

# Mortality from COVID-19 and the drop in employment rates in Brazil and around the world<sup>1</sup>

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## 1 Introduction

### Why compare countries, despite limitations?

The year 2020 was marked by the spread of the SARS-CoV-2 virus, which resulted in an increase in the total number of deaths in most countries. All national economies were impacted in some way and almost all recorded reduced employment rates. There is no doubt that Brazil was strongly affected both in terms of human lives and the deterioration of its labour market. The goal of this Policy Research Brief is to compare the losses across these two dimensions experienced in 2020 by various countries based on available data, and to rank the severity of losses in Brazil relative to the rest of the world.

Understanding where losses were greater is a necessary—although not sufficient—step in recognising the circumstances that have led to disparate results. Faced with comparative data regarding the variety of what was observed in different contexts, individual and collective actions gain potential to be improved, reinforced or replaced by new strategies.

International comparisons are almost always subject to discrepancies regarding the assessment of indicators in each country as well as error patterns. It is not trivial to analyse data from two different sources regarding the Brazilian labour market, for example, and the challenge becomes even greater when considering various other countries. Regardless of these difficulties, however, it is necessary to parse available data and find the best way to understand what they indicate, given the limitations of each type of comparison.

Regarding the effects of the COVID-19 pandemic, there are additional caveats. Although it is a global phenomenon, its shocks were not felt simultaneously in all parts of the globe, nor did they find the same conditions everywhere. The new coronavirus disease was christened with the year it was identified—2019—but it only took over the world in 2020. In Brazil, the first deaths attributed to COVID-19 were registered in March 2020, and the same happened at different times in each country.

In Brazil's most populous areas, the virus started reaping lives between the end of summer and early autumn. Even within the country, whose territory reaches up to the Equator, seasons are not homogeneous, and the seasonal impacts are variable, whether on health or on the economy. Worldwide, this variability is even greater. In addition, the spread of the virus is affected by how people move and interact in networks that vary greatly at both local and global levels. The consequences, therefore, depend on population characteristics and the various ways available to deal with the virus across many dimensions—immunological memory, economic and health care conditions, health care systems with professionals and infrastructure that vary greatly in both quality and quantity, channels to coordinate various actions, etc.

The set of conditions varies greatly. Even so, results must be compared systematically in many ways. There is no single 'correct' way to do this. What is important is to understand what information is relayed by each type of comparison. This brief presents some possible comparisons, clearly pointing out their main advantages and limitations, to rank the relative intensity of health-related damages inflicted by COVID-19 in Brazil compared to the rest of the world and their probable implications for the labour market. It is beyond the scope of this work, however, to investigate any causal link between these two spheres.

## 2 Selected indicators and international comparisons

The most striking characteristic of the current pandemic is its potential to cause death. However, accounting for COVID-19-related deaths involves processes related to diagnosis, testing, and registering causes of death according to standards, quality and reliability that can vary greatly both between and within countries.

Overall, the identification of the cause tends to be more accurate among serious cases, especially those that result in death, than among light cases, which include asymptomatic infections. This implies that COVID-19 cases worldwide are underreported, especially in countries with low levels of testing, and even more so in those that concentrate their testing in symptomatic patients and that base their records largely on lesser-quality tests.

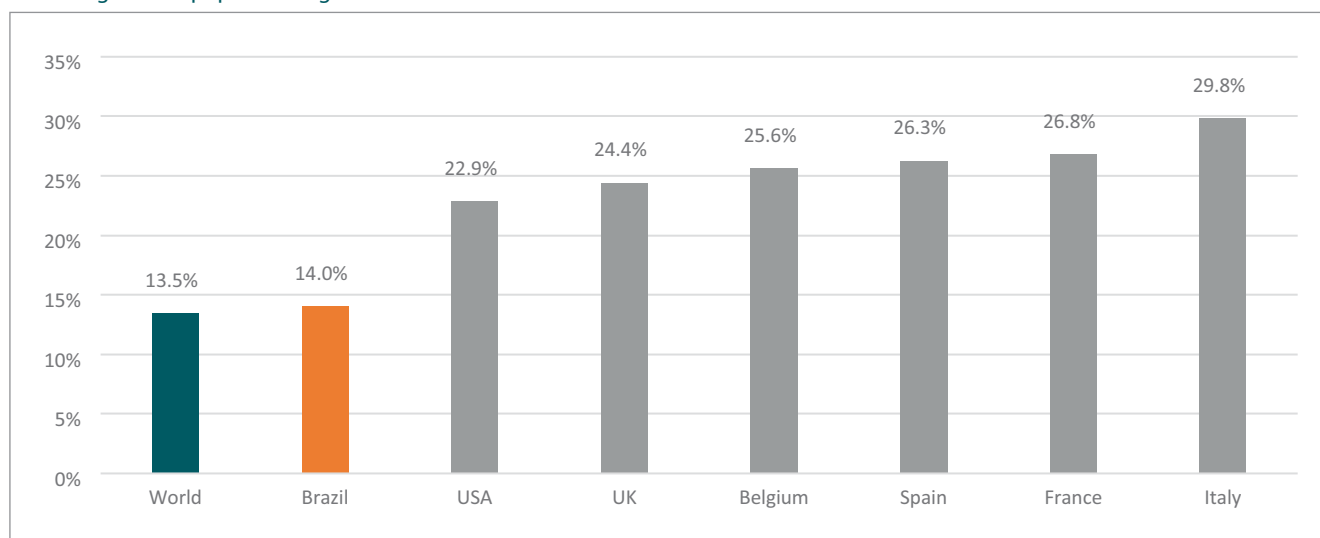
The total accounting of cases will not be considered in this brief. Even the number of deaths registered due to COVID-19, which tends to be less underestimated than the number of cases themselves, depends greatly on a complex and highly variable set of practices adopted by the health care and information systems in each country.

Some indicators have been cited more frequently in public debate, but it is important to qualify what each of them means. Since May 2020, the press has devoted significant attention to the fact that Brazil is among the countries with the highest absolute number of registered COVID-19 cases and deaths. These ‘rankings’ are led by the US, while India and Brazil have jostled for second and third place over many months. Absolute figures, however, are significantly affected by the population size. Brazil is the sixth most populous country in the world, and some of the most populous countries are among the most questioned about the quality of data they report.

An indicator that is widely used is the cumulative number of deaths per 100,000 inhabitants, to at least circumvent the issue of the size of populations affecting comparisons.<sup>2</sup> Brazil ranks 20th among the 179 countries which have recorded any number of deaths resulting from COVID-19 in 2020, according to the World Health Organization (WHO).<sup>3</sup> Of the remaining 178 countries, 159 (89.3 per cent) have had less deaths per 100,000 than Brazil.

Public debate often highlights countries with worse indicators than Brazil. Even if it is a small group (10.7 per cent of countries with recorded COVID-19 deaths in 2020), it includes various developed countries, such as Belgium, France, Italy, the UK, the US, and Spain. All these countries, which are further along in their demographic transitions, have a larger share of elderly people relative to their populations than Brazil and the world in general. This is illustrated in Figure 1. As the risk of dying of COVID-19 is much higher among elderly people, the age distribution of each population is a decisive factor when considering deaths per 100,000 inhabitants.

**FIGURE 1**  
Percentage of the population aged 60 or older in 2020



Source: Author's elaboration based on UN data.

There are many ways to obtain a comparison that discounts demographic differences. One of them is to compare the total number of deaths observed in each country against the number that would have been expected if, given their respective population pyramids, all countries had faced the same proportion of deaths by each age group and sex. It would be possible to consider, for example, specific mortality rates by age and sex observed worldwide, which has the added benefit of offering a ‘neutral’ reference. On the other hand, these global rates are an average that combines biases in the records of all countries, with greater weight for the most populous ones.

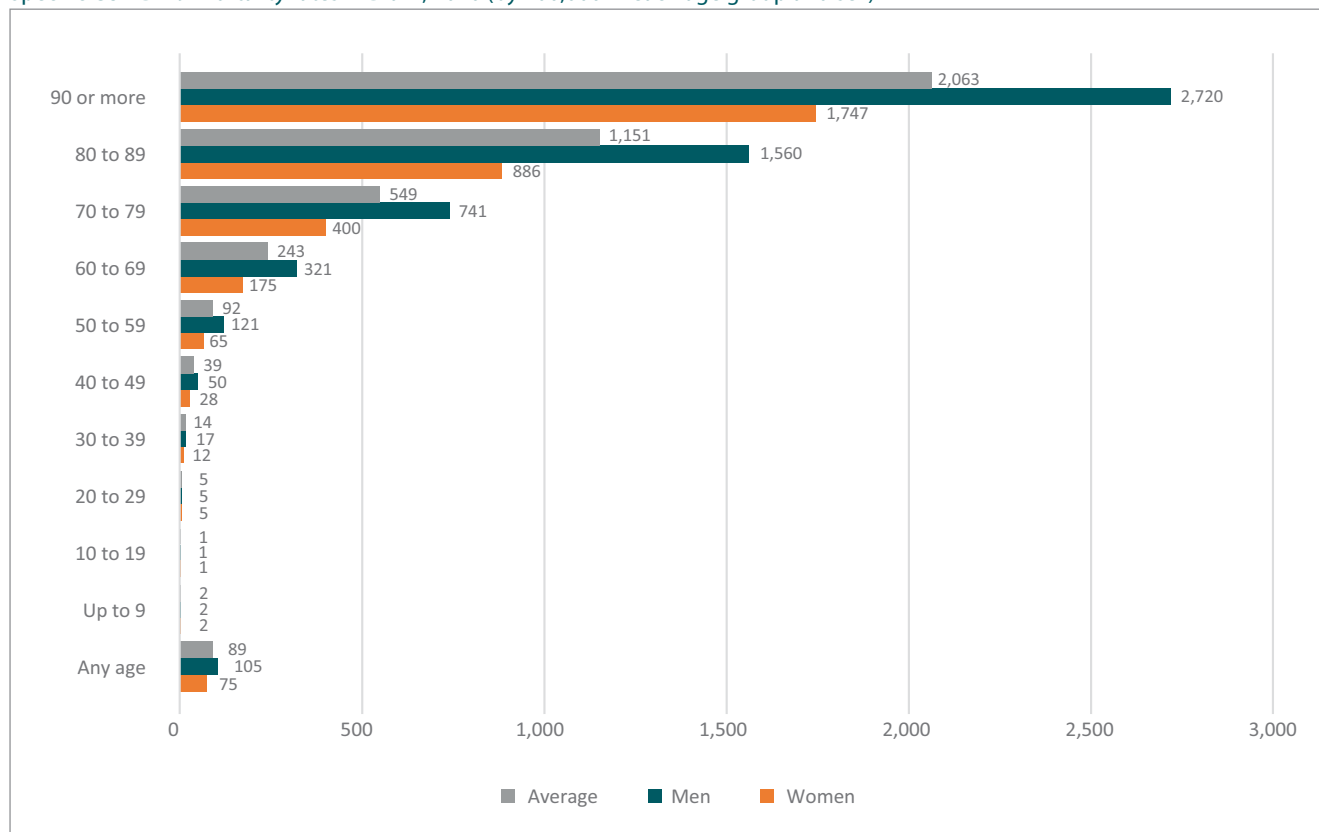
In this brief, we have opted for an adjustment whose reference is the specific mortality rates for Brazil, whose potential biases can be more easily discussed in the country. After all, the goal is simply to be able to rank Brazil relative to other countries. This is a basic adjustment, which depends solely on the comparability of population data available for all countries, which serve as the basis for nearly all other statistics, which are more subject to differences

in estimation methods. In 2019, the United Nations (UN) published its latest prospects (for 1 July 2020) of the amount of people in each age group and sex who comprise the population pyramids of all 179 countries with any record of death by COVID-19 as per the WHO compilation, and of 17 countries with no records, which have been disregarded in this analysis.<sup>4</sup> For Brazil, we have used the population pyramid of 1 July 2020, projected by the Brazilian Institute of Geography and Statistics (*Instituto Brasileiro de Geografia e Estatística*—IBGE) in 2018 (IBGE 2018).

The numerators for the specific mortality rates by COVID-19 by each age group and sex in 2020 in Brazil were obtained from registry office data (*Cartórios de Registro Civil*).<sup>5</sup> Figure 2 presents these deaths as a proportion of the population projected by the IBGE and makes it obvious why population pyramids are so determinant for the crude mortality rates. After all, for people aged 90 or older, the risk of contracting and dying of COVID-19 is approximately a thousand times higher than among children and adolescents. In addition, men are at higher risk than women.

**FIGURE 2**

Specific COVID-19 mortality rates in Brazil, 2020 (by 100,000 in each age group and sex)



Source: Author's elaboration based on data from IBGE and *Portal da Transparência*.

According to the indirect standardisation method described by Szklo and Nieto (2019, 271-273), these rates were multiplied by the population in each age group, sex and country to estimate the expected number of deaths by COVID-19 in each country if they all had the same mortality pattern as Brazil. Next, the total number of deaths by COVID-19 notified in each country was divided by the expected number according to Brazilian rates.<sup>6</sup> Table 1 shows these results (as a percentage) for all 179 countries compiled as well as global results.

Within the same set of 179 countries where Brazil placed 20th regarding crude mortality rate per 100,000 inhabitants, it moves to the 10th worst position in the ranking adjusted by demographic composition (Table 1). In 169 of the remaining 178 countries (94.9 per cent of the total), the total recorded deaths by COVID-19 were less than what would be expected according to Brazil's mortality pattern.

After adjusting for the population distribution according to age group and sex, 7 of the 9 countries with worse indicators than Brazil are in Latin America, most notably Peru (142.8 per cent) and Mexico (133.9 per cent). These figures indicate that reported deaths in 2020 for these two countries surpassed what would have occurred if both had replicated Brazilian rates across each age group and sex—by 42.8 per cent in Peru and 33.9 per cent in Mexico, respectively. At the opposite extreme, Vietnam recorded only 0.05 per cent of the deaths it would have registered under the Brazilian mortality pattern—in other words, the risk of dying of COVID-19 in Brazil was 2,000 times higher than in Vietnam, according to both countries' records. In the rest of the world, the risk was 27.9 per cent of Brazil's: the risk of dying of COVID-19 in Brazil was 3.6 times the global average.

Table 2 shows the same indicator as Table 1, albeit for country groups classified by the UN Population Division. It shows that Latin America was the region with the worst adjusted indicator of deaths by COVID-19. Central America, which in this classification includes Mexico, is the only sub-region with a worse indicator than Brazil. When the analysis focuses on groups that contain Brazil, the country exhibits a higher adjusted mortality than the average and median mortality of its peers. The Brazilian indicator is worse than 66.7 per cent of the 12 remaining South American countries and worse than 80 per cent of the 35 remaining Latin American countries listed in Table 1.

To help understand why, after the adjustment, none of the six developed countries highlighted in Figure 1 has a worse indicator than Brazil, Table 3 relies on data regarding the proportion of deaths by age group in each country and in Brazil in 2020, compiled by the COVerAGE-DB project.<sup>7</sup> The table presents data gathered in only two large age groups, which highlights the role of the adjustment. Brazil recorded a higher mortality than the remaining 6 countries for people aged up to 59 years old and higher than 5 of them for people aged 60 or older. Therefore, for these 5 countries, only a higher share of elderly people can explain the fact that their crude mortality rates per 100,000 inhabitants are higher than Brazil's—given a person's age group, the risk of dying of COVID-19 has always been higher in Brazil. In the specific case of Belgium, its elderly mortality is higher, but the mortality rate for non-elderly people is much lower than the Brazilian rate, so much so that the adjusted rates of both countries (as seen in Table 1) are almost the same.

**TABLE 1**

Deaths by COVID-19 observed in 2020 in relation to expected deaths under the Brazilian mortality pattern, by age and sex (as a percentage)

1 - Peru	142.8%	61 - Israel	35.6%	120 - Martinique	6.1%
2 - Mexico	133.9%	62 - Portugal	35.2%	121 - Congo	6.0%
3 - Belize	114.1%	63 - Lithuania	33.7%	122 - Cameroon	6.0%
4 - Bolivia (Plurinational State of)	112.1%	64 - Albania	33.1%	123 - Antigua and Barbuda	5.9%
5 - Ecuador	111.5%	65 - Ukraine	31.8%	124 - Curaçao	5.9%
6 - Panama	111.4%	66 - Slovakia	31.5%	125 - Finland	5.6%
7 - North Macedonia	103.4%	67 - Russian Federation	31.4%	126 - Norway	5.4%
8 - Colombia	102.4%	68 - Turkey	31.2%	127 - Mali	5.3%
9 - Iran (Islamic Republic of)	101.3%	69 - Dominican Republic	30.5%	128 - Lesotho	5.3%
10 - BRAZIL	100.0%	70 - Suriname	30.4%	129 - Angola	5.0%
11 - Belgium	99.6%	71 - Guyana	30.4%	130 - Liberia	4.9%
12 - Argentina	98.6%	72 - Lebanon	29.7%	131 - Venezuela (Bolivarian Republic of)	4.9%
13 - South Africa	95.6%	73 - Puerto Rico	29.7%	132 - Ethiopia	4.9%
14 - Iraq	93.1%	74 - Morocco	29.3%	133 - Central African Republic	4.7%
15 - Armenia	89.6%	75 - Malta	28.9%	134 - Nicaragua	4.5%
16 - Jordan	89.3%	WORLD	27.9%	135 - Haiti	4.3%
17 - State of Palestine	88.8%	76 - El Salvador	27.1%	136 - Réunion	4.2%
18 - Bosnia and Herzegovina	86.0%	77 - Canada	26.3%	137 - Botswana	4.1%
19 - Montenegro	85.9%	78 - Serbia	25.3%	138 - Uruguay	3.7%
20 - Chile	80.1%	79 - Sao Tome and Principe	23.6%	139 - Malawi	3.7%
21 - Slovenia	79.5%	80 - Guadeloupe	23.0%	140 - Uzbekistan	3.7%
22 - Oman	78.9%	81 - Greece	23.0%	141 - Sierra Leone	3.2%
23 - Guam	78.8%	82 - Qatar	22.9%	142 - Comoros	3.2%
24 - Republic of Moldova	74.4%	83 - Namibia	22.7%	143 - Ghana	3.1%
25 - United States of America	71.2%	84 - Equatorial Guinea	22.5%	144 - Madagascar	2.9%
26 - Czechia	70.1%	85 - Mauritania	21.1%	145 - Somalia	2.8%
27 - United Kingdom	66.4%	86 - Kazakhstan	20.9%	146 - Saint Lucia	2.7%
28 - Bulgaria	66.0%	87 - Germany	20.6%	147 - Togo	2.7%
29 - Hungary	65.3%	88 - Afghanistan	20.3%	148 - Tajikistan	2.5%
30 - Honduras	63.2%	89 - Latvia	20.1%	149 - Australia	2.5%
31 - Luxembourg	59.7%	90 - Maldives	19.7%	150 - Uganda	2.5%
32 - Italy	59.4%	91 - United Arab Emirates	19.6%	151 - Chad	2.5%
33 - Spain	59.3%	92 - Gambia	19.2%	152 - Rwanda	2.2%
34 - Bahamas	59.0%	93 - India	17.6%	153 - Guinea	2.2%
35 - Croatia	56.3%	94 - Philippines	16.2%	154 - Nigeria	2.2%
36 - Guatemala	55.7%	95 - Egypt	14.9%	155 - Democratic Republic of the Congo	2.2%
37 - France	54.7%	96 - United States Virgin Islands	14.1%	156 - Malaysia	2.2%
38 - Romania	52.9%	97 - Denmark	13.4%	157 - Mozambique	1.9%
39 - Georgia	50.9%	98 - Indonesia	13.3%	158 - Côte d'Ivoire	1.7%
40 - Paraguay	50.4%	99 - Djibouti	12.9%	159 - South Sudan	1.7%
41 - Poland	50.3%	100 - Nepal	12.3%	160 - Niger	1.6%
42 - Sweden	50.1%	101 - Belarus	12.0%	161 - Barbados	1.6%
43 - Bahrain	49.8%	102 - Jamaica	11.9%	162 - Burkina Faso	1.6%
44 - Eswatini	49.5%	103 - Kenya	11.2%	163 - Republic of Korea	1.3%
45 - Tunisia	49.2%	104 - Estonia	10.8%	164 - Brunei Darussalam	1.1%
46 - French Polynesia	49.1%	105 - Pakistan	10.4%	165 - Japan	1.1%
47 - Switzerland	48.1%	106 - Algeria	9.8%	166 - Benin	1.1%
48 - Mayotte	47.2%	107 - Sudan	9.2%	167 - Sri Lanka	1.0%
49 - Costa Rica	44.9%	108 - Trinidad and Tobago	9.2%	168 - Cuba	0.9%
50 - French Guiana	44.8%	109 - Zambia	9.0%	169 - Mauritius	0.8%
51 - Libya	44.1%	110 - Myanmar	8.7%	170 - Singapore	0.42%
52 - Kyrgyzstan	43.6%	111 - Syrian Arab Republic	8.5%	171 - Fiji	0.40%
53 - Kuwait	42.9%	112 - Cyprus	8.4%	172 - New Zealand	0.37%
54 - Cabo Verde	40.4%	113 - Zimbabwe	8.3%	173 - China	0.33%
55 - Austria	40.1%	114 - Guinea-Bissau	8.3%	174 - Papua New Guinea	0.27%
56 - Netherlands	39.7%	115 - Bangladesh	8.1%	175 - Eritrea	0.21%
57 - Aruba	38.8%	116 - Senegal	8.1%	176 - United Republic of Tanzania	0.13%
58 - Saudi Arabia	38.4%	117 - Gabon	7.9%	177 - Thailand	0.08%
59 - Azerbaijan	38.2%	118 - Yemen	6.8%	178 - Burundi	0.07%
60 - Ireland	36.4%	119 - Iceland	6.2%	179 - Viet Nam	0.05%

Source: Author's elaboration based on data from IBGE, WHO, UN and *Portal da Transparência*.

**TABLE 2**

Deaths by COVID-19 observed in 2020 in relation to those expected under the Brazilian mortality pattern by age and sex (as a percentage)

Latin America	94.9%
Central America*	113.5%
South America	97.9%
Caribbean	12.5%
North America*	66.2%
Europe	44.8%
Africa	14.0%
Asia	9.3%
Oceania	2.5%
World	27.9%
World excluding Brazil	25.6%
Latin America excluding Brazil	89.5%
South America excluding Brazil	90.6%

Note: \* Mexico included in Central America, not North America, in accordance with the UN's population statistics.

Source: Author's elaboration based on data from IBGE, WHO, UN and *Portal da Transparência*.

**TABLE 3**

Specific COVID-19 mortality rates in 2020 (COVID-19 deaths per 100,000 by age group and country)

	Average	Up to 59 years old	60 years old or older
Brazil	91.2	22.8	509.8
France	98.4	6.7	348.4
USA	101.4	16.0	389.6
Spain	107.9	7.1	390.7
UK	108.3	8.6	417.1
Italy	122.7	7.9	392.6
Belgium	168.5	7.1	637.6

Source: Author's elaboration based on data from COVerAGE-DB, IBGE and UN.

Other factors influence the risk of exposure and could also be discounted in alternative analyses, but the main ones are related to the individual and collective resources that are available to face the pandemic. These are not disregarded and should explain a significant portion of the variation found in Table 1. They are generally factors regarding which—unlike age—there is some margin for action, although in many cases they are not very malleable in the short term.<sup>8</sup>

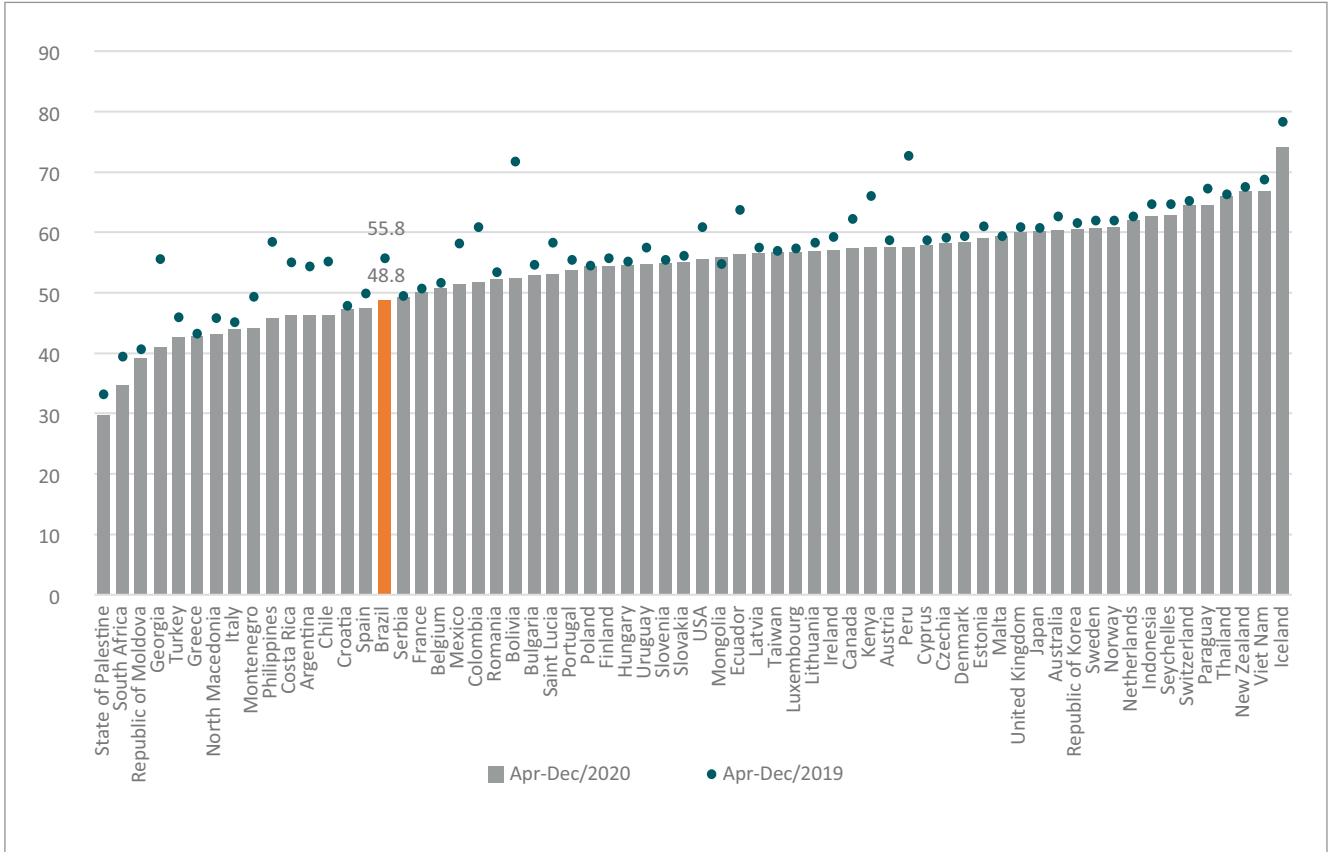
Finally, to compare the impacts of 2020 on the labour market, we have used data compiled by the International Labour Organization (ILO)<sup>9</sup> for 63 countries and, for Brazil, we have used microdata from the IBGE's Continuous National Household Sample Survey (*Pesquisa Nacional por Amostra de Domicílios—PNAD Contínua*).

The adopted indicator was the variation, in percentage points (p.p.), of the employment rate (the percentage of employed people relative to the population aged 15 or older). The variation observed was the one between the averages of the last 3 quarters of 2019 and 2020.<sup>10</sup> Figure 3 shows employment levels during these same quarters and ranks countries according to their final value. Figure 4 ranks countries according to the variation between the two periods, on which the effects of the pandemic should already be felt.

In 2019, prior to the pandemic, Brazil had the 25th lowest employment rate among the 64 countries analysed, with 55.8 per cent of its working-age population engaged in some form of labour. One year later, Brazil had the 16th lowest rate (48.8 per cent). Brazil's post-pandemic rate of employment became lower than 76.2 per cent of the 63 remaining countries in the sample.

**FIGURE 3**

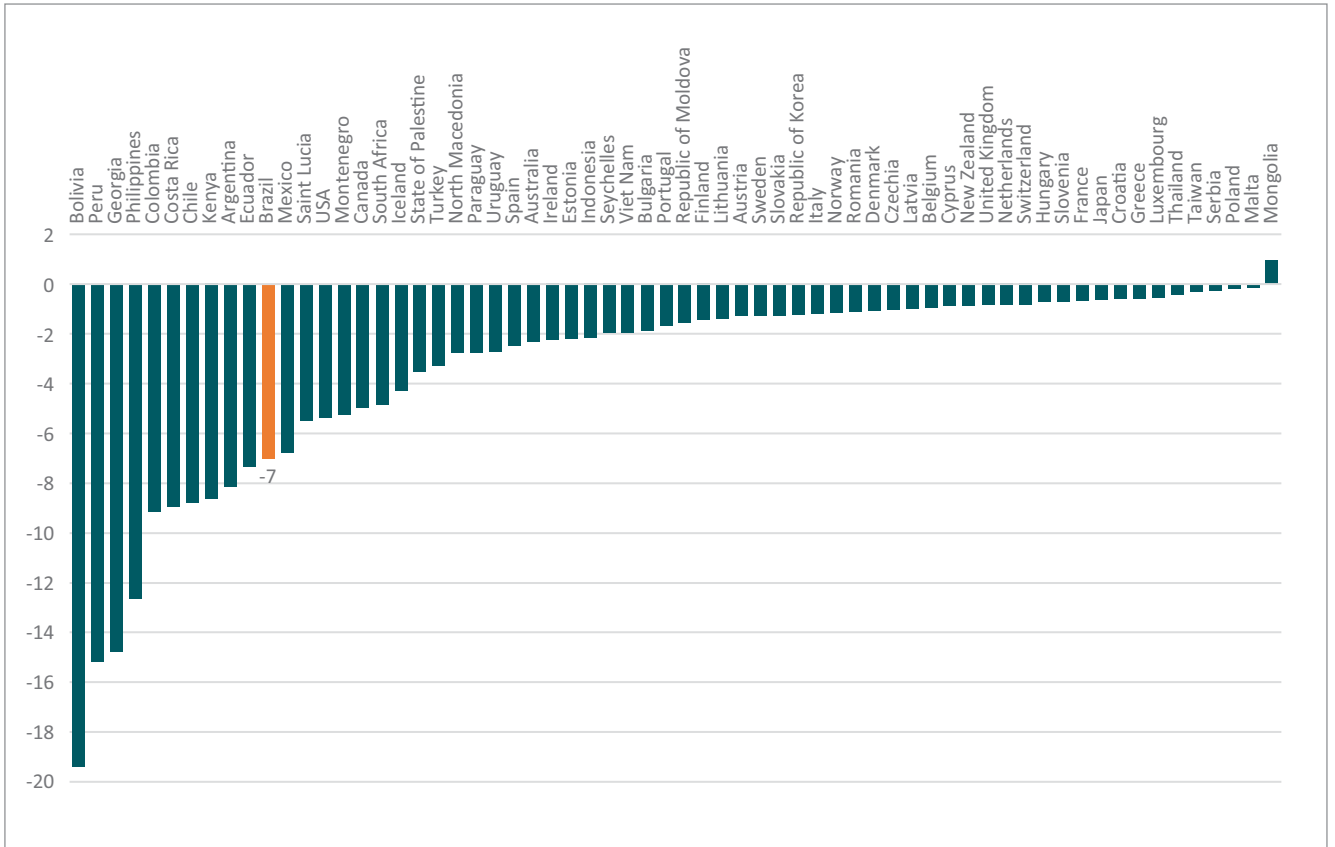
Employment rate in the last 3 quarters of 2019 and 2020 (as a percentage)



Source: Author's elaboration based on ILO and PNAD *Continua*.

**FIGURE 4**

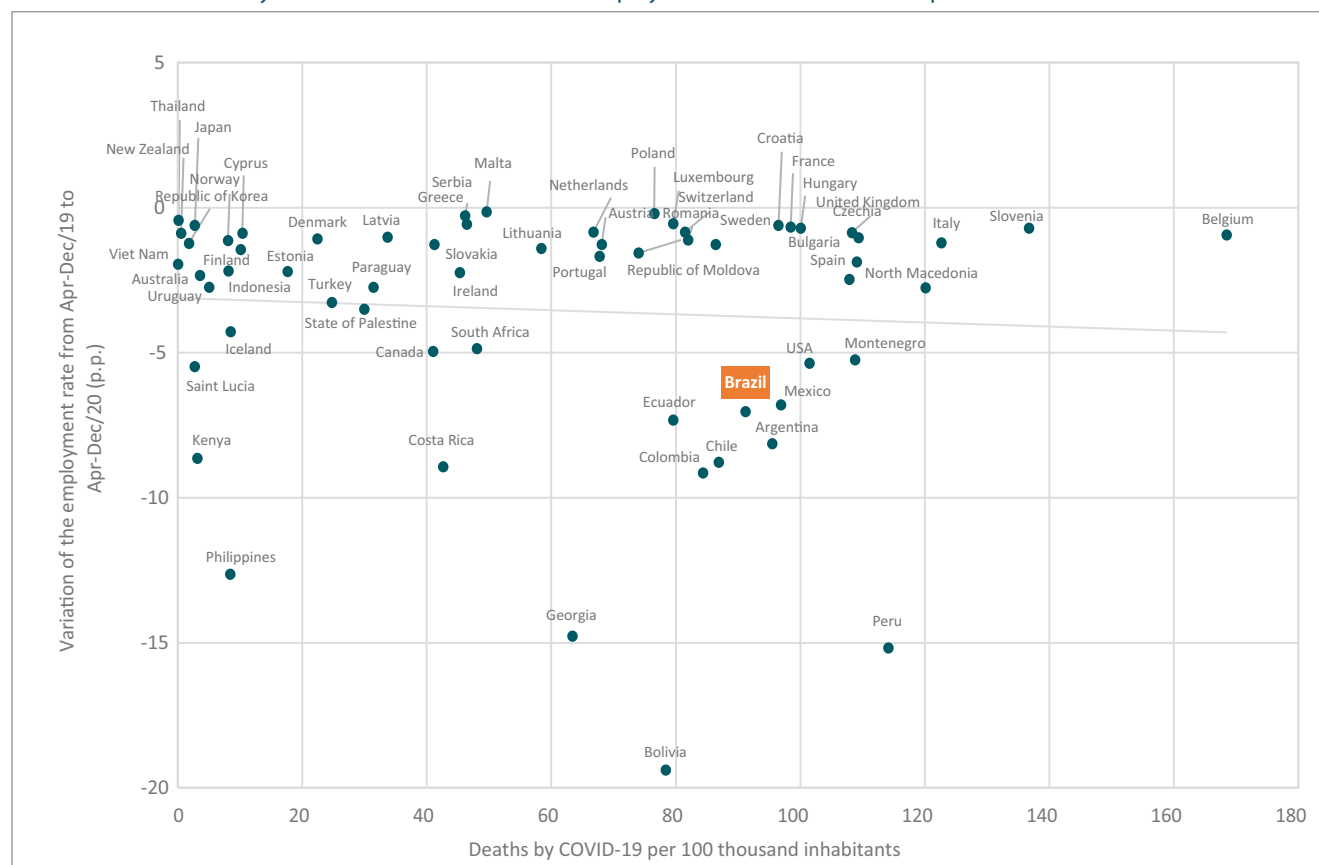
Variation in the employment rate between the last 3 quarters of 2019 and 2020 (p.p.)



Source: Author's elaboration based on ILO and PNAD *Continua*.

**FIGURE 5**

Crude COVID-19 mortality rate in 2020 versus variation in employment across the three last quarters of 2019 and 2020

Source: Author's elaboration with data from the WHO, ILO and Pnad *Continua*.

As a last caveat, we should note that the indicator of decreased employment derives from the Continuous PNAD and its accuracy might have been affected by the difficulties found by the IBGE since March 2020, when it became necessary to conduct the survey through the phone, rather than in-person. There is evidence of factors that might have contributed to both the overestimation<sup>11</sup> and the underestimation<sup>12</sup> of the drop in employment demonstrated in the survey, and the aggregate result of these factors is still being analysed.

It is possible that the novel situation of restricted access to interviewees might have led surveys to underestimate in some countries and overestimate in others the real effects of the pandemic on the share of employed people. The level of Brazilian employment being under 50 per cent in the second quarter of 2020, however, is corroborated by another IBGE survey—PNAD COVID-19, which was not influenced by the mentioned factor that causes overestimation in the decrease in employment but rather by the factor of underestimation.

### 3 Conclusion

Brazil has recorded more deaths by COVID-19 as a share of its total population in 2020 than 89.3 per cent of the remaining 178 countries with data compiled by the WHO. When the comparison between records is adjusted according to the population distribution by age group and sex in each country, the Brazilian result is worse than 94.9 per cent of countries in the group. The risk of dying from COVID-19 in Brazil in 2020, given a person's age and sex, was 3.9 times higher than in the rest of the world according to national records.

In a set of 64 countries with available employment data, Brazil has recorded a sharper drop in the indicator than 84.1 per cent of the remaining 63 countries over the last 3 quarters of 2019 and 2020. The final rate of employment is lower than 76.2 per cent of countries in the same set.

The indicators analysed in this brief highlight that the known effects of the COVID-19 pandemic in Brazil in 2020 were strong, not only compared to the country's own historical series, but also given the international context. In the analysed periods, Brazil and other Latin American countries are among those most affected in the world in terms of loss of lives and employment. Countries in Oceania, Asia and Scandinavia figure among those least affected across both dimensions in 2020.

Once again, it is important to highlight that all international comparisons have limitations, and the ones presented in this brief, by virtue of their specificities, require additional caution. The COVID-19 pandemic is still under way and has attacked different parts of the world in distinct, successive waves, which rise and fall at distinct times according to location. The comparisons in this brief refer to periods starting and ending at the same dates across all countries, regardless of when they were hit by the pandemic, seasonal factors or other factors that might influence the results, such as level of development and related conditions. We have sought to present only basic and easily reproducible comparisons, although they have not been widely used so far, with indicators that might contribute to the formulation of diagnoses and actions.



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1. This Policy Research Brief is based on Hecksher (2021).
  2. Demographers and epidemiologists usually prefer presenting deaths per 100,000 inhabitants, as is customary in their respective fields of study, while some sites with compilations that are updated daily show rates per million inhabitants, such as Worldometer: <<https://www.worldometers.info/coronavirus>>.
  3. WHO Coronavirus (COVID-19) Dashboard: <<https://covid19.who.int/table>>.
  4. Bhutan, Cambodia, Granada, East Timor, Laos, Kiribati, Micronesia, Mongolia, New Caledonia, North Korea, Samoa, Solomon Islands, St. Vincent and the Grenadines, Seychelles, Tonga, Turkmenistan, and Vanuatu.
  5. *Portal da Transparência — Registro Civil*: <<https://transparencia.registrocivil.org.br/dados-covid-download>>.
  6. Lima et al. (2021) and Silva, Jardim and Lotufo (2021) applied other demographic adjustment methods when comparing different areas of Brazil.
  7. See <<https://osf.io/mpwjq/>>. To get around the different totals across databases, the proportions by age and sex of COVerAGE-DB were applied to the WHO's totals.
  8. The World Obesity Federation (WOF 2021), for example, highlights the national incidence of obesity as one of the factors associated with COVID-19

mortality. Its compiled database (<https://data.worldobesity.org/tables/prevalence-of-adult-overweight-obesity-2/>) points to Brazil as having 20.7 per cent of its adult population as obese, which is a higher percentage than 57.2 per cent of the remaining 192 countries with available data.

9. Employment-to-population ratio (ILOSTAT): <[t.ly/5RTA](https://t.ly/5RTA)>.
10. These periods were chosen for analysis because, in all 64 countries with employment data that were analysed, the first records of infection by SARS-CoV-2 occurred in the first quarter of 2020. Therefore, the comparison is always between before and after countries' first recorded case of COVID-19.
11. The Continuous PNAD seeks to visit the same households for five consecutive quarters, replacing about a fifth of the sample each quarter. Corseuil and Russo (2021) note that people incorporated to the sample since the phone survey started present, in each quarter, a lower rate of formal employment compared to those who have been in the sample since before the pandemic.
12. Among the people who were already part of the sample since before the pandemic, the probability of being interviewed again has decreased since the start of the phone survey, but decreased more sharply for those who were originally outside the labour market and less so for those who were employed. See Hecksher (2021).

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