

# Social determinants of health in Brazil during the COVID-19 pandemic: strengths and limitations of emergency responses

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## Abstract

Economic crises often expose the most vulnerable to higher health risks and tend to exacerbate existing inequalities. The Social Determinants of Health (SDoH) framework illustrates many layers of inequalities that would affect outcomes of the COVID-19 pandemic. The impacts of emergency policy responses considering the SDoH framework are important for all sectors in policymaking. However, its assessment in Global South countries is limited, due to high informality rates and data availability. We address this gap using a unique dataset that allows for the analysis of occupational categories before and after the COVID-19 pandemic in Brazil, incorporating the emergency assistance provided in 2020. Results show that, although labor earnings fell 4% for the self-employed at each death from COVID-19, increasing unemployment and inactivity among the typically most vulnerable, those effects were offset by emergency policies, reducing poverty. Groups often considered less vulnerable, such as formal employees, had an increase. The policy responses to this shock served then as a leveler of previous SDoH, despite ignoring the health-risk gradient there is along the income distribution. A poverty rebound that ensued after the sudden discontinuation of those policies is a lesson for future crises, and on how SDoH inequalities should be addressed.

**Key words:** pandemic; social determinants of health; poverty; inequality; Brazil.

## Introduction

Economic crises have their largest health impacts on the most vulnerable, given Social Determinants of Health (SDoH). Low living standards, unemployment, and poverty are associated with psychological stress, poorer nutrition, chronic illnesses, depression, and even household overcrowding, which can lead to changes in the spread of vector-borne diseases.<sup>1</sup>

Since the SDoH framework is relevant for all diseases, there is evidence that an additional US\$100 in social welfare spending is associated with a 1.19 percentage point (pp) drop in overall mortality rate.<sup>2</sup> Thus, the direct or indirect assessment of health impacts of different economic and policy responses should interest all sectors,<sup>3</sup> especially during a public health emergency.

In response to the coronavirus disease 2019 (COVID-19) pandemic, governments adopted several measures to contain the spread of the virus and to prevent hospital networks from collapsing. These measures included lockdowns, physical distancing, closure of services, remote work, and schooling.<sup>4</sup> The type, timing, duration, and stringency of the measures varied by country.<sup>5</sup> Those measures were expected to affect the labor market, and thus income and poverty, 2 important SDoH.

In addition, the stringency of the measures also varied by occupational category. In Colombia, formal employees had to abide by lockdown rules, which shut down some economic sectors, while self-employed individuals in the same sectors were not formally obliged to follow those rules.<sup>6</sup>

Another example is Uruguay, which has a higher informality rate than Europe's average (8.65%), but the lowest one in Latin America, equivalent to 21.9% in 2020.<sup>7</sup> In the pandemic, it is estimated that losses in unemployment and income, considering self-employed and informal workers alone, amount to 4.2% of its GDP.<sup>8</sup> Therefore, measures in response to COVID-19 likely affected occupational categories differently.

To mitigate those effects, countries launched different forms of emergency income assistance programs, which varied in eligibility, duration, value amount, and coverage.<sup>9</sup> Critical to the deployment of those programs was the identification of individuals most vulnerable to income losses, and in countries from the Global South the task was, in part, hampered by the lack of accurate data. For those, the need for income-assistance programs was imperative for at least 2 reasons. First, more people are living under vulnerable conditions, with a greater risk of falling into poverty and thus

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being exposed to higher health risks. Evidence suggests that, as a country was further from being a high-income country, a larger portion of welfare was lost due to the increased poverty rather than the increased number of deaths related to the pandemic.<sup>10</sup> Second, different from high-income countries, most workers in the remaining countries do not have access to formal social-protection benefits due to the segmentation of labor.<sup>11</sup>

Emergency cash transfers created at the onset of the pandemic were critical to attenuate the exposure to risk for the most vulnerable. Considering 10 Latin American countries, at least half of the first quintile of the income distribution was covered by some emergency transfer, as the case of Ecuador indicates, the country with the lowest percentage of assisted households. However, albeit also vulnerable, people in the second quintile of the income distribution did not have the same coverage, exposing those households to poverty.<sup>12</sup> Descriptive evidence indicates that, considering the ex-ante income distribution in those countries, those in the “middle” rather than those at the bottom of the distribution were the most affected by the pandemic.<sup>13</sup>

This scenario has important implications for health inequalities. Since there is a health-risk gradient across the income distribution, in which health conditions deteriorate as one gets away from the top, to focus exclusively on the most vulnerable is not sufficient to eliminate health inequalities, requiring that policy responses should be universal and proportional to one’s level of health disadvantages.<sup>14,15</sup>

Using longitudinal microdata from Brazil, the objective was to identify which occupational groups (self-employed, informal workers, formal employees, employers, and public servants) were, indirectly, the most exposed to health risks in the first year of the pandemic. We do this considering the impacts that the COVID-19 pandemic had on SDoH, assessing whether emergency policy responses mitigated health inequalities that followed the pandemic.

Four reasons make Brazil an important country to study. First, in 2020, the federal government created several emergency benefits. Most important, it created an emergency income assistance benefit equivalent to 138.4% of the poverty line based on US\$5.5 purchasing power parity (PPP).<sup>16</sup> The Emergency Basic Income was the most important policy response that would have, indirect, health impacts, given its scope and generosity.

Overall, the fiscal effort represented 15% of the country’s gross domestic product (GDP), comparable to the effort deployed by high-income countries.<sup>17</sup> Second, Brazil is marked by striking inequalities, which have increased since an economic crisis started in 2015.<sup>18</sup> Third, the country has been severely hit by the pandemic, ranking second in the number of deaths worldwide (Figure 1).<sup>19</sup> Fourth, the Brazilian Institute of Geography and Statistics (IBGE) collected household interviews throughout the beginning of the pandemic, among those that were previously surveyed in 2018 and 2019, allowing to longitudinally analyze how different workers were affected.

Therefore, with a detailed panel dataset, we can assess how Brazil’s emergency policies, in a period of generosity and large scope, indirectly represented a leveler of health inequalities, as it systematically benefited the most vulnerable, in occupational, socioeconomic, racial, and educational terms.

## Materials and Methods

### COVID-19 deaths

Deaths due to COVID-19 by month and state in 2020 were extracted from the Influenza Epidemiological Surveillance Information System (SIVEP-Gripe), compiled by the Ministry of Health. The total population by state was extracted from IBGE and used to calculate COVID-19 death rates per 100 000 inhabitants.

### Individual panel data

Information on occupational groups, identification of pension beneficiaries, age, sex, education, labor outcomes, occupational status, inactivity, and poverty was obtained from the National Household Sample Survey (PNAD), routinely conducted every quarter by IBGE.

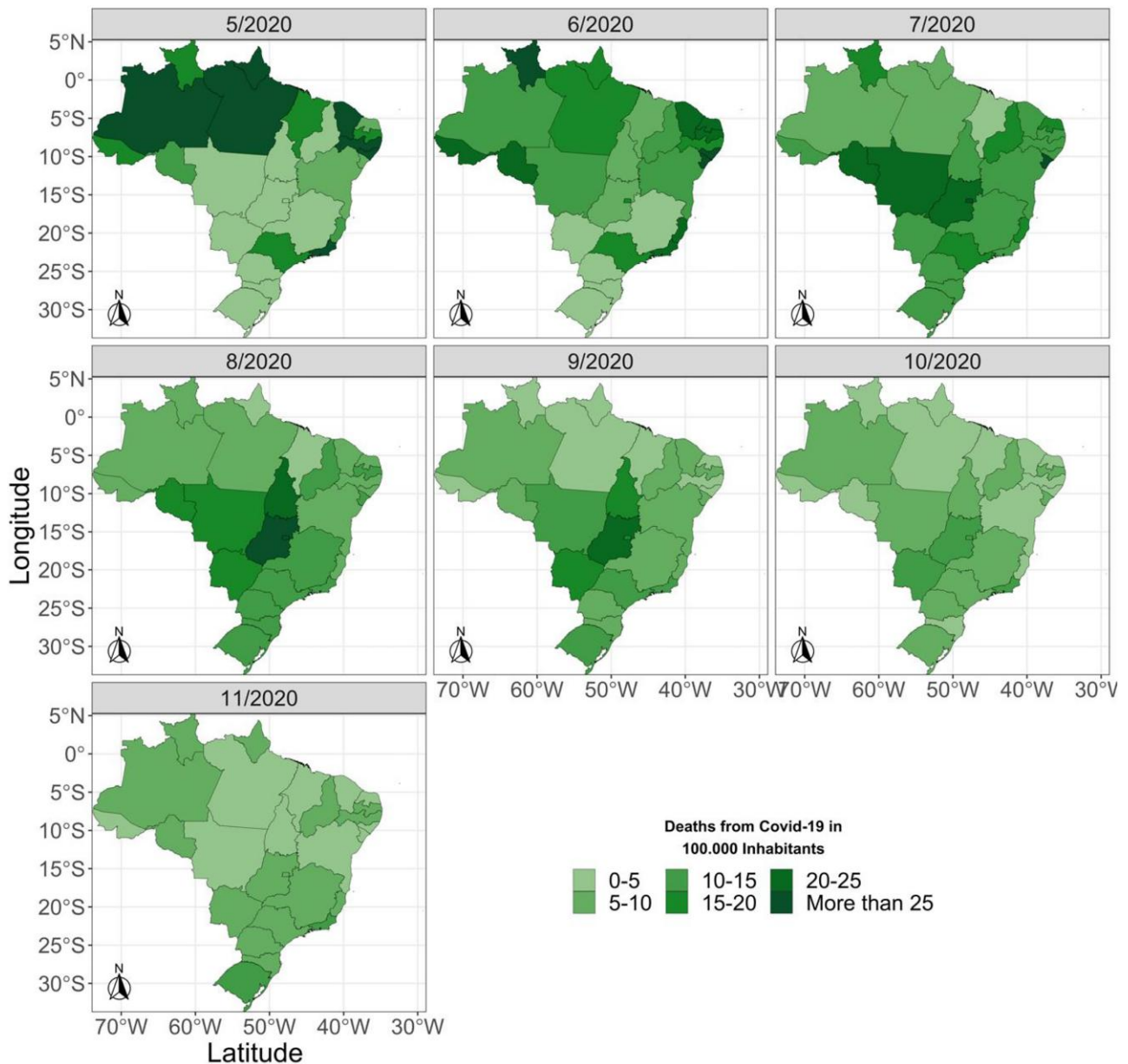
With the onset of the pandemic, in-person interviews were interrupted. The IBGE quickly implemented a protocol to conduct interviews by phone, following up with households that were included in the 2018 and 2019 PNADs. The interviews were conducted monthly from May to November 2020, and a household interviewed in 2020 should have been previously surveyed in 2018, 2019, or both. To construct the individual panel data, we linked 2018, 2019, and 2020 PNADs using a household unique identifier and the individual’s date of birth. Since the 2020 questionnaire was shortened to facilitate the phone interview, one of the questions removed was the occupational group (eg, self-employed, informal worker, formal employee, employer, and public servant). Hence, we considered the latest reported group to identify the occupational group in the baseline. In our final sample, every individual had at least 1 observation before and another after the pandemic.

With regard to control and outcome variables, some definitions are necessary. Pension beneficiaries are those who receive retirement transfers or pensions. Occupational status defines whether a person is employed or not; it indicates that a person has performed any job in a reference period. Inactivity indicates if a person is of working age but does not work or is not looking for work, hence out of the workforce. A household is in poverty if its total household income per capita was lower than one-quarter of the minimum wage in Brazil in 2020 (R\$1045, or US\$209). The same criterion is used to determine eligibility for an official noncontributory pension scheme paid to individuals with a disability and those aged 65 years old or more, which is called *Benefício de Prestação Continuada*.

### Data analysis

We considered five different outcomes: (1) log of labor earnings, with constant prices for November 2020; (2) unemployment; (3) inactivity; (4) poverty; and (5) poverty without any COVID-19–related benefits. The same poverty threshold outlined above was considered in the case of the counterfactual scenario without COVID-19–related benefits, subtracting emergency assistance transfers from household income.

All outcomes were analyzed in the form of longitudinal linear regressions, using race, sex, education, and age as control variables, as well as an identifier for recipients of retirement



**Figure 1.** Deaths from COVID-19 deaths per 100 000 people, Brazilian states, May–November/2020.

pensions, which can be received even when one is still in the workforce (detailed specifications are available in the [supplementary appendix](#)).

Our focus is on an interactive term between occupational groups and the severity of the pandemic in state  $s$  and month  $m$ . The objective was to assess the impact each death from COVID-19 in 100 000 inhabitants had on each outcome of interest (eg, poverty) for all occupational groups relative to public servants, the reference category in all specifications.

COVID-19 deaths vary depending on state and month, because the timing of introduction and the speed of virus spread were heterogeneous across the country,<sup>20</sup> distinctively affecting the labor market and allowing for causal identification conditional upon fixed effects and controls.

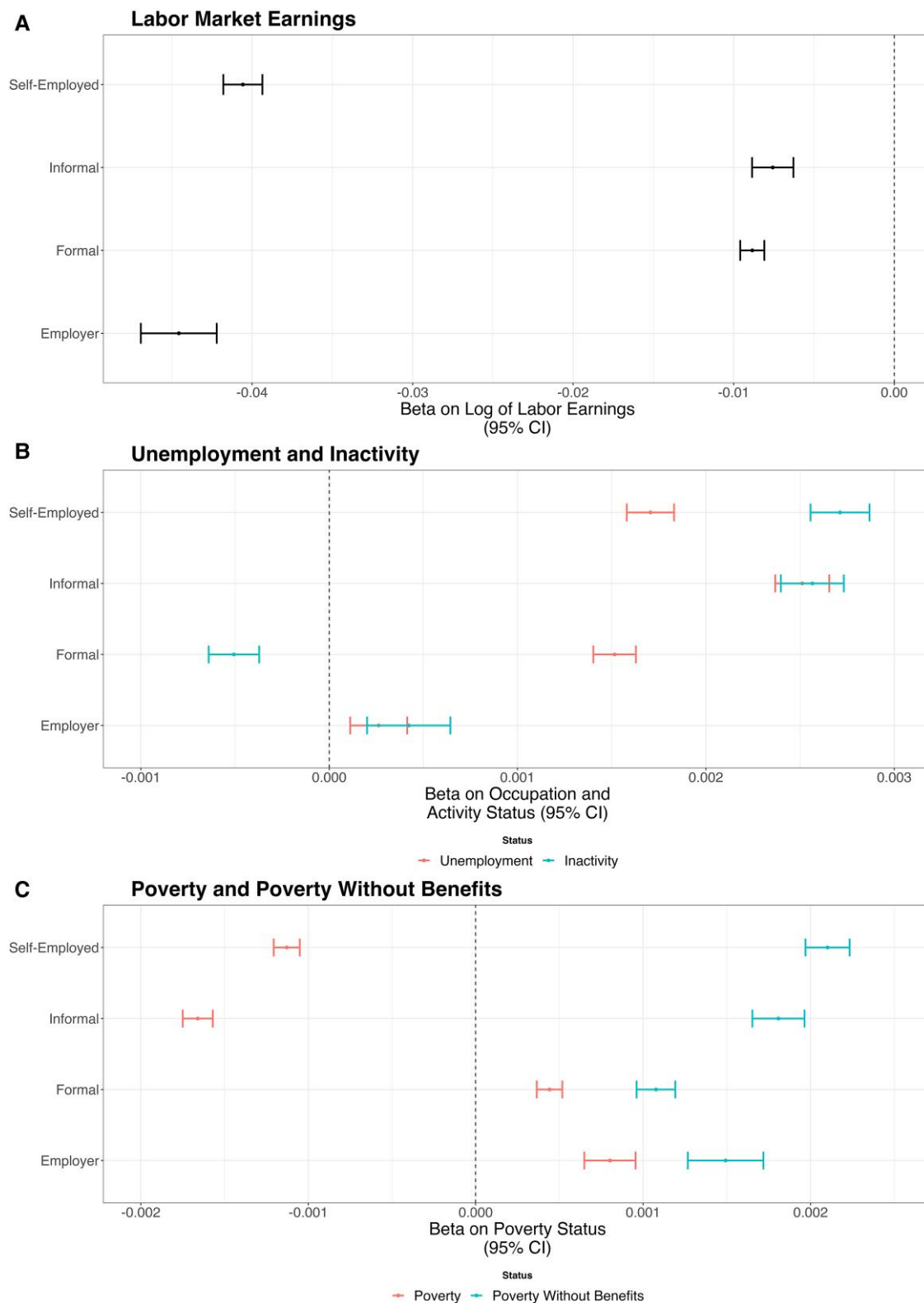
Assuming that the pandemic's effects would take at least 1 month to be felt in the labor market, as a robustness check we replace the COVID-19 component in the interactive term

by the same figure but lagged in 1 month, yielding, qualitatively, the same results ([supplementary Figures A2 and A3](#)). The same specifications were run separately by race, education (both available in the [supplementary appendix](#)), and income quintiles.

## Results

### Labor earnings

Social gradients across occupation groups existed before the COVID-19 pandemic. Formal employees, public servants, and employers were mainly composed of White people with more years of schooling, and higher average earnings and lower poverty rates, compared with informal workers and self-employed workers ([supplementary Figure A4](#)).



**Figure 2.** Coefficients (beta) of occupational groups interacted with COVID-19 deaths per 100 000 people in month  $m$  and state  $s$  on the log of labor earnings (A), on unemployment and inactivity (B), and on poverty (C). Coefficients were estimated in ordinary least squares (OLS) models controlling for age, gender, race, education, and an identifier for beneficiaries of pensions. All models add household and time fixed effects. Standard errors were clustered at the household level.

Once the pandemic started, all occupational groups saw a negative trend in earnings, relative to public servants (Figure 2A). Employers and self-employed workers had the largest negative impact on income. Each death from

COVID-19 represented a decrease in 4% of labor income among those groups, compared with public servants, conditional on fixed effects and controls. This corresponds to a sizable reduction of 34% in earnings for a variation of 1 SD in the



**Table 1.** Percentage of recipients of government transfers and other earnings by occupational group and poverty status, Brazil, 2020.

Poverty status	Occupational group	% <i>Bolsa Família</i> <sup>a</sup>	% BPC	% Unemployment insurance	% COVID-19 income assistance	% Other COVID-19–related benefits	% Others <sup>b</sup>
No	Self-employed	6.88	2.61	1.44	54.44	4.60	5.31
Yes	Self-employed	6.62	0.00	0.00	0.00	0.00	0.29
No	Informal worker	9.13	2.51	1.63	54.46	5.69	4.37
Yes	Informal worker	9.53	0.00	0.00	0.00	0.00	0.20
No	Formal employee	2.37	0.97	4.91	31.39	3.11	4.83
Yes	Formal employee	2.40	0.00	0.00	0.00	0.00	0.18
No	Employer	1.23	0.81	1.00	27.63	2.15	14.05
Yes	Employer	1.07	0.00	0.00	0.00	0.00	0.84
No	Public servant	1.00	0.85	1.00	17.26	1.00	6.47
Yes	Public servant	0.74	0.00	0.00	0.00	0.00	0.55

Abbreviation: BPC, *Benefício de Prestação Continuada* (a noncontributory pension for extremely poor seniors above 65 years old or disabled persons).

<sup>a</sup>*Bolsa-Família* is a means-tested program for the extremely vulnerable.

<sup>b</sup>Includes rent, leases, private pensions, scholarships, capital gains, etc.

state monthly average number of deaths per 100 000 inhabitants between May and November of 2020 ( $4\% \times 8.53 = 34\%$ ). Among formal and informal workers, negative effects on earnings were lower, 1% on average.

Therefore, although all occupational groups faced a drop in their labor earnings, that decrease was larger among employers and the self-employed. These results nevertheless must be interpreted considering selection bias in employment and inactivity.

### Unemployment and inactivity status

We ran the same models for unemployment and inactivity, since labor earnings can carry considerable selection bias, as it necessarily excludes those who are unoccupied or who left the workforce altogether. Labor earnings for employers could have had a higher decrease than for formal employees because the latter had to leave the workforce, keeping occupied only those who could sustain higher earnings.

The likelihood of unemployment increased for all occupational groups after the pandemic started (Figure 2B). Similar results were found for inactivity. Compared with public servants, each death from COVID-19 per 100 000 inhabitants is associated with an increase in the probability of being unemployed by 0.02 pp among employers, and by 0.25 pp for informal workers.

With regard to inactivity, formal employees were the only category that did not observe an increase in the probability of leaving the workforce. Compared with public servants, the probability of being inactive among formal employees fell by 0.05 pp, while it increased by 0.04 pp among employers, and 0.25 pp among informal workers and the self-employed.

Therefore, the pandemic's effects on labor market earnings were mediated by transitions to unemployment and inactivity. Among the most vulnerable groups, unemployment and inactivity increased, positively selecting those who remained occupied and inflating average earnings. Yet, even among the self-employed who remained in the workforce and kept their jobs, there was a significant decrease in earnings (Figure 2A and B). With a general reduction in labor earnings and higher levels of unemployment and inactivity, poverty should be impacted too, leading to broader health risks.

### Poverty and counterfactual poverty status

There are several social-assistance and pension schemes in Brazil. There is the main policy aimed to mitigate extreme

poverty, *Bolsa Família*, a conditional cash transfer program focused on families with children that had an extremely low per capita income. There is also the noncontributory pension mentioned above, and unemployment insurance, restricted to formal employees.

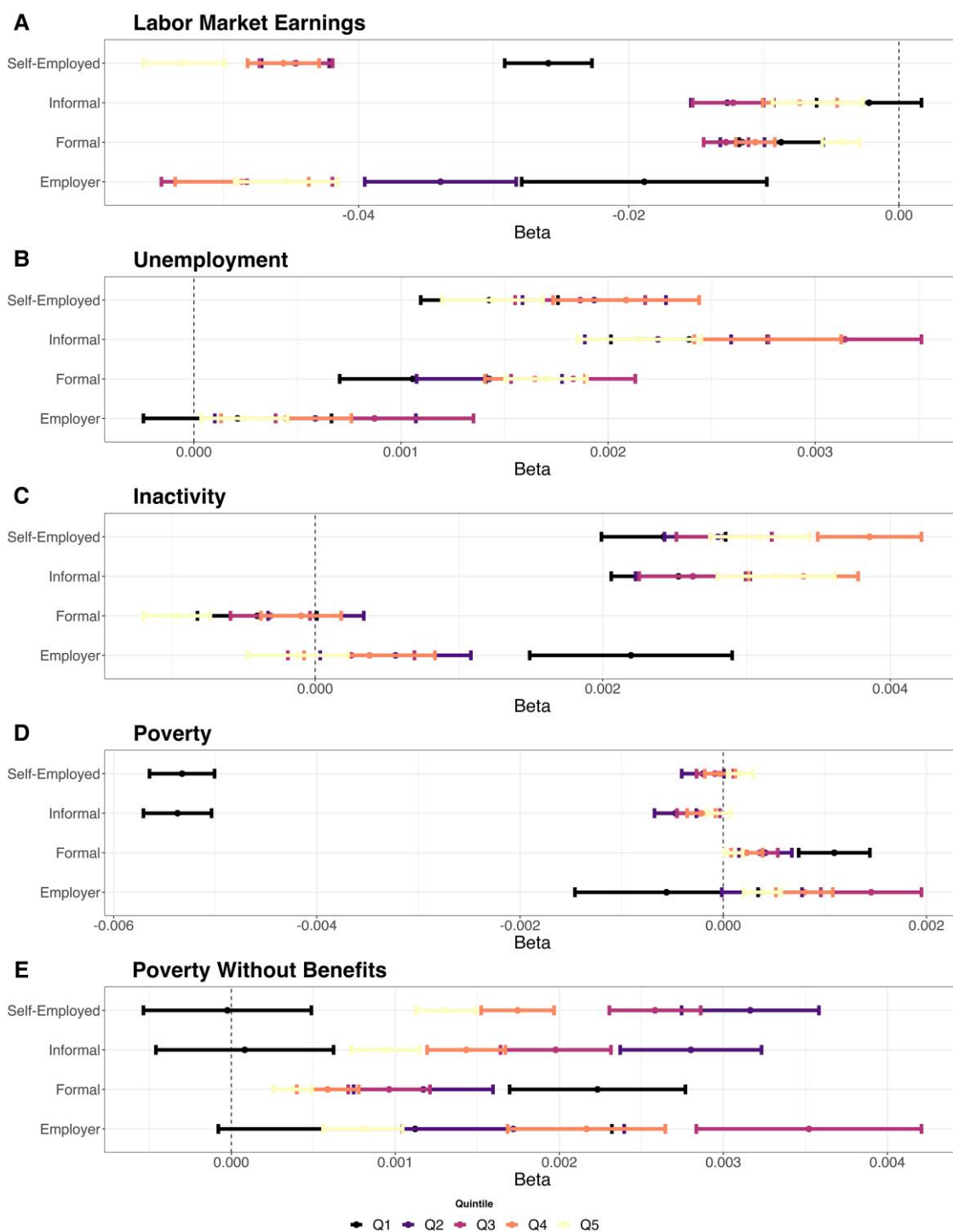
As a response to the pandemic, despite the unwillingness of the federal government in implementing broad policy responses, Congress created the Emergency Basic Income program, the main policy enacted to tackle the impacts of the pandemic on the labor market and poverty. This emergency scheme was created in April 2020, transferring monthly payments of R\$600 (US\$120) to any individual who did not receive any federal transfer, except *Bolsa-Família*, and anyone who, in 2018, did not earn more than approximately 2.2 times the minimum wage. This scheme lasted until September; then, transfers were reduced in half until the end of 2020 (R\$300, US\$60).

Figure 2C shows the effect that emergency income assistance had on poverty. Informal workers and the self-employed greatly benefited from emergency transfers, specifically designed for these groups. At each death from COVID-19, this represented an average poverty reduction of 0.17 pp and 0.11 pp, respectively.

In summary, the self-employed faced an average 4% decrease in labor earnings, followed by an increase in the likelihood of being unemployed of approximately 0.25 pp. Nevertheless, poverty decreased, with a similar pattern found among informal workers. Alternatively, employers faced virtually the same average negative impact on earnings, despite having a slightly higher likelihood of being unemployed or inactive. However, poverty followed a different trend, increasing by 0.08 pp for each death from COVID-19.

In the counterfactual scenario, had the COVID-19–related benefit not existed, poverty would have increased for all, from 0.10 pp among formal employees to 0.21 pp for the self-employed (Figure 2C), thus exposing every group to higher health risks.

These results follow the eligibility profile for the Emergency Basic Income. Table 1 shows that 54.4% of informal workers and self-employed workers received the Emergency Basic Income, while the coverage for formal employees, employers, and public servants was 31.3%, 27.6%, and 17.2%, respectively. These results indicate how employers and formal employees benefited less from emergency transfers, but also show the efficacy of the Emergency Basic Income in lifting beneficiaries out of poverty.



**Figure 3.** Coefficients (beta) of occupational groups interacted with COVID-19 deaths per 100 000 people in month  $m$  and state  $s$  on poverty status on labor market earnings (A), unemployment (B), inactivity status (C), poverty status (D), and poverty status without COVID-19-related benefits (E), stratified by position in the ex-ante income distribution, according to quintiles. Coefficients were estimated in ordinary least squares (OLS) models controlling for age, gender, race, education, and an identifier for beneficiaries of pensions. All models add household and time fixed effects. Standard errors were clustered at the household level.

### Effects across the income distribution

We conducted the same analysis stratifying by the individual's household position in the income distribution before the pandemic, according to a worker's total household income per capita in 2018 or 2019. After ordering households from the poorest to the richest, the distribution was divided into quintiles, being Q1 the poorest. The quintile identifier was used to

stratify regressions, first only including Q1, then iteratively including the remaining quintiles.

Figure 3A shows that, among employers, although all quintiles faced a reduction in labor earnings, the loss was lower among the poorest. Employers who were in Q1 had, on average, from each COVID-19 death per 100 000 inhabitants, a decrease of 1.86% in their labor earnings, against 4.43%

among those who were part of Q5. A similar trend was found among the self-employed. However, this reflects a selection bias (Figure 3C). Employers who were among the poorest faced the highest increase in the probability of transitioning to inactivity, 0.21 pp on average.

Informal workers and the self-employed in the first quintile faced the highest reduction in poverty when accounting for emergency transfers (Figure 3D). For each death from COVID-19 per 100 000 inhabitants, both groups faced a decrease in the chance of being poor equal to 0.5 pp, whereas among the other quintiles, including the quintile immediately above (Q2), we did not observe any statistically significant impacts. Figure 3E shows that, without emergency transfers, poverty would have increased from Q2 onwards, ranging from an average increase of 0.13 pp to 0.31 pp.

## Discussion

This paper assessed the socioeconomic impacts of the COVID-19 pandemic in the context of a country from the Global South by estimating its effects on labor earnings, unemployment, inactivity, and poverty. Thus, it analyzed how the pandemic indirectly exposed occupational groups to health risks. We also evaluated the effectiveness of emergency policies implemented in response to the pandemic, mitigating health inequalities. Results show that labor earnings were reduced among all groups, but reductions were larger among employers and the self-employed.

Typically considered vulnerable groups, the self-employed and informal workers faced higher chances of being unemployed and inactive. In contrast, employers and formal employees did not see the same increase in their chances of being unemployed or leaving the workforce, partially justifying the results observed in labor earnings, supported by selection bias of those workers who remained occupied or in the workforce.

Reinforcing this divide, more vulnerable groups saw a decrease in poverty, whereas employers and formal workers observed an increase. This opposing trend in poverty status was due to the coverage of the main COVID-19–related emergency response, the Emergency Basic Income, which benefited the most vulnerable workers, considering occupational, socioeconomic, racial, and educational terms (supplementary Figure A1). We found that the economic effects of the significant drop in labor earnings and the increase in unemployment or inactivity were offset by the program.

This study has many strengths. It used data that allows for longitudinal analyses of Brazilian households before and after the pandemic, and captured inequalities across different population groups according to labor market participation. It also assessed the heterogeneous impacts of the main policy enacted to tackle the pandemic's economic effects. It represents an important assessment of the indirect health implications that emergency policies had, as those served as tools to systematically improve the living standards of the most vulnerable.

The importance of the results are not limited to the first year of the pandemic. After 5 initial payments of R\$600 (US\$120) between April and August 2020, the amount was reduced by half and paid from September until December 2020. The emergency transfers ended exactly when the country was going through the worst phase of the pandemic, without coordinated health responses from the federal government, and it was only reinstated in April 2021.

Then, the value of the transfer varied according to household composition and had a monthly average of R\$250 (US \$50), 58% less than it paid individually at the beginning of the pandemic. There was also a change in eligibility, which was limited to 1 person per household (instead of 2 household members, as initially designed). These changes were implemented, albeit with persistently high levels of unemployment and inactivity, thus contributing to a poverty rebound.

Without the emergency benefit in 2021, the number of poor people nearly quadrupled, reaching even higher levels of poverty than before the pandemic.<sup>21</sup> This scenario led to 14 million new persons facing food insecurity.<sup>22</sup>

The analysis of what happened in the first year of the pandemic and what is known about the following period is an indication of how the generosity and scope of policy responses to economic crises are crucial to mitigate health inequalities not only in the pandemic but in the future.

First, an unprecedented governmental transfer with low eligibility criteria managed to focus on the most vulnerable, addressing health risks previously untouched. Second, albeit its positive externalities at the bottom of the income distribution, it did not consider the health gradient that also exposes those in the “middle” of the income distribution to health risks. Its original design and limitations are a framework of how policy should be designed in future economic and public health crises.

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## Supplementary material

Supplementary material is available at *Health Affairs Scholar* online.

## Conflicts of interest

Please see ICMJE form(s) for author conflicts of interest. These have been provided as supplementary materials.

## Notes

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