


## Short Report

# Racial disparity in excess mortality in Brazil during COVID-19 times

Maria Fatima Marinho<sup>1</sup>, Ana Torrens<sup>1</sup>, Renato Teixeira<sup>1</sup>, Luisa Campos Caldeira Brant<sup>2,3</sup>, Deborah Carvalho Malta<sup>4</sup>, Bruno Ramos Nascimento <sup>2,3\*</sup>, Antonio Luiz Pinho Ribeiro<sup>2,3</sup>, Richard Delaney<sup>1</sup>, Pedro do Carmo Baumgratz de Paula<sup>1</sup>, Philip Setel<sup>1</sup>, Jhames Matos Sampaio<sup>5</sup>, Ana Maria Nogales-Vasconcelos<sup>5</sup>

1 Vital Strategies, São Paulo, SP, Brazil

2 Faculdade de Medicina, Universidade Federal de Minas Gerais (UFMG), Belo Horizonte, MG, Brazil

3 Serviço de Cardiologia e Cirurgia Cardiovascular e Centro de Telessaúde, Hospital das Clínicas da Universidade Federal de Minas Gerais (UFMG), Belo Horizonte, MG, Brazil

4 Escola de Enfermagem, Universidade Federal de Minas Gerais (UFMG), Belo Horizonte, MG, Brazil

5 Statistics Department, University of Brasília (UnB), Brasília, DF, Brazil

**Correspondence:** Maria Fatima Marinho, Vital Strategies, R. São Bento, 470 - Room 104 - São Paulo, SP 01010-001, Brazil, Tel/Fax: +55 11 3514 3930, e-mail: [mfmouza@gmail.com](mailto:mfmouza@gmail.com)

We evaluated the impact of the COVID-19 pandemic on excess mortality by race/skin colour in Brazil, between epidemiological weeks 12 and 50 of 2020. We compared the 2020 point estimate and the expected point estimate applying 2019 mortality rates to the 2020 population. There was an excess of 187 002 deaths (+20.2%) compared to the expected. Excess mortality was 26.3% (23.3–29.3%) among blacks/browns compared to 15.1% (14.1–16.1%) among whites (58.9% of excess among black/browns). Age-standardized rates increased from 377 to 419/100 000 among blacks/browns compared to 328 to 398/100 000 in whites, resulting in 9% relative risk. Excess mortality in Brazil depicts a considerable gap, with increased mortality in all age groups in the black/brown population.

## Introduction

Excess mortality is the number of deaths within a jurisdiction that exceeds the expected toll for the period, comparing to historic series or predictions. This indicator allows the evaluation of the pandemic's trajectory and measures its magnitude.<sup>1</sup> Stratified by race/skin colour, excess mortality may reveal the impact of COVID-19 on racial disparities.

Half of Brazil's population is composed by black/brown individuals (56%, 2019)—varying from 26% in the South to 81% in the North—who are more socioeconomically vulnerable compared to the white population.<sup>2</sup> Previous studies in the country involving hospitalized patients or restricted to a city have shown higher mortality risk for black/browns individuals.<sup>3,4</sup> However, Brazil is a heterogeneous country and whether this information applies to all regions, considering the diverse racial composition and healthcare resources, is unknown.<sup>2,5</sup> We aimed to evaluate the impact of the COVID-19 pandemic on excess mortality in Brazil according to race/skin colour.

## Methods

A descriptive analysis of deaths from natural causes registered in Brazil between the date of first COVID-19 death, in epidemiological week (EW) 12 (starting on 15 March 2020), and EW 50 of 2020 (ending on 12 December 2020), compared to the expected for 2020. Baseline data of deaths from 2019 were derived from the Mortality Information System (SIM) of the Ministry of Health, and data for 2020 were extracted from the Transparency Portal of the Brazilian Civil Registry (CR) Database. Mortality rates in the past 5 years (SIM) by race showed a stable trend compared to 2019 ([Supplementary figure S1](#)), and

population by race in 2019 and 2020 was, respectively, browns/blacks 118.83/119.67 and whites 89.23/89.98 million inhabitants.

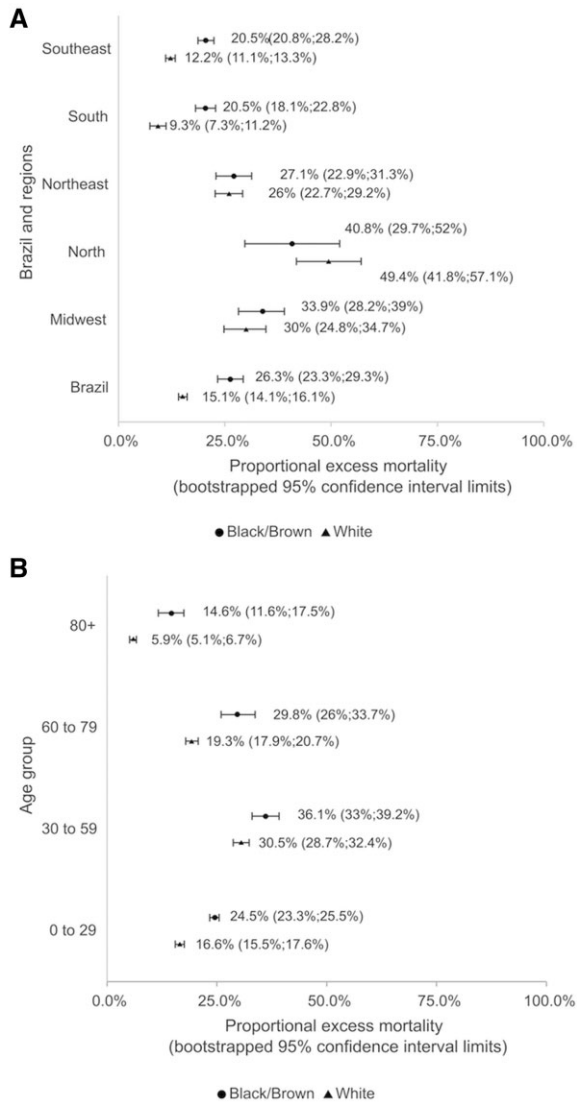
To account for under-registration of deaths in the CR in 2020, a correction factor according to age, sex and location was applied when necessary, based on the ratio between deaths registered in SIM and in the CR in 2019 ([Supplementary tables S1 and S2](#)). SIM was the reference because it is the official epidemiological data source, submitted to qualification, including investigation of deaths.<sup>6,7</sup> More details about the methods applied are available in the [Supplementary Methods](#).

## Results

From EW 12 to 50, there were 926 511 deaths from natural causes in Brazil—an excess of 187 001 deaths (+20.2%). Excess mortality was higher among men (23.3% vs. 16.8% for women) in all regions ([Supplementary figure S2](#)) and for blacks/browns [26.3% (23.3–29.3%), 110 138] vs. the white population [15.1% (14.1–16.1%), 76.863]. Excess deaths in black/browns accounted for 58.9% of all excess deaths ([Supplementary table S1](#)).

All Brazilian regions experienced an increase in the death toll ([figure 1A](#)) and excess mortality was proportionally higher among black/brown population in the South and Southeast. In the 30–59 age group there was 36.1% excess mortality among blacks/browns compared to 30.5% for white individuals, and excess deaths were 1.5 times higher among blacks/browns compared to whites from 60 to 79 years old ([figure 1B](#)).

Age-standardized mortality rates increased from 354/100 000 inhabitants in the period of 2019 to 410/100 000 inhabitants in the same period of 2020. Among the black/brown population, mortality



**Figure 1** Proportional excess mortality between weeks 12 and 50 in white and black/brown population, for **(A)** Brazil and regions and **(B)** age groups. The boundaries in the percentages bars reflect bootstrapped 95% confidence intervals

rates increased from 328 to 398/100 000 inhabitants compared to 377–419/100 000 inhabitants in the white population. This represents an increased mortality risk from 2019 to 2020 of 1.21 (21%) among blacks/browns contrasting with 1.11 (11%) in the white population, resulting in a 9% relative risk.

## Discussion

Our findings depict a considerable gap in excess mortality among black/brown population in Brazil during the COVID-19 pandemic. Importantly, the excess premature mortality in Brazil, especially in the 30–59 age group, was remarkable, particularly affecting blacks/browns.

Previous data from Brazil, evaluating almost 100 000 cases from a public dataset (SIVEP-Gripe), suggested higher COVID-19 mortality rates in the North and among black/browns.<sup>4</sup> Authors speculate that the risk factor burden in less resourced Northern areas, coupled with higher individual susceptibility and impaired access to healthcare among black/browns were the determinants.<sup>4</sup> Other reports reinforce that COVID-19 is disproportionately affecting black people in the hardest-hit countries, as Brazil and the USA,<sup>8</sup> and an analysis of the Brazilian Health Ministry data suggest that among severe cases,

hospital mortality among black citizens reached 54%, vs. 38% among whites.<sup>9</sup> A similar scenario has been observed in other countries: there is an underestimated excess burden of COVID-19 among black and Latino US populations, with a 1.6 odds of death for blacks, with a significant increase in mortality risk from pre-COVID-19 to COVID-19 periods after adjustment for clinical and social indices.<sup>10</sup> A systematic review suggests that the black, Asian and ethnic minorities are at increased risk of acquiring SARS-CoV-2 infection and having worse outcomes compared to white individuals.<sup>11</sup>

Racial disparities in outcomes during the COVID-19 pandemic in Brazil are presumably multifactorial and result from social and health inequalities that historically affected the black/brown population.<sup>2</sup> First, black/browns are more exposed to SARS-CoV2: social distancing is more difficult to achieve in lower SES due to household, work and public transportation conditions; and those with less education are less likely to work remotely.<sup>12</sup> Second, lower Socioeconomic status (SES) is also related to a greater burden of comorbidities that increase lethality.<sup>13</sup> Third, lethality is higher in populations with less access to healthcare. A Brazilian national survey showed a higher likelihood of underutilization of healthcare in lower SES and among those self-classified as blacks/browns.<sup>14</sup>

The lack of excess mortality among blacks/browns in the North and Northeast may be explained by the high proportion of this ethnicity in these regions (81%), underpowering comparisons, and by the health system collapse affecting individuals of all SES, in both public and private sectors. In the regions with majority of white population—South and Southeast—overall lowest excess mortality can be attributed to better access to prevention and healthcare assistance, although inequalities are evident across race categories, with a greater mortality increase among blacks/browns.

A limitation of our study is using race information from death certificates, which is not self-reported. However, previous data from Brazil show that race misclassification in death certificates is 17.3%, but 13.1% correspond to misclassifying individuals self-reported as black/browns as whites, suggesting that we may be in fact underestimating deaths in the black/brown population.<sup>15</sup> Moreover, we used distinct sources of information (CR and SIM). However, both systems use information from death certificates, and we applied corrections for underreporting of deaths and redistributed missing race data in the CR based on SIM. Although corrections may be a limitation, SIM was the reference because it is the most accurate mortality information in Brazil.<sup>6</sup>

The consequences of greater COVID-19 burden in the black/brown population are further enhancing health and social gaps, as premature deaths may affect the socioeconomic support of families in the long run. Public policies to promote equity should address this population and may include focused campaigns to promote adherence to mask use and hand hygiene, and prioritize vaccination.

## Conclusion

Since the first reported COVID-19 death in Brazil until 12 December, there was an excess mortality from natural causes of over 180 000 deaths. Excess mortality among black/browns was remarkably higher compared to the white population, being as high as 26.3%, and accounting for 58.9% of excess deaths. These data point to racial inequalities as results of the pandemic's direct and indirect impacts on mortality.

## Supplementary data

Supplementary data are available at *EURPUB* online.

## Funding

This study has no specific funding. A.L.P.R. was supported in part by CNPq (310679/2016-8 and 465518/2014-1), FAPEMIG (PPM-00428-

17 and RED-00081-16) and CAPES (88887.507149/2020-00). B.R.N. was supported in part by CNPq (Bolsa de produtividade em pesquisa, 312382/2019-7), the Edwards Lifesciences Foundation (Every Heartbeat Matters Program 2020) and FAPEMIG (grant APQ-000627-20); D.C.M. was supported in part by CNPq (Bolsa de produtividade em pesquisa, 308250/2017-6) and FAPEMIG (Programa Pesquisador Mineiro). A.M.N.-V. was supported in part by CNPq (Bolsa de produtividade em pesquisa, 309944/2018-0).

*Conflicts of interest:* None declared.

## Human participant protection statement

This study was approved by the Universidade Federal de Minas Gerais Institutional Review Board. As no primary patient data were collected, no informed consent was required.

## Data availability statement

Data analytic methods and study materials will be made available to other researchers for purposes of reproducing the results or replicating the procedure, from the corresponding author upon reasonable request.

### Key points

- The COVID-19 pandemic is having a striking global health impact in Brazil, with an excess mortality from natural causes of over 180 000 deaths in the country since the first reported death until 12 December 2020.
- Excess mortality among black/brown individuals was remarkably higher compared to the white population, being as high as 26.3%, and accounted for 58.9% of excess deaths in this period, with a 9% relative risk.
- All Brazilian regions experienced an increase in the death toll compared to the expected in 2020. Excess mortality was proportionally higher among black/brown population in the South and Southeast regions.
- These data point to racial inequalities as results of the pandemic's direct and indirect impacts on mortality.

## References

- 1 Leon DA, Shkolnikov VM, Smeeth L, et al. COVID-19: a need for real-time monitoring of weekly excess deaths. *Lancet* 2020;395:e81.
- 2 Available at: [https://biblioteca.ibge.gov.br/visualizacao/livros/liv101681\\_informativo.pdf](https://biblioteca.ibge.gov.br/visualizacao/livros/liv101681_informativo.pdf) (15 September 2020, date last accessed).
- 3 Ribeiro KB, Ribeiro AF, de Sousa Mascena Veras MA, de Castro MC. Social inequalities and COVID-19 mortality in the city of Sao Paulo, Brazil. *Int J Epidemiol* 2021, 1–11. doi: 10.1093/ije/dyab022.
- 4 Baqui P, Bica I, Marra V, et al. Ethnic and regional variations in hospital mortality from COVID-19 in Brazil: a cross-sectional observational study. *Lancet Glob Health* 2020;8:e1018–26.
- 5 Noronha K, Guedes GR, Turra CM, et al. The COVID-19 pandemic in Brazil: analysis of supply and demand of hospital and ICU beds and mechanical ventilators under different scenarios. *Cad Saude Publica* 2020;36:e00115320.
- 6 Costa LFL, de Mesquita Silva Montenegro M, Rabello ND, et al. Estimating completeness of national and subnational death reporting in Brazil: application of record linkage methods. *Popul Health Metr* 2020;18:22.
- 7 Available at: <https://www.ibge.gov.br/estatisticas/sociais/populacao/26176-estimativa-do-sub-registro.html?edicao=26182&t=o-que-e> (5 July 2020, date last accessed).
- 8 Caldwell KL, Araújo EM. COVID-19 is deadlier for black Brazilians, a legacy of structural racism that dates back to slavery. *The Conversation*. London, UK: The Conversation, 2020.
- 9 Batista A, Antunes B, Faveret G, et al. Análise socioeconômica da taxa de letalidade da COVID-19 no Brasil. NOIS PUC-Rio. Rio de Janeiro, RJ: Núcleo de Operações e Inteligência em Saúde (NOIS), Pontifícia Universidade Católica do Rio de Janeiro, 2020: 1–12.
- 10 Cowger TL, Davis BA, Etkins OS, et al. Comparison of weighted and unweighted population data to assess inequities in coronavirus disease 2019 deaths by race/ethnicity reported by the US centers for disease control and prevention. *JAMA Netw Open* 2020;3:e2016933.
- 11 Pan D, Sze S, Minhas JS, et al. The impact of ethnicity on clinical outcomes in COVID-19: A systematic review. *EClinicalMedicine* 2020;23:100404.
- 12 O IBGE AP OIANDO O COMBATE À COVID-19. Desocupação, renda, afastamentos, trabalho remoto e outros efeitos da pandemia no trabalho. <https://covid19.ibge.gov.br/pnacovid/trabalho.php>. Accessed Sep 11, 2020.
- 13 Malta DC, Goncalves RPF, Machado IE, Freitas MIF, Azeredo C, Szwarcwald CL. Prevalence of arterial hypertension according to different diagnostic criteria, National Health Survey. *Rev Bras Epidemiol* 2018;21:e180021.
- 14 Boccolini CS, de Souza Junior PR. Inequities in Healthcare utilization: results of Brazilian National Health Survey, 2013. *Int J Equity Health* 2016;15:150.
- 15 Dos Santos HG, do Nascimento CF, de Oliveira Duarte YA, Kawachi I, Chiavegatto Filho ADP. Blurred lines: racial misclassification in death certificates in Brazil. *Int J Public Health* 2020;65:29–36.