific and medical communities. Bolsonaro's tendency to dismiss recommendations of physical distancing measures implemented by governors and mayors at the state and municipal levels has been counterproductive, according to interviews with health care workers and public health experts in São Paulo (86-90). One example mentioned in interviews was when Bolsonaro declared that gyms and beauty salons ought to be considered 'essential' businesses while some governors and municipalities—e.g., São Paulo—were already putting strict mitigation strategies into place. (82, 84, 91) Subsequently, the business of controlling the pandemic was effectively left to individual states and municipalities. (70, 82)

The first registered case on February 26th was of a 61-year-old man who had travelled to the Lombardy region of Italy. Two days later, somewhere around 182 cases were suspected in 16

states. The first documented case in Brazil was therefore travel-related and so early inaccurate rumours about COVID suggested to the public that it was only an illness of the rich and wealthy who had travelled abroad (86-90). This rumour dissipated as the virus spread across different communities.

Brazil invoked previously established Ordinance No. 2, 952 from 2011, which allowed Brazil to deploy its Event Monitoring Committee and gather more information on events in China. This occurred on January 10th 2020. Brazil declared COVID-19 an Emergency in Public Health of National Importance on February 3, which mandated that the government do a full analysis of the situation and come up with a response plan. On March 20 the executive branch in Brazil sent a legislative decree (No. 6) to the Congress where it would declare a "state of public calamity" (CP or Public Calamity in English). This decree allowed the executive branch to overspend on their budget in order to fund actions to combat the pandemic. However, this action has been largely judged as symbolic because responsibility for specific action against COVID-19 was devolved to states and local governments. It is notable that it was difficult to control the virus and its spread from April forward. By May 18, 2020, the BBC was describing São Paulo's (the epicenter) hospital system as near collapse, as the city's mayor, Bruno Covas described hospitals as having reached 90 per cent capacity. At that point in time, there were almost 3000 deaths in São Paulo, even while the state and city had brought more serious mitigation measures to the public. (92-95) (See, São Paulo report in this series)

The Ministry of Health recognized in mid March that community transmission was occurring across the country and implementation of non-pharmacological measures—physical distancing and quarantine of cases—would need to be put in place. Physical distancing and social isolation of the vulnerable were the main recommendations followed through the end of March, with masks slowly gaining importance in cities like São Paulo. (96) While masks have been common in Asia for a few years, in Brazil and in the rest of Latin America, masks worn in public have not been commonplace until this current COVID-19 pandemic.

Travel (97)

March

Brazil did issue a number of travel restrictions between mid-March and December of 2020. From the 6th of February to the 6th of March, there was a restriction barring entry of foreigners of any nationality into the country by highway, land or boat. On March 19th, Brazil closed its land borders for 15 days with eight other South American neighbouring countries: Argentina Bolivia, Colombia, French Guiana, Guyana, Paraguay, Peru, and Suriname. On March 26th, Brazil announced several travel restrictions for individuals planning travel to Brazil. Brazil's population was told to stay at home in self-isolation. Quarantine was also dependent on place. Quarantine measures have been in place in the following cities: Rio de Janeiro, Belém do Pará, São Luís do Maranhão and Fortaleza.

May

Until May 28th, all foreign travellers were banned entry into the country, with the exception of citizens and residents, family member of Brazilians, diplomats and persons traveling on behalf

of the Brazilian government and crew. Also, foreigners who were in one of the land border countries and needed to cross to Brazil to board a repatriation flight were allowed to enter Brazil with authorization from the Federal Police, provided the traveller went directly to the airport, ticket in hand, with authorization by the respective embassy or consulate of both countries.

The May restrictions were then extended through June 21. Land borders remained closed with exemptions for trucks carrying essential goods and people on humanitarian missions who had permits. The countries included were: Argentina, Bolivia, Colombia, French Guiana, Guyana, Paraguay, Peru, Suriname and Venezuela.

June
On June 23, new restrictions extended in the country until July 4. The new restrictions did not apply to nationals and residents of Brazil and did not apply to immediate family members of a national of Brazil. Spouses of a national of Brazil had to have a Brazilian marriage certificate.

On June 26, the banning of entry for all foreign passengers by air went into effect until July 5. Then, on July 29th the government reopened limited international travel to foreign tourists.

July
The entry of foreign visitors traveling by air was banned through July 29th. Brazil—from the outside—remains at a Level 4 Travel Advisory (Do Not Travel) due to COVID-19 but quarantine upon arrival has not been mandatory. Health screening procedures have been in place at airports but there is no mandatory quarantine. The Brazilian government during this time recommends that those experiencing COVID-19 symptoms self-quarantine for 15 days.
Air travel mostly resumed on July 29th. (95, 97) On this date, Brazil announced that international travel pertaining to foreign visitors—not just foreign nationals— would also reopen.

August
Brazil had closed its land borders (except to Brazilian citizens, resident foreign national and foreign spouses, children, parents or guardians of a Brazilian national) and this mandate would extend to August 28th. During this time, passengers who were not residents of Brazil or married to Brazilians were not allowed to travel to Brazil. Restrictions differed depending on the city they planned to visit.

September
Extension of existing travel restrictions on land and sea borders. (97)

Summary: While there were some restrictions on travel to Brazil—land and sea borders were restricted during multiple periods since March—air travel was only restricted for a brief period of time and only for some cities of entry. Quarantine procedures varied across states and locales and offered recommendations as opposed to mandatory regulation. (97)

Masks

On July 2, 2020, President Jair Bolsonaro signed Law No. 14,019. Law No. 14,019 provides for measures to deal with the COVID-19 pandemic, and added article 3-A, which makes it mandatory to keep the mouth and nose covered by an individual protection mask while in public spaces and private spaces accessible to the public; on public roads and public transport; in individual private passenger transport vehicles or taxis; and on chartered buses, aircraft, and boats. Bolsonaro, nevertheless, vetoed the mandatory use of masks in shops, churches and schools. He thus vetoed the mandatory use of masks in commercial or industrial establishments, places of worship, educational spaces and other closed spaces where people gather, invoking article 5(XI) of the Constitution, which states that "the home is the individual's inviolable asylum." (98) Mask use therefore became politicized in Brazil.

There are additional local requirements for the compulsory use of masks in other places, such as shops and gyms, in various cities including São Paulo, Rio de Janeiro, Belo Horizonte and Brasília. Physical isolation measures were lifted in some parts of the country, but localized lockdowns continue, depending on the presence of the virus and the particular location. Many non-essential services that had been closed (i.e. restaurants, shops and bars) began reopening in some cities in late July. Face-masks became mandatory in public in cities including Belo Horizonte, Rio de Janeiro, Santa Catarina, Brasilia, Salvador, and São Paulo. (98, 99)

Factors leading to poor uptake of policy interventions at the beginning of the pandemic included a sense from the president and his government that not only was COVID-19 not more than a 'little flu' but that the economy was to take precedent over possible lives to be lost. As with the elections that brought Bolsonaro to power in 2019, social media (and what some have labelled fake news) played a deeply important role in the messaging from the national government to the people. (86-90)

Economic stress was supported through economic relief for individuals and businesses. Approximately 13.5 million Brazilians live in extreme poverty where families are densely concentrated and there is poor sanitation and lack of access to running water. The 'coronavoucher' gave 600 Brazilian Reals per month (US $120) to more than 38 million Brazilians. (100) This was a surprise to many experts as pre-COVID-19 economic plans from Bolsonaro's government had been to institute cuts and increase privatization, policies favoured by the current Economy Minister Paulo Guedes. Guedes, a Chicago-trained economist who had worked in Pinochet's shock-treated Chile, openly admires the neoliberal policies of Margaret Thatcher and Ronald Reagan. (101) Thus, the economic relief in the form of subsidies that came during the pandemic was not part of the original plan, but instead came about in spite of the ideological make-up of the current government. Economic relief for businesses was passed on March 23rd. Pressured by civil society, more comprehensive government benefits were directed at individuals and then distributed beginning in April and by July had reached more than 30 million households, providing an average monthly benefit of $163 per home. By August, Bolsonaro's popularity had risen from 32% (in June) to 37%. (102) Bolsonaro has stated that he is now planning a "Brazil Income," a form of cash transfers traditionally popular with the

country's left, and this policy shift shows a new friendliness of Bolsonaro toward social spending that would have been unimaginable without a pandemic. (102)

Several suggestions for future waves of the COVID-19 pandemic or future pandemics were provided by interviewees. (86-90)

- It was highlighted that for public trust, and therefore compliance of public health measures, it is important that the president deals in facts rather than rumours. He touted the efficacy of hydroxychloroquine as a treatment for COVID-19, took his mask off in public after having been diagnosed with COVID-19 and engaged in multiple forms of science denialism. (82) Some have called this the 'strategic mobilisation of ignorance'.

- Clear public messages are important. The contradiction between what the president said and what policies and messages were being implemented in the state of São Paulo and in other states that implemented more rigorous guidelines for physical distancing during the pandemic, proved to undermine state and municipal attempts to control the pandemic.

- The late start and infrequency of RT-PCR testing, including only testing people who were seriously ill made it difficult to control the pandemic.

- The delayed call to wear masks plus the delayed mandate of their use in public was also considered a failure in this pandemic. The pandemic travelled out of the epicenter of São Paulo and reached everywhere in the nation. Some states and municipalities did not wait for evidence on the effectiveness of masks and moved forward with policy decisions, but even in the epicenter, there was a slow response.

- Preventive measures such as physical distancing and remote work, and closing of schools where possible, were seen to help mitigate COVID-19 cases.

- Successful responses were seen to be at least partially a product of political will by governors and mayors across regions.

- The interviewees were all working in the state of São Paulo, primarily in the city of São Paulo, where some of the most rigorous guidelines were followed. All interviewees mentioned the political, or rather politicized aspect of the pandemic and how the mixed messaging from the national government got in the way of implementing successful local policy. WHO (and its guidelines) was not mentioned specifically as an important institution in setting the groundwork for what occurred locally, but the local implementation of policies in São Paulo followed a much more rigorous public health approach than the federal government.

- State and municipal announcements occurred often and stood in contrast to the confusion, chaos, and science denialism of the national response. (82)

- Due to a lack of PPE early in the response, earlier planning for PPE needs to be included in any pandemic plan. By May 2020, at least 116 nurses had died of COVID-19 in Brazil. News reports (103) and interviewees discussed the lack of training of personnel, the shortage of PPE and the lack of correct technical specifications and use.

- Transportation was considered a problem by the interviewees. Public transport was discussed as problematic because many essential workers were forced to get to work via public transport, coming into contact with many others in relatively tight spaces. In some instances, people did not wear masks on public transport. (86-90, 104)

- Interviewees also mentioned that it was difficult for people in low-resource environments, such as Brazil's favelas and other dense and impoverished areas, to adhere to isolation and quarantine.

- The situation of long-term care or LTC in Brazil for the elderly is different than in European or US contexts. LTC of the elderly is less common and is still viewed with suspicion. The majority of LTC takes place in charitable institutions. The main source of support for male spouses is their female spouses as well as caregivers. For women, it is their children. (105) Brazil did not experience the same institutional crisis among elderly long-term care facilities that took place in the US, for example, because that form of care is less common. Nevertheless, up to October 6th there were 210,007 cases and 100,059 deaths of people over 60, corresponding to 53.1 percent of the total number of cases and 75.2 percent of the deaths, pointing to the dangers of COVID-19 to the elderly. (106)

- All interviewees highlighted the fact that even with the measures taken in São Paulo to stem the transmission of the virus, the numbers in the country reached a plateau of approximately 1000 deaths per day and stayed there a long time without declining. (86-89, 104)

Disproportionately affected populations

There are certain groups that have been affected disproportionately in Brazil.

The Poor (Socioeconomic Inequality)

Brazil's version of class-based inequality is well-known, with a Gini coefficient estimated at 53.9 by the World Bank (0 is perfect equality and 100 is perfect inequality). People living in poorly resourced regions or who live in favelas in Rio de Janeiro, or who are under socioeconomic distress, were more likely to have a poor outcome if they contracted COVID-19. That is, a wealthy person is more likely to have a better outcome than a poor person, and the private system has different resources than the public system, accounting for some of these health outcome differences. (107)

Lockdowns, hand-washing and other public health measures are difficult in resource poor environments. RioOnWatch, an NGO dedicated to social justice in Rio's favelas, identified lack of ICU beds, lack of testing and under-notification of cases, as well as a lack of access to free burials, as issues affecting Rio's poorest. They also noted the challenges poor communities face in maintaining social distancing measures and in distributing food aid. (108)

Racial and Ethnic Inequality

A study by the Oswaldo Cruz Foundation (Fiocruz) shows that 48 percent of hospitalized patients who have died due to COVID-19 are Indigenous. This is the highest death rate in the country, surpassing the *pardo*, or Brown (40%), Black (36%), Asian (34%), and white (28%) Brazilian populations. (109)

Indigenous peoples face a number of risks during the COVID-19 crisis. Some have mentioned the risk of genocide. On June 30th, the APIB (Association of Indigenous Peoples of Brazil) took action by filing a constitutional lawsuit against the federal government. By June 27th, it was registered that 9,166 had been infected, 378 deaths were registered and 112 indigenous groups had been affected by the virus. Notably, the mortality rate for Indigenous people is 9.6 percent, compared to 5.6% for the rest of Brazil's population. (109)

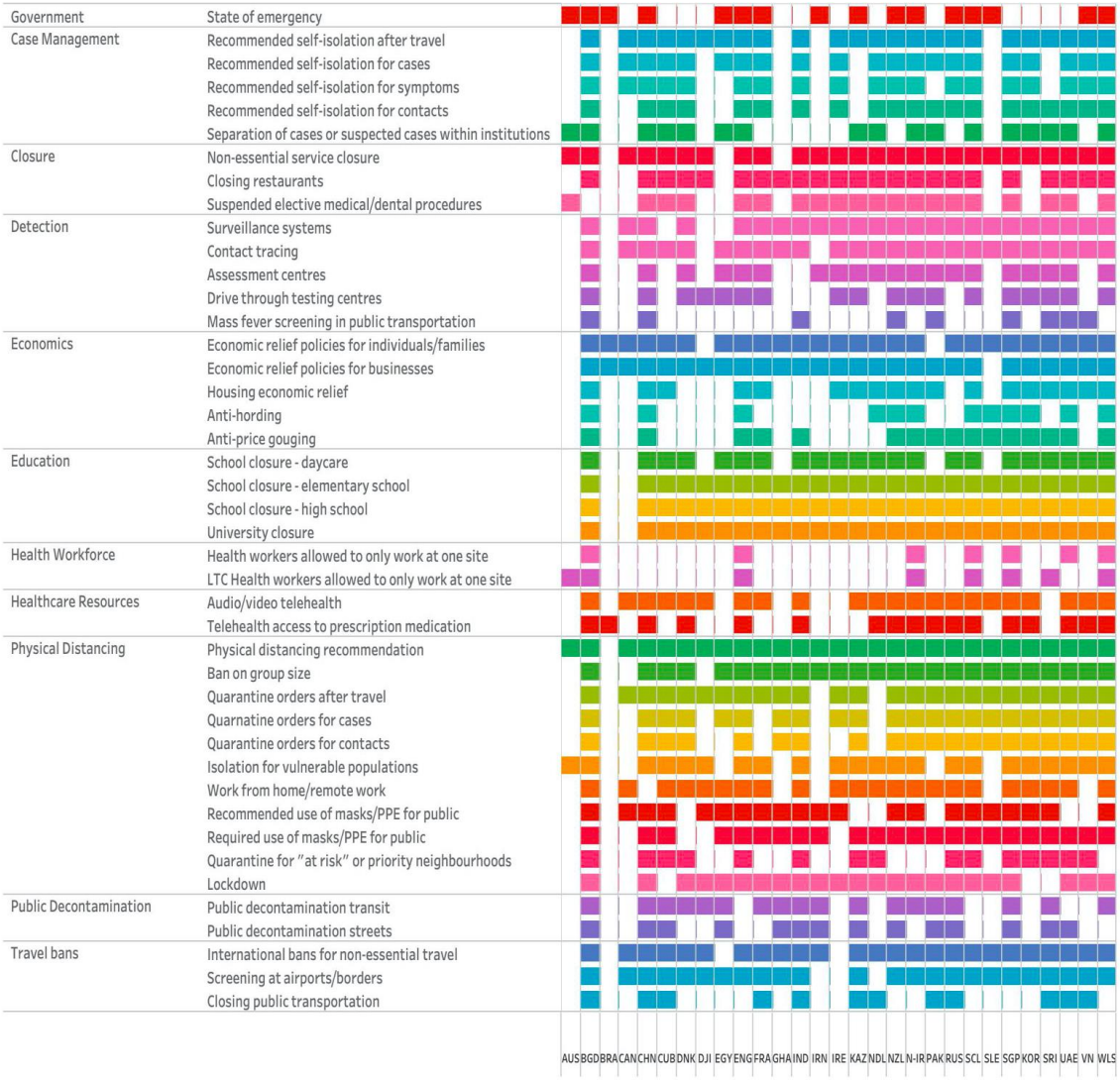
Geographical Inequalities

In poorly resourced regions, states and municipalities, there are fewer hospitals and fewer ICU beds. Moreover, the distances required to arrive at high quality health care are greater. There are entire resource-poor states in Brazil and this has been important during the COVID crisis.

Comparisons with other country responses

There are many concerns in trying to compare countries' responses to COVID-19. This is shaped by limitations of the data itself and differences in contextual factors. A separate paper by this working group describes limitations of COVID-19 data. Table 4 presents a list of countries and their use of different physical distancing policies.

Table 4. Comparative national-level responses to COVID-19 by country – updated August 21, 2020 (filled in means policy was implemented in that jurisdiction)



AUS–Australia, **BGD**–Bangladesh, **BRA**–Brazil, **CAN**–Canada, **CUB**-Cuba, **DNK**–Denmark, **DJI**–Djibouti, **EGY**-Egypt, **ENG**-England, **FRA**-France, **GHA**-Ghana, **IND**-India, **IRN**–Iran, **IRE**-Ireland, **KAZ**-Kazakhstan, **NDL**-Netherlands, **NIR**-Northern Ireland, **PAK**-Pakistan, **RUS**-Russia, **SCL**-Scotland, **SLE**-Sierra Leone, **SGP**-Singapore, **KOR**-South Korea, **SRI**-Sri Lanka, **UAE**-United Arab Emirates, **VN**-Vietnam, **WLS**-Wales

IV. Discussion of main findings, limitations, and next steps

Brazil has a population of 211,049,527 with 3,910,901 cases recorded in Brazil and 121,515 deaths as of August 31, 2020. This is no doubt an undercount of cases, as Brazil dealt with a lack of testing supplies in spite of a general laboratory capacity. The Oswaldo Cruz Foundation of Rio de Janeiro collected some important race- ethnicity- and class- based information on COVID-19. (106) Since the beginning of the pandemic, alarms have been raised about the lack of PPE, low observance of social distancing measures and the scarce availability of diagnostic tests in Brazil. (110)

Subsequent updates to this report will be added as well as breakdowns for various states and municipalities.

Conclusions

It is without a doubt that COVID-19 has caused significant loss of life, economic hardship, and social changes in Brazil. Long-term effects have yet to be fully understood. Further contextualized research needs to be conducted to determine which social distancing policies are the most effective for specific settings. It is also imperative to improve surveillance and reporting systems internationally to deal with this and future pandemics. Comparative work is being conducted by this Working Group to understand what policies work, where and why.

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