DOI: 10.1590/1413-812320212612.14672021

Unemployment and suicide among the Brazilian population in the crisis of capitalism

Antonio Angelo Menezes Barreto (https://orcid.org/0000-0002-5917-9135) [1]
Luis Eugenio Portela Fernandes de Souza (http://orcid.org/0000-0002-3273-8873) [1]

Abstract *The current crisis of capitalism has multiple economic, financial, social, environmental, cultural and political facets. In Brazil, the severity of the crisis is no different, resulting from the exhaustion of the neo-developmentalist model and its inability to resist global crisis. This study compares suicide mortality rates (MR) among employed and unemployed persons in Brazil prior to and during the economic crisis using death records from the period 2011 to 2016. The findings show that in the period 2011 to 2016 the suicide MR fell from 2.66/100,000 to 2.46 among unemployed persons and increased from 5.52/100,000 to 6.89/100,000 in employed persons. Suicide is a complex, multi-causal phenomenon determined by a diverse range of social factors, including strategies that increase worker exploitation. Indeed, being employed can have a greater negative impact on the mental health of workers than being unemployed.*

Key words *Crisis of capitalismo, Economic crisis, Unemployment, Precarious work, Suicide*

[1] Instituto de Saúde Coletiva, Universidade Federal da Bahia. R. Basílio da Gama s/n, Canela. 40110-040 Salvador BA Brasil. aambarreto@hotmail.com

Introduction

At the end of the twentieth century, capitalism underwent social and historical transformations that have significantly affected the *world of work*[1,2]. After a long period of economic growth beginning in the post-war era, the 1970s were marked by stagnation of investment. A persistent drop in average profit margins was witnessed, together with a crisis of the Taylorist/Fordist accumulation pattern, explained by contradictions of the material structure of social, economic and political reproduction, which ended up undermining profits and economic expansion[1-5].

At the end of the 1970s, the Workers' Party (*Partido dos Trabalhadores* - PT) emerged in Brazil, bringing together the left, working and middle classes, and intellectual segments of society. This new party expressed a new organization of formal sector workers[6]. This "new organization" was the result of a considerable shift in productive activity from advanced capitalist countries to regions located in the periphery of the world capitalist system, reducing the industrial proletariat in these countries and expanding the workforce (especially in the service sector, agro-industry and industry) in various countries in the Global South[1].

This new *international division of labor* was designed using measures that combined old and new forms of labor exploitation in response to the obstacles imposed on the accumulation process[1]. In Brazil, the 1980s were characterized by the rearticulation of conservative forces, meaning that the country's transition to democracy went hand in hand with an economic transition to neoliberalism[6]. The neoliberal model may be understood as capitalism's response to crisis, based on the articulation of strategies to promote the extraction of absolute and relative surplus-value built around super-exploitation of labor[1].

Against this backdrop, a production restructuring process was triggered involving specific forms of exploitation that combine elements of Fordism with new mechanisms inherent in forms of flexible accumulation, transforming the economy, social structure and employment patterns in Brazil[1,6].

The global financial crisis that erupted in 2008 – one of the effects of the inherent contradictions of capitalism and patterns of accumulation developed since the 1970s, triggered by the housing bubble burst (in the subprime market) – rocked numerous financial institutions and severely impacted the real economy. This crisis was followed by a recession in the US and other countries[5,7,8].

The unemployment caused by the recession added to "structural unemployment on a global scale"[9] (p. 264), which is not a recent phenomenon when analyzed from the perspective of advanced capitalist countries. Indeed, unemployment is a permanent outcome of the global crisis of the capitalist system, having emerged as a necessary and increasingly severe aspect of a structural crisis[9,10].

Unemployment has been accompanied by worsening working terms and conditions, another capital reproduction strategy manifested in various forms: workforce commodification; poor management and work organization standards, resulting in extremely unsafe and insalubrious working conditions and employment relationships based on fear and abuse of power (moral harassment and discrimination created by outsourcing); the constant threat of unemployment; undermining of trade unions, social movements and struggles; and denial of well-established rights[11].

Working conditions and lack of work are also important determinants of health. Within a broader concept of health, population health is determined by social, cultural, political, and economic factors that extend beyond biological and ecological dimensions. Thus, by seeking to understand the social determinants of health, various studies have assessed trends in suicidal behavior related to economic crises and the association between this behavior and unemployment and other consequences of crises[12-23].

Considering that Brazil has been suffering an economic crisis since 2014, characterized by a drop in Gross Domestic Product (GDP) between 2014 and 2016, rising unemployment rates (2014 – 6.8%; 2015 – 8.5%; 2016 – 11.5%; 2017 – 12.7%)[24] and fiscal austerity policies, reducing the provision of social protection services[25,26], it is important to study the impact of high unemployment rates on suicide, which in turn is a key indicator of population health.

The aim of this study was therefore to estimate the suicide mortality rate in the Brazil population and compare rates among employed and unemployed persons prior to (2011 to 2013) and during (2014 to 2016) the economic crisis.

Ciência & Saúde Coletiva, 26(12):5869-5882, 2021

Methods

We conducted a mortality study based on secondary data using records of suicide deaths in the period 2011 to 2016. Only individuals aged 18 years and over were included in the sample.

This data is publicly available from the Mortality Information System (SIM/MS 2011-2016), which is part of the country's national health information system (DATASUS). Deaths are coded according the tenth revision of the International Statistical Classification of Diseases and Related Health Problems (ICD-10)[27]. The population data were obtained from the National Household Sample Survey (PNAD)[28] and Continuous National Household Sample Survey (PNAD Contínua)[29], which are publicly available on the Brazilian Institute of Geography and Statistics' (IBGE) website.

Considering that Brazil witnessed a drop in GDP[30] per capita and rise in unemployment between 2014 and 2016, constituting a recession, we used 2014 as the baseline date for beginning of the crisis, delimiting the study period into two specific periods: economic crisis (2014-2016) and prior to the crisis (2011-2013).

The concept of *working class* refers to individuals who sell their labor power to earn a living. However, it is important to highlight that official statistics confuse this concept, as the classification of *labor force* includes both *employed* and *unemployed* persons, and the category employed includes all persons who participate in economic activity, including people who sell their labor power (workers) and those who purchase this labor power (employers). This means that employers – owners of the means of production – appear together with workers[31].

The outcome variable (suicide) was defined according to the following ICD-10 primary cause (<primcaus>) of death codes: intentional self-harm (X60 to X84), poisoning of undetermined intent (Y10 to Y19) and sequelae of intentional self-harm (Y87.0). All other causes of death were classified as non-suicide. It is important to highlight that suicide by poisoning is underreported due to shortcomings in cause coding[32,33].

The variable occupation (<occup>) was the person's regular occupation recorded on the death certificate according to the codes used in the Brazilian Classification of Occupations (CBO/2002)[34]. Although included in the SIM/MS, the category unemployed (code 999994 defined by the DATASUS)[35] is not one of the occupations included in the CBO/2002[34]. Thus, since the death certificate only records "regular occupation" and not occupational status, the fact that the individual was unemployed often goes unrecorded[37].

Other factors potentially associated with suicide were also analyzed. These covariates comprised the following sociodemographic and economic characteristics: sex, age, race/skin color (white, black, yellow, brown and indigenous), marital status (single, married, widowed or divorced) and education level. Not all factors associated with risk of suicide were analyzed because the SIM data used in this study include only a limited number of variables.

Mortality was measured using the suicide mortality rate (MR) per 100,000 population among employed and unemployed persons, calculated by dividing the number of suicide deaths by the total number of employed and unemployed persons in the country. Suicide MR was calculated by occupational status, considering other covariates.

A descriptive analysis was conducted using absolute and relative frequencies. The analyses were performed using Stata version 12.0 (*Stata Corporation*, *College Station*, USA).

Results

A total of 62,950 suicide deaths were recorded during the study period, 30,493 of which occurred between 2011 and 2013 and 32,457 in the period 2014 to 2016. In both periods men accounted for the highest proportion of deaths: 79.19% prior to the crisis, and 79.91% during the economic crisis. The age groups that accounted for the highest proportion of deaths prior and during crisis were the 25-39 and 40-59 years groups, respectively (Table 1).

The proportion of suicide deaths was higher among white people in both periods, although the largest percentage change between the two periods was found among the indigenous group. With regard to "education level", people with at least eight years of formal education accounted for the highest proportion of suicides both prior to (26.05%) and during the crisis (31.30%) and also showed the largest percentage change (20.15%) between the two periods.

With regard to marital status, suicides as share of total deaths varied only slightly between the two periods across all categories. With regard to occupation, most of the study sample were recorded as having a "regular occupation". The

percentage change between the two periods in this group was + 1.49%. Although relatively few people were recorded as unemployed, this group showed the highest increase in number of suicide deaths between the periods (from 457 in the period 2011-2013 to 728 in the period 2014-2016) (Table 1).

Despite this increase, suicide MR was greater among people recorded as having an occupation than those whose occupation was recorded as unemployed in both study periods. During the period 2011-2013, the percentage change in suicide MR was + 4.3% among people recorded as having an occupation and + 51% in those recorded as unemployed. During the period 2014-2016, the suicide MR rose by 25.0% among people recorded as having an occupation and decreased by 43% among those recorded as unemployed. The highest suicide MR was in 2014 for people recorded as unemployed and 2016 for those recorded as having an occupation (4.31/100,000 and 6.89/100,000, respectively) (Graph 1).

In general, the male suicide MR was higher among men recorded as having an occupation than those recorded as unemployed. The highest suicide MR was in 2014 for men recorded as unemployed and 2016 for those recorded as having an occupation (11.46/100,000 and CM 10,39/100,000, respectively). During the period prior to the crisis, the suicide MR rose by 4.8% in men recorded as having an occupation and 54.5% in those recorded as unemployed. During

Table 1. Suicide deaths and percentage change in number of deaths between the two periods by sociodemographic and economic characteristics. Brazil, 2011-2016.

Variables	2011-2013			2014-2016		
	Deaths	Suicides N (%)		Deaths	Suicides N (%)	
	N (%)	Yes	No	N (%)	Yes	N
Total	3,365,335 (100)	30,493 (0.91)	3,334,842 (99.09)	3,613,041 (100)	32,457 (0.90)	3,580,584 (99.10)
Sex						
Female	1,458,354 (43.33)	6,341 (20.79)	1,452,013 (43.54)	1,584,828 (43.86)	6,513 (20.07)	1,578,315 (44.08)
Male	1,905,929 (56.63)	24,147 (79.19)	1,881,782 (56.43)	2,026,787 (56.10)	25,938 (79.91)	2,000,849 (55.88)
Ignored	1,052 (0.03)	5 (0.02)	1,047 (0.03)	1,426 (0.04)	6 (0.02)	1,420 (0.04)
Age group						
18 - 24 years	113,607 (3.38)	4,273 (14.01)	109,334 (3.28)	116,428 (3.22)	4,341 (13.37)	112,087 (3.13)
25 - 39 years	276,755 (8.22)	10,473 (34.35)	266,282 (7.98)	276,598 (7.66)	10,775 (33.20)	265,823 (7.42)
40 - 59 years	721,557 (21.44)	10,450 (34.27)	711,107 (21.32)	734.214 (20.32)	11.421 (35.19)	722.793 (20.19)
60 years and over	2,241,659 (66.61)	5,195 (17.04)	2,236,464 (67.06)	2,475,733 (68.52)	5,839 (17.99)	2,469,894 (68.98)
Race/skin color						
White	1,766.773 (52.50)	15,146 (49.67)	1,751,627 (52.53)	1,866,609 (51.66)	16,243 (50.04)	1,850,366 (51.68)
Black	263,665 (7.83)	1,768 (5.80)	261,897 (7.85)	277,245 (7.67)	1,735 (5.35)	275,510 (7.69)
Yellow	19,762 (0.59)	125 (0.41)	19,637 (0.59)	20,746 (0.57)	139 (0.43)	20,607 (0.58)
Brown	1,124,704 (33.42)	11,998 (39.35)	1,112,706 (33.37)	1,284,961 (35.56)	13,137 (40.48)	1,271,824 (35.52)
Indigenous	6,929 (0.21)	211 (0.69)	6,718 (0.20)	7,691 (0.21)	246 (0.76)	7,445 (0.21)
Ignored	183,502 (5.45)	1,245 (4.08)	182,257 (5.47)	155,789 (4.31)	957 (2.95)	154,832 (4.32)

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Table 1. Suicide deaths and percentage change in number of deaths between the two periods by sociodemographic and economic characteristics. Brazil, 2011-2016.

Variables	2011-2013			2014-2016		
	Deaths	Suicides N (%)		Deaths	Suicides N (%)	
	N (%)	Yes	No	N (%)	Yes	N
Education level						
No education	571,134 (16.97)	1,631 (5.35)	569,503 (17.08)	614,350 (17.00)	1,582 (4.87)	612,768 (17.11)
1 to 3 years of formal education	863,228 (25.65)	5,272 (17.29)	857,956 (25.73)	908,825 (25.15)	4,953 (15.26)	903,872 (25.24)
4 to 7 years of formal education	599,219 (17.81)	7,081 (23.22)	592,138 (17.76)	693,729 (19.20)	7,834 (24.14)	685,895 (19.16)
≥ 8 years of formal education	516,276 (15.34)	7,944 (26.05)	508,332 (15.24)	629,814 (17.43)	10,160 (31.30)	619,654 (17.31)
Ignored	815,478 (24.23)	8,565 (28.09)	806,913 (24.20)	766,323 (21.21)	7,928 (24.43)	758,395 (21.18)
Marital status						
Single	840,554 (24.98)	14,402 (47.23)	826,152 (24.77)	907,884 (25.13)	15,534 (47.86)	892,350 (24.92)
Married	1,173,125 (34.86)	8,627 (28.29)	1,164,498 (34.92)	1,219,026 (33.74)	9,050 (27.88)	1,209,976 (33.79)
Widowed	802,758 (23.85)	1,311 (4.30)	801,447 (24.03)	878,420 (24.31)	1,339 (4.13)	877,081 (24.50)
Divorced	179,378 (5.33)	2,094 (6.87)	177,284 (5.32)	211,537 (5.85)	2,306 (7.10)	209,231 (5.84)
Ignored	369,520 (10.98)	4,059 (13.31)	365.461 (10.96)	396,174 (10.97)	4,228 (13.03)	391,946 (10.95)
Regular occupation						
Employed	1,208,019 (35.90)	16,581 (54.38)	1,191,438 (35.73)	1,292,032 (35.76)	17,912 (55.19)	1,274,120 (35.58)
Unemployed	22,437 (0.67)	457 (1.50)	21,980 (0.66)	35,224 (0.97)	728 (2.24)	34,496 (0.96)

Source: SIM.

the crisis, the suicide MR increased by 21.6% in men recorded as having an occupation and dropped by 62.3% among those recorded as unemployed (Graph 2).

The female suicide MR was higher among women recorded as having an occupation than those recorded as unemployed throughout the whole study period (Graph 3). At the start of the period (2011), the suicide MR among women recorded as having an occupation and those recorded as unemployed was 1.77/100,000 and 0.63/100,000, respectively. During the crisis, the suicide MR increased 30.3% in women recorded as having an occupation and fell by 7.1% among those recorded as unemployed (Graph 3).

With regard to the recorded occupations of suicide cases, the majority of the individuals were agricultural workers (2011-2013: 23.17%; 2014-2016: 20.97%), followed by extractive industry and construction workers (2011-2013: 15.06%; 2014-2016: 14.81%), service workers (2011-2013: 13.43%; 2014-2016: 13.47%) and cross-functional role workers (2011-2013: 6.22%; 2014-2016: 6.40%) (Table 2).

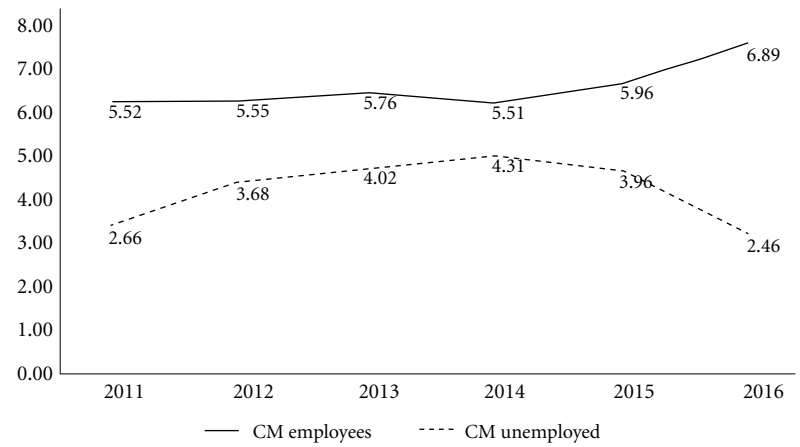
Discussion

Our findings show that the suicide MR was higher in men than in women. Studies in European countries conducted after 2008[38-40] and other studies in Brazil[41,42] have also reported that suicide is more common in men. The higher rate of suicide among men may be associated with fac-

tors such as impulsivity, aggressiveness, psychoactive substance use[43-45], and use of more lethal suicide methods[46,47].

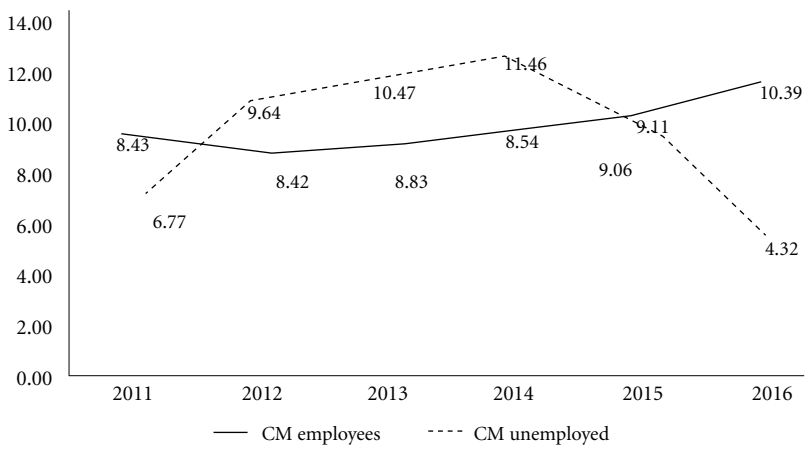
We observed a negative percentage change in suicide MR during the period of crisis in people recorded as unemployed. In a study examining the relationship between suicide rates and economic indicators (GDP per capita and unemployment rates) in major urban centers in Brazil between 2006 and 2015, Asevedo et al. found a correlation between a reduction in unemployment rates and higher suicide rates[48]. Another study in Brazil, undertaken by Bando et al. in 2010, found higher suicide rates in regions with high per capita income and lower rates of unemployment, suggesting that suicide is more common in regions with higher quality of life[41]. These results are consistent with our findings. However, these studies used aggregate data[41,48], which is a limitation because this type of data does not show the effect of unemployment at the individual level.

Machado *et al.* on the other hand showed that income inequality is a determinant of suicide in



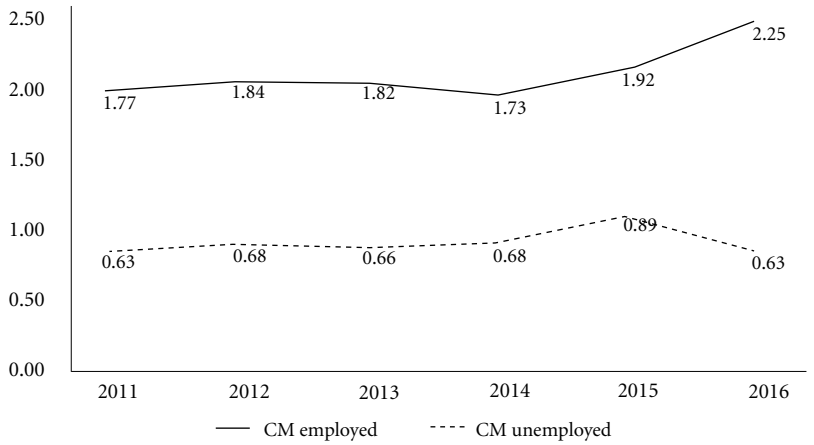
Graph 1 . Suicide mortality rate by occupational status. Brazil, 2011-2016.

Source: SIM and IBGE.



Graph 2 . Suicide mortality rate in employed and unemployed men. Brazil, 2011-2016.

Source: SIM and IBGE.



Graph 3 . Suicide mortality rate in employed and unemployed women. Brazil, 2011-2016.

Source: SIM and IBGE.

Brazil. They showed that the increase in suicide rates between 2000 and 2011 was lower than in previous periods, attributing this effect to a reduction in social inequality, fall in the proportion of individuals who did not complete primary education, and rise in income[49].

Studies analyzing the relationship between socioeconomic indicators and suicide suggest that unemployment resulting from economic crisis and fiscal austerity measures contributes to an increase in suicide rates[13,15,16,20,25,38,39,50,51]. Our results however indicate that people recorded as employed are more exposed to the risk of dying by suicide than those recorded as unemployed.

This increased risk of dying by suicide among people recorded as having an occupation may be related to the changes that have taken place in the world of work in recent decades. Psychic suffering linked to work is a direct result of the destructive logic of capitalism, which fails to limit precarious employment, exploiting the workforce to the extreme, while shortening time of use and making workers disposable (since many workers end up being left with a permanent incapacity for work)[52].

The global dissemination of work and production reorganization processes, combined with the expansion of different forms of precarious work, such as the growth in outsourcing, moral harassment, management by objectives, and stripping away of workers' rights, is related to the increasing incidence of mental distress among workers[52] and, possibly, increased risk of death by suicide.

It is worth highlighting two other similarities with other studies: the increase in suicide MR during the period of crisis[14,20,38,53-57] and the high proportion of suicides among agricultural workers[58-60]. In a study in Rio de Janeiro, Meyer et al. showed that SM was higher in people living in rural areas, particularly among agricultural workers. The findings suggest that workers living in areas of intensive use of pesticides were at greater risk of SM, which may be explained by increased risk of depression and attempted suicide due to continuous exposure to these neurotoxic compounds[60].

However, our findings are not consistent with the results of studies showing that risk of suicide was greater among businesspersons and high-ranking employees during the economic crisis[54,61].

The difference between our findings and those of other studies regarding unemployment may be related to the use of different methods. In this respect, it is important to stress that the SIM data used in the present study focus on regular occupation rather than occupational status.

Suicide is a complex, multi-causal phenomenon determined by a diverse range of social factors, including the super-exploitation of labor[1] (e.g.: employee performance appraisals, increas-

Table 2. Occupation of suicide cases recorded in the Mortality Information System. Brazil, 2011-2013 and 2014-2016.

2011-2013				2014-2016			
	Recorded occupation	**N = 16,581**	**%**		**Recorded occupation**	**N = 17,912**	**%**
1º	Agricultural workers	3.841	23.17	**1º**	Agricultural workers	3.756	20.97
2º	Extractive industry and construction workers	2.497	15.06	**2º**	Extractive industry and construction workers	2.652	14.81
3º	Service workers	2.226	13.43	**3º**	Service workers	2.413	13.47
4º	Cross-functional role workers	1.031	6.22	**4º**	Cross-functional role workers	1.147	6.40
5º	Farmers	707	4.26	**5º**	Administrative technicians without a degree	824	4.60
6º	Managers	702	4.23	**6º**	Farmers	784	4.38
7º	Administrative technicians without a degree	612	3.69	**7º**	Managers	710	3.96
8º	Salespersons and business service providers	610	3.68	**8º**	Salespersons and business service providers	691	3.86
9º	Metal and composites material workers	440	2.65	**9º**	Metal and composites material workers	482	2.69
10º	Clerks	387	2.33	**10º**	Clerks	387	2.16
11º	Mechanical maintenance and repair workers	262	1.58	**11º**	Biological sciences, health professionals and related areas	302	1.69
12º	Biological sciences, health professionals and related areas	240	1.45	**12º**	Social and human science professionals	284	1.59
13º	Social and human science professionals	240	1.45	**13º**	Mechanical maintenance and repair workers	265	1.48
14º	Workers in the textile, tanning, clothing and graphic arts industries	215	1.30	**14º**	Workers in the textile, tanning, clothing and graphic arts industries	264	1.47
15º	Education professionals	201	1.21	**15º**	Physical and chemical sciences and engineering professionals without a degree	217	1.21
16º	Physical and chemical sciences and engineering professionals without a degree	181	1.09	**16º**	Education professionals	215	1.20

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ingly demanding productivity targets, moral harassment etc.), which in turn adversely affects workers' health and contributes to psychic suffering.

Finally, it is important to highlight two methodological limitations of the present study. First, we did not include other well-documented suicide risk factors. The second limitation is the low level of data completeness (for example, race/skin color, education level, marital status and occupational status) and inconsistencies in the variable "regular occupation" as a measure of occupational status.

Conclusions

This study investigated the relationship between unemployment (as recorded in the field "regular occupation" in the SIM) and suicide, comparing two periods: prior to (2011-2013) and during (2014-2016) the economic crisis. We did not observe an increase in suicide MR among people recorded as unemployed, unlike in other countries, notably Greece after 2008. However, this result does not mean that unemployment is a protective factor against suicide. Rather, it may suggest that the working conditions imposed by the *new*

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2011-2013				2014-2016			
	Recorded occupation	**N = 16,581**	**%**		**Recorded occupation**	**N = 17,912**	**%**
17º	Customer service workers	178	1.07	**17º**	Customer service workers	196	1.09
18º	Military police	172	1.04	**18º**	Communicators, artists and religious professionals	188	1.05
19º	Communicators, artists and religious professionals	157	0.95	**19º**	Food, beverage and tobacco manufacturing workers	187	1.04
20º	Biological, biochemical, health sciences technicians and related areas without a degree	154	0.93	**20º**	Exact sciences, physics and engineering professionals	186	1.04
21º	Food, beverage and tobacco manufacturing workers	142	0.86	**21º**	Biological, biochemical, health sciences technicians and related areas without a degree	180	1.00
22º	Workers in the woodworking and furniture industries	141	0.85	**22º**	Legal professionals	178	0.99
23º	Other maintenance and repair workers	140	0.84	**23º**	Military police	169	0.94
24º	Legal professionals	137	0.83	**24º**	Workers in the woodworking and furniture industries	169	0.94
25º	Exact sciences, physics and engineering professionals	127	0.77	**25º**	Fishers and forest extractivists	146	0.82
26º	Fishers and forest extractivists	115	0.69	**26º**	Other maintenance and repair workers	134	0.75
27º	Production, harvesting, treatment and distribution operators (energy, water and utilities)	104	0.63	**27º**	Senior and government officials	130	0.73
28º	Senior and government officials	98	0.59	**28º**	Production, harvesting, treatment and distribution operators (energy, water and utilities)	122	0.68
29º	Steel plant and construction material workers	84	0.51	**29º**	Steel plant and construction material workers	76	0.42
30º	Lay and high school teachers	69	0.42	**30º**	Lay and high school teachers	69	0.39
31º	Directors of companies and organizations (except public companies and organizations)	68	0.41	**31º**	Directors of companies and organizations (except public companies and organizations)	64	0.36

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morphology of labor (for example, stripping away of workers' rights, informality and generally precarious working conditions) expose employed persons to a greater risk of dying by suicide than the unemployed.

The consequences of the social metabolism of capital for the world of work have effects on people's way of life, which materialize in the direct relationship between work and health, leading to physical and/or mental illness among workers around the world.

In view of the above, it is not enough to think about strategies to mitigate the crisis of capitalism, minimizing its impacts on people's health. Transforming this reality poses the following challenge: to create a form of social organization that eliminates the super-exploitation of labor, dismantling the process of capital accumulation through measures that break with the logic of capitalism and contribute to the emancipation of humanity and planetary sustainability.

Table 2. Occupation of suicide cases recorded in the Mortality Information System. Brazil, 2011-2013 and 2014-2016.

2011-2013				2014-2016			
	Recorded occupation	**N = 16,581**	**%**		**Recorded occupation**	**N = 17,912**	**%**
32º	Jewelers, glassmakers, ceramists and related areas	44	0.27	**32º**	Agricultural and forestry mechanization workers	61	0.34
33º	Electronics manufacturing workers and installers	40	0.24	**33º**	Cultural, communications and sports services technicians without a degree	43	0.24
34º	Agricultural and forestry mechanization workers	40	0.24	**34º**	Jewelers, glassmakers, ceramists and related areas	42	0.23
35º	Cultural, communications and sports services technicians without a degree	37	0.22	**35º**	Polymaintenance workers	37	0.21
36º	Members of the armed forces	29	0.17	**36º**	Transport services technicians without a degree	28	0.16
37º	Polymaintenance workers	27	0.16	**37º**	Workers in continuous process and other industries	24	0.13
38º	Workers in continuous process and other industries	20	0.12	**38º**	Electronics manufacturing workers and installers	23	0.13
39º	Military firefighters	18	0.11	**39º**	Members of the armed forces	18	0.10
40º	Transport services technicians without a degree	15	0.09	**40º**	Military firefighters	16	0.09
41º	Multipurpose technicians	11	0.07	**41º**	Other technicians without a degree	11	0.06
42º	Other technicians without a degree	8	0.05	**42º**	Polyscientific researchers and professionals	11	0.06
43º	Precision and musical instrument and device assemblers	6	0.04	**43º**	Multipurpose technicians	5	0.03
44º	Polyscientific researchers and professionals	4	0.02	**44º**	Pulp and paper manufacturing plant and machinery workers	3	0.02
45º	Directors and managers in health, education, cultural, social or personal services companies	3	0.02	**45º**	Precision and musical instrument and device assemblers	2	0.01
46º	Pulp and paper manufacturing plant and machinery workers	1	0.01	**46º**	Directors and managers in health, education, cultural, social or personal services companies	1	0.01

Source: SIM.

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Collaborations

AAM Barreto was responsible for study conception, participated in data collection, analysis and interpretation, and in the discussion of results, and wrote the manuscript as lead author; LEPF Souza was responsible for study conception, participated in data interpretation and the discussion of results, and collaborated with the writing and critical review of the manuscript.

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Article submitted 20/04/2020
Approved 21/07/2021
Final version submitted 23/07/2021

Chief editors: Romeu Gomes, Antônio Augusto Moura da Silva