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When the only solution is death: suicide among male and female workers in Brazil

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Abstract *An ecological study that assessed the frequency of suicides in Brazil in the 14-65 age group, with data reported on the MIS. Objectives: to describe the time-trend of suicides during the period 2010-19, and evaluate the socio-occupational profile of occurrences, exploring aspects connecting suicide and work. We analyzed the percentage distribution, proportional percentage variation (PPV) estimates, and mortality rates (MRs), with population data from IBGE, RAIS, and occupation surveys. Between 2010-19, suicides showed a sustained upward trend (global PPV = 60.1%) which was higher in men (PPV = 62.8%) than women (PPV = 51.4%). The MR was 8.1 suicides/100,000 people of a working age. The risk of suicide was 3.5 times higher in men than women. In 2019, the MR among self-declared indigenous people (19.5/100,000) and agricultural workers (21.7/100,000) is highlighted. Hanging was the most commonly used method (71.4%). The evolution of suicide and accentuated vulnerability in the self-declared indigenous population and agricultural workers is of great concern. The expansion of affected occupations is also highlighted, indicating its dissemination and relevance for attention to characteristics of surveillance work and the control of suicide.*

Key words *Suicide, Occupational health, Occupational health surveillance, Health of the rural population, Mental health*

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Introduction

There are 800,000 victims of suicide per year around the world. Estimates indicate nine suicides per 100,000 inhabitants, with one death every 40 seconds[1]. Lesotho, in Southern Africa, currently holds first place, with 87.5/100,000, replacing South Korea (21.2/100,000) which had held this position for a significant period[1]. In 2019, despite being the 15th country in the Americas, and holding 124th position in the world, Brazil was second in numbers of cases (14,540 cases), only behind the United States (53,099 cases) on the American continent. Brazil figures as the 8th country in the world in absolute numbers[1]. In twenty years, the country has accumulated approximately 170,000 cases[2] (6.4/100,000 per year).

Statistics, although underestimated in relation to real events, indicate an upturn in suicide, illustrating the need for measures to tackle prevention[1]. Therefore, it is a public health problem which must feature on health agendas, requiring the development of monitoring protocols and public policies to decrease its occurrence[1].

Actions to tackle this issue are established in the goals of the 2030 Agenda for Sustainable Development (Ensuring healthy lives and promoting well-being for all at all ages). For Brazil, in particular, Target 3.4 directly discusses suicide prevention in the country[3]. As a consequence, Law 13.819/2019 – National Policy to Prevent Self-Harm and Suicide, was established as a permanent strategy to prevent cases and their determinants[4].

An important strategy to tackle suicide is related to the production of knowledge of associated factors, where epidemiology makes a significant contribution, enabling an analysis of its distribution, and identification of the characteristics which demarcate health inequalities. Studies have identified gender differences, with women being more prone to suicidal ideation, while men demonstrated a higher occurrence of suicide [1]. This data indicates the need for attention to the signals, which may indicate vulnerability to suicide, as early as possible [1,2,5-7].

Ethnic/racial, cultural, and behavioral issues also form important indicators of the event[2,8,9]. Low income, a lack of social support, isolation, and loneliness have an impact on various emotional problems, producing, or exacerbating, behavioral and mental disorders associated with the context of suicide[2,10,11]. The complexity of the phenomena associated with suicide require a far-reaching and multidimensional approach, with the incorporation of aspects of different dimensions of life. Work features among these.

Essential for ways of living and producing life, work plays a decisive role in the health-disease process. Studies by Dejours and Bègue[11] confirm that a set of factors related to the organization of work have repercussions in daily life and the conditions which drive workers to suicidal events. Precarious work, whether characterized by a low income or productive logical which alienates workers and makes them disposable, directly impacts the worker's quality of life and produces a context of insecurity, suffering, and, consequently, constitutes conditions that may evolve into attempted suicide[11,12,13,14]. World Health Organization (WHO) data demonstrates that suicide is the fourth cause of death among young adults around the world[1], reinforcing the emergence of the problem in this (economically active) population.

This study aims to describe the frequency of suicides in workers in Brazil, using data notified on the Mortality Information System (Sistema de Informação de Mortalidade – SIM). Work-related aspects, with an emphasis on occupation estimates, was analyzed from the data available, in the light of literature, and social and critical epidemiology. The study had the following aim: (a) to analyze the time trend for suicide in the period 2010-2019; and (b) to evaluate the socio-occupational profile of suicide in Brazil, exploring estimates by occupation in 2019.

Method

This is an ecological, descriptive study, considering the distribution and time-trend of suicides between 2010 and 2019. It also includes a detailed analysis of 2019 data, estimating the mortality rates by sociodemographic and occupational characteristics. The suicide cases were taken from the SIM, considering external causes, and accessed through the Collaborative Center to Monitor Damages to Workers' Health (Centro Colaborador da Vigilância aos Agravos à Saúde do Trabalhador). External causes are represented by damage to health, whether intentional, or otherwise, of an exogenous nature.

We used the International Classification of Diseases (ICD), version 10, to identify the suicide cases, selecting the codes which include the event of interest, within the interval X60 to X84. We then identified the cases of individuals aged between 14 and 65 (economically active population

– EAP age range). Lastly, the cases of individuals with an identified Brazilian Occupational Classification (Classificação Brasileira de Ocupações - CBO) field were included in this study, since this represents the only means that attributes having an occupation on the database (Figure 1). The cases in which the CBO was not identified were not incorporated into the analyses. The EAP with the CBO field identified was considered as working.

With the goal of evaluating the time-trend, we estimated the frequencies in the above-mentioned period, stratified by gender. We analyzed data from 2019 to develop a descriptive analysis of the distribution of occurrences according to sociodemographic and occupational variables. The analysis of this year included the following variables: gender, age range, race/color, civil status, level of education, type of job, and suicide method. The analysis estimated the suicide frequencies (percentage distribution and mortality rates) for the groups with the highest occurrences. The professional categories used in the Annual Social Information Report (RAIS) structured the stratification by professional cluster. The classification identified the occupation on a case by case basis, and its allocation to the job category to which the case belonged. The frequencies of cases considered missed and ignored to dimension the notification problems were also registered.

The annual rates were estimated for the time series, and the proportional percentage variations (PPV) were calculated for the entire period analyzed and two specific 5-year sub-periods (2010-14 and 2015-19) to detail their evolution and verify behavior by sex.

We used population data for people aged between 14 and 65 (by gender, age rage, marital status, level of education, and race/color), to calculate the mortality rates, based on the Brazilian Institute of Geography and Statistics (IBGE), Automatic Recovery System (SIDRA), with continuous National Household Sample Survey (PNAD) data, through tables 6407, 6408, and 1624. We calculated the projections for the strata in which direct data identification was unavailable using information from the last two censuses and the geometric population growth rate method, orientated by the Unified Health System of Brazil IT Department (DATASUS). The databases used for the population occupational cluster data analyzed were as follows: IBGE, RAIS, the 2019 Brazilian Yearbook of Public Safety, Inter-Union Department of Statistics and Socioeconomic Studies (DIEESE), Institute of Applied Economic Research (IPEA), National Council of Justice (CNJ), and Order of Attorneys of Brazil (OAB) data.

Results

Between 2010 and 2019, 1,510,004 deaths by external causes occurred in Brazil, which were registered on the SIM. Of these, 112,164 (7.4%) were by suicide, corresponding to a mortality rate (MR) of 5.6/100,000 inhabitants. When individuals aged between 14 and 65 with the CBO identified were considered, 76,808 suicides (68.4% of the total suicides) were registered, with the MR= 11.1/100,000. When considering the sex of the age range analyzed, 59,219 suicides occurred in men (17.8/100,000), and 17,587 among women (4.9/100,000) - two of these individuals did not have their sex defined. The risk of suicide in this period was 3.5 times higher for men.

Time-trend of suicide in workers in Brazil (2010-19)

Data analysis of the 14-65 age range, in which the CBO was identified and classified, demon-

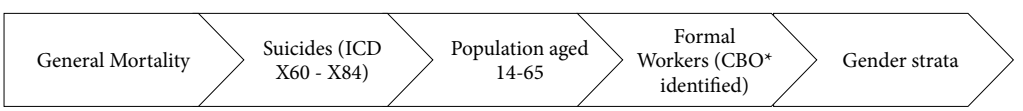


Figure 1. Flowchart of the selection of suicide cases in workers in Brazil, from the MIS.

ISC-UFBA/CGSAT-MS/SIM (http://www.ccvisat.ufba.br/bases-de-dados/); BOC identified through the Ministry of Labor and Employment (MTE) link: http://www.mtecbo.gov.br/cbosite/pages/downloads.jsf.

Source: Authors.

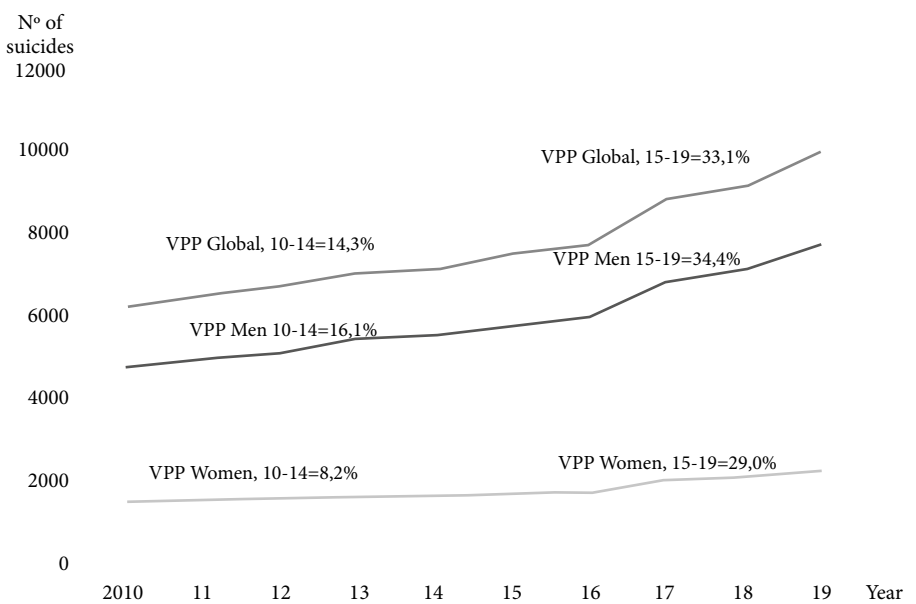
strated an upward time-trend during the period 2010 to 2019. The global PPV had a 60.1% increase in suicides, with a PPV of 62.8% for men, and 51.4% for women. The PPV was also estimated in two periods (2010-14 and 2015-19), in order to compare the trend in distinct sub-periods. There was a 14.3% growth for the period 2010-14, and 33.1% between 2015-19, demonstrating an expressive increase from 2016 (Graph 1).

Sociodemographic characteristics of suicide in workers in Brazil (2019)

We conducted a more detailed analysis of the situation for 2019. In this year, 142,800 deaths registered as external causes; 13,520 of these were by suicide (9.5% of the total). The MR for suicide was 6.4/100,000. In the population aged 14 to 65, 11,952 suicides were notified (88.4% of the total suicides for the year), corresponding to a MR of 8.1/100,000. In this population, with the CBO identified (considered workers), were 9,977 suicides (MR = 6.7/100,000); 7,732 of these in men (77.5% of cases, with the MR = 10.6/100,000), and 2,244 in women (MR = 3.0/100,000). The risk of suicide in workers remained 3.5 times higher for men (Table 1).

Considering the sociodemographic profile of suicide in this year, the percentage of cases was higher in the 30 to 49 age range in general; however, the risk was greater for individuals aged between 50 and 65 (higher MR). More deaths occurred among single people (60.1%). However, when evaluating mortality by marital status, separated or divorced people presented the highest rates (7.5/100,000). For the level of education, the highest percentage occurred for those who had studied up to high school level (40.6%). However, the MR was higher in the group with between four and seven years of study (Elementary and Middle School), with a highlight on men, with 31.9/100,000.

The MRs for the population self-reported as indigenous were the highest: both in general (19.5/100,000), and by gender (33.7/100,000 for men, and 5.2/100,000 for women). When the ra-



Total	6230	6486	6711	7047	7119	7494	7733	8838	9173	9977
Men	4748	4961	5105	5451	5514	5754	6012	6835	7107	7732
Women	1482	1525	1606	1596	1604	1740	1721	2003	2066	2244

Graph 1. Suicide cases and PPV in workers in Brazil (2010-2019).

Source: Authors, based on SIM – Mortality Information System data.

Table 1. Distribution (%) of suicide cases and mortality rates (MRs) per 100.000, in accordance with sociodemographic data on workers in Brazil. MIS, 2019.

Characteristics	N	%	Global MR	Men			Women		
				n	%	MR	n	%	MR
Suicides*	9977	100.0	6.7	7,732	77.5	10.6	2,244	22.5	3.0
Age Range*									
14 to 29 years old	3,285	32.9	6.2	2,486	32.2	9.2	799	35.6	3.0
30 to 49 years old	4,315	43.3	6.9	3,354	43.4	11.0	960	42.8	3.0
50 to 65 years old	2,377	23.8	7.3	1,892	24.4	12.4	485	21.6	3.0
Race/color**									
Black/brown*	4,918	49.8	5.9	3,875	50.6	9.4	1,042	46.9	2.5
White	4,841	49.0	7.7	3,682	48.1	12.1	1,159	52.2	3.6
Indigenous	98	1.0	19.5	85	1.1	33.7	13	0.6	5.2
Yellow	19	0.2	1.2	12	0.2	1.4	7	0.3	0.9
Marital status***									
Married/ civil partnership	2,905	30.8	6.0	2,259	31.0	9.3	645	30.1	2.6
Single	5,668	60.1	6.9	4,461	61.2	10.6	1,207	56.4	3.0
Separated	699	7.4	7.5	487	6.7	12.4	212	9.9	3.9
Widows/widowers	157	1.7	2.0	81	1.1	5.2	76	3.6	1.2
With partners									
Yes	2,905	30.8	6.0	2,259	31.0	9.3	645	30.1	2.6
No	6,524	69.2	6.5	5,029	69.0	10.6	1,495	69.9	2.9
Level of education***									
None	328	4.0	5.2	260	4.1	8.5	68	3.6	2.1
Completed 1 to 3 years (basic 1)	1,027	12.4	2.7	868	13.6	4.5	159	8.4	0.9
Completed 4 to 7 years (basic 2)	2,384	28.9	19.9	1,940	30.5	31.9	444	23.4	7.5
Completed 8 to 11 years (high school)	3,357	40.6	6.9	2,528	39.7	10.8	828	43.6	3.3
12 years or more (higher education)	1,168	14.1	4.4	770	12.1	6.8	398	21.0	2.7

Rate calculated from LivroIDB (Indicators and Basic Data) guide: Population growth rate – A3 (http://tabnet.datasus.gov.br/tabdata/LivroIDB/2edrev/a03.pdf) (n=number of cases; %= distribution percentage calculated for men and women).

* Loss of data: 1 record without identification of sex (0.1% of losses); **101 records for race/color (1% of losses); ***548 ignored or missing records (5.5% of losses); ****1,713 ignored or missing records (17.2% of losses).

Source: Authors, based on SIM – Mortality Information System data.

tios were observed, suicide was more prominent in black people, both in general, and in men, but was reversed for women (Table 1).

Mortality among agricultural and fishing workers attracts attention, with the register of 1,803 cases, equivalent to 4.9 suicides per day in 2019. The MR was 21.7/100,000 workers for this sector. Other professional categories can be highlighted, including: security force workers (20.4/100,000); health (13.9/100,000); civil construction (13.3/100,000); transport (including drivers), warehouse and post office workers; domestic services; education; commerce; judiciary; financial and the administrative sector; and industry. Other workers were sprayed in the 'workers in general' category (9.5% of the total). Among these, a part considered self-employed, is usually allocated to industries (such as specialized technical and engineering services). However, they were not included in this category in this study, which probably underestimates the industrial worker estimate (Table 2).

In 2019, the daily average of worker deaths was 27.3 suicides per day. The data analyzed systematized information on the thirteen most affected occupational groups, totalizing 6,295 suicides (63.1%). Most suicides occurred among agricultural and fishing workers (20.9% and

8.4%, respectively) for both men and women. Besides these workers, among women, health workers can also be highlighted (7.2%), occupying second position. It is important to emphasize that in the occupational cluster process, the CBO codes of 2,732 cases (27.4%) were not identified, indicating a possible problem with records in this field. In other words, even in cases with a completed CBO, a high percentage of codes without a correspondence identified in the MTE CBO table was observed. We also highlight that this problem was more expressive for women, totalizing 50.6% of registered cases – more than double those observed among men.

The method most commonly used for suicide was hanging (71.4%), followed by gunshots (6.9%), and jumping from a high place (3.5%). Hanging (74.7%), followed by gunshots (8.0%) prevailed for men. For women, although hanging (60.2%) prevailed, higher percentages were observed for other methods, such as self-induced intoxication, and when the various types are added together, they reached 19.1%, and jumping from a high place (6%) (Table 3).

When comparing men and women for each method, a higher percentage among men for all types of method used was observed, except for self-induced intoxication due to non-specified

Table 2. Number, percentage (n) and mortality rates (MRs) of the suicides registered on the SIM, according to the most affected occupational groups. Brazil, 2019.

Occupation Category	N	%	Global MR	Men		Women	
				n	%	n	%
Agriculture, cattle-raising, forest production, fishing and aquaculture	1,803	18.1	21.7	1,614	20.9	189	8.4
Security force workers (federal, military and civil police, firemen, prison officers, national forces, watchmen, and guards)	271	2.7	20.4	254	3.3	17	0.8
Health workers	289	2.9	13.9	128	1.7	161	7.2
Construction	929	9.3	13.3	924	12.0	4	0.2
Transport (including drivers), warehouses and post office	381	3.8	7.6	377	4.9	4	0.2
Domestic services	423	4.2	6.8	292	3.8	131	5.8
Education workers (teachers, educators, instructors, and tutors)	135	1.4	5.5	62	0.8	73	3.3
Commerce, repair of motor vehicles and motorcycles	1,002	10.0	5.4	862	11.1	140	6.2
Judiciary workers (lawyers, attorneys, prosecutors, judges, technical analysts, and legal officials)	77	0.8	4.4	57	0.7	20	0.9
Information, communication and financial, real estate, professional and administrative activities	434	4.4	4.0	305	3.9	129	5.7
Industry in general	408	4.1	3.3	376	4.9	32	1.4
Accommodation and food	84	0.8	1.5	57	0.7	27	1.2
Cultural workers	59	0.6	1.1	42	0.5	17	0.8
Workers in general (all the other sectors)	950	9.5	-	787	10.2	163	7.3
Ignored or typing error	2,732	27.4	-	1,595	20.6	1,137	50.6

MR: Mortality rate per 100,000.
n = number of cases; % = distribution percentage calculated for men and women.
Bases for MR calculation (denominators): Brazilian Public Safety Yearbook (2019) and Fenavist (National Federation of Security and Transport of Valuables Companies) for security force workers. (https://forumseguranca.org.br/publicacoes/profissionais-de-seguranca-publica/ and https://fenavist.org.br/dados-do-anuario-brasileiro-de-seguranca-publica-evidenciam-os-efeitos-da-pandemia-sobre-o-segmento-de-seguranca-privada/). CNJ and OAB for legal workers (https://www.cnj.jus.br/wp-content/uploads/conteudo/arqu ivo/2019/08/justica_em_numeros20190919.pdf and https://www.oab.org.br/noticia/59992/brasil-tem-1-advogado-a-cada-164-habitantes-cfoab-se-preocupa-com-qualidade-dos-cursos-juridicos); RAIS-2019 for education and health (http://pdet.mte.gov.br/images/RAIS/2019/2-Sum%C3%A1rio_Executivo_RAIS_2019.pdf); IBGE Table 5434 for the other categories (https://sidra.ibge.gov.br/tabela/5434).

Source: Authors, based on SIM – Mortality Information System data.

medication and anti-seizure drugs and sedatives – the method in which the percentage among women predominated (53.0% versus 47.0%; and 64.0% versus 36.0%, respectively) (data not presented in Table 3).

On account of the emphasis on deaths in agricultural and fishing workers, we analyzed the sociodemographic characteristics by sex. An even higher proportion of cases was demonstrated among men (89.5%) (Table 4). Distribution by race/color presented a higher concentration among black people (black/brown), which represented 63.0% of the cases in this occupation. A higher percentage of cases at lower levels of education (77.1% had up to high school level) was also observed. Hangings also predominated (75.3%), followed by gunshots (9.0%). Self-induced intoxication by pesticides (4.5%) is also highlighted, in third position, which, if added to self-induced intoxication with biological substances and chemical products (in which agrochemicals may be inserted), totaled 8.4%. When marital status was analyzed, we observed that a higher proportion of suicides occurred among single men (54.6%); however, the highest percentage among women was registered for those who were married (50.3%) (Table 4).

Discussion

The data demonstrated a time-trend of an upturn in suicides during the period studied for both sexes. The PPV in the two periods (2015-19 and 2010-14) showed that the increase was more expressive in the latter period, which indicates that not only the event maintained a tendency for growth, but this has increased progressively in recent years. This appears to indicate a profile of a truly upcoming epidemic. Clearly, men are the most affected, representing approximately 80% of the cases. However, we would like to register that the PPV increase among women from the first to the second sub-period showed a greater intensity than in men – indicating a warning signal for surveillance. Gender differences for mental suffering are historically consolidated in literature, with greater frequency of mental disorders among women, and a higher occurrence of suicides among men[2,5-7]. Suicidal ideation, for example, is more prevalent among women[1,2,5-7], while suicide is higher in men[1]. In this study, 3.5 suicides in men were observed for one suicide in women. This difference is close to global estimates (9.0/100,000 in men and 2.3/100,000 in women)[1]. This data forms a gender paradox: Which factors may explain the fact that, apparently, women committed less suicides, since they idealize it more frequently?

Table 3. Main suicide methods in workers in Brazil (2019).

Main suicide methods in workers in Brazil (2020)	N	%	Men n	%	Women n	%
Hanging, strangulation and suffocation*	7,125	71.4	5,774	74.7	1,350	60.2
Gunshot	684	6.9	617	8.0	67	3.0
Jumping from a high place	349	3.5	214	2.8	135	6.0
Self-induced intoxication by medication and biological, non-specified substances	296	3.0	139	1.8	157	7.0
Self-induced intoxication by pesticides	220	2.2	149	1.9	71	3.2
Self-induced intoxication by anti-seizure drugs [anti-epileptic], sedatives, hypnotic, anti-Parkinson's and psychotropic substances	211	2.1	76	1.0	135	6.0
Self-harm by unspecified means	197	2.0	141	1.8	56	2.5
Self-harm by a sharp or penetrating object	149	1.5	121	1.6	28	1.2
Self-induced intoxication by chemical products and non-specified harmful substances	140	1.4	75	1.0	65	2.9
Other method of death**	606	6.1	426	5.5	180	8.0

n = number of cases; % = percentage distribution calculated for men and women; * An individual not identified by sex (0.1% loss).
** Another 15 suicide methods were identified.

Source: Authors, based on SIM – Mortality Information System data.

Table 4. Distribution (%) of the sociodemographic characteristics of suicide cases of agricultural and fishing workers in Brazil. SIM, 2019.

Characteristics	N	%	Men		Women	
			n	%	n	%
Agricultural and Fishing Workers	1,803	100.0	1,614	89.5	189	10.5
Age Range						
14 to 29 years old	408	22.6	367	22.8	41	21.7
30 to 49 years old	837	46.4	747	46.3	90	47.1
50 to 65 years old	558	31.0	499	30.9	59	31.2
Race/Color*						
Black/brown	1,138	63.0	1018	63.7	120	63.8
White	598	33.2	534	33.4	64	34.1
Indigenous	49	2.7	45	2.8	4	2.1
Yellow	2	0.1	2	0.1	0.0	0.0
Marital Status**						
Married/civil partnership	686	38.0	597	39.7	89	50.3
Single	885	49.1	819	54.6	66	37.3
Widow(er)	26	1.4	18	1.2	8	4.5
Divorced	81	4.5	67	4.5	14	7.9
Level of education***						
No access to school	177	9.8	154	12.0	23	14.9
Completed 1 to 3 years (basic I)	394	21.9	350	27.4	44	28.6
Completed 4 to 7 years (basic II)	523	29.0	470	36.8	53	34.4
Completed 8 to 11 years (high school)	295	16.4	264	20.6	31	20.1
Completed 12 or more years (higher education)	44	2.4	41	3.2	3	2.0
Main suicide methods****						
Hanging, strangulation and suffocation	1,358	75.3	1,227	75.4	131	74.4
Gunshot	162	9.0	155	9.5	7	4.0
Self-induced intoxication by pesticides	81	4.5	70	4.3	11	6.3
Self-induced intoxication with medication and biological substances	39	2.2	23	1.4	16	9.1
Self-induced intoxication by chemical products and unspecified harmful substances	31	1.7	25	1.6	6	3.4
Other means	132	7.3	127	7.8	5	2.8

n = number of cases; % = percentage distribution calculated for men and women.
Loss of data: *16 missing records (0.9% loss); **125 missing or ignored records (6.9% loss); ***370 missing or ignored records (20.5% loss); ****Another 15 methods were used as a means of suicide
.
Source: Authors, based on Mortality Information System – SIM data.

These differences are evident when the dimensions that structured the context of suicide are analyzed, such as ideation, planning, and attempts of the act. O'Connor and Kirtley[15] put forward an explanatory model for the processes which culminate in suicide, presenting impulsiveness as the determining factor for the effectiveness of the attempt. This condition, of a sudden, thoughtless action, is behavior mostly associated with men. In stressful situations, male suffering is commonly contained and silenced, which favors realization of a more violent, unconsidered, and all-consuming action at its climax. Thus, impulsiveness is associated with fear, and dread that their suffering may be seen, strengthening the idea that actual death is preferred to symbolic death, and the image of a weak, suffering man. This assumption is more concrete when observing data on suicide methods, in which methods of a less violent potential predominate among women, such as self-induced intoxication. Therefore, aspects of the social construction of male and female characteristics which are acceptable, or not, may assist in understanding this apparent paradox.

The mortality rate was higher among separated and single people, mainly among men. Studies indicate special concern with aspects related to failures, or insufficiencies, in the support received from friends, family members, and work colleagues. Failures in these interactions may produce feelings of isolation, and a greater propensity to loneliness, fostering an increased risk of alcoholism, mental suffering, and suicide[16,17]. Another condition which attracts attention is education levels. In Brazil, 85.9% of cases occurred among people with low or average levels of education, as demonstrated in Brazilian studies[18]. In world publications, lower levels of education prevail as a risk factor for suicide[19,20]. The education level modulates a series of factors crucial to physical and mental health, including access to food, information, secure jobs, and health services. In the low/average education strata, there is restricted, or difficulties with access to services and protective structures, lower paid jobs and precarious living conditions in general, which produce multiple sources of suffering, restricted resources, and strategies to combat the issue, forming vulnerabilities, and the risk of suicide.

Issues related to racial and ethnic differences are associated with suffering, with a special highlight on the Brazilian indigenous population. The high mortality rate for suicide in this group attracts attention to the drama which has been taking place in the country, and which may be explained by the lack of access to basic health care structures, social exclusion, exploitation of their territories and bodies, in contexts of countless acts of violence, historic prejudice, and social invisibility – observed in restricted records which monitor their living conditions and health (structural limitations of the agencies which assist them), in addition to the demographic aspects of access for non-urban groups[22].

The context of violence experienced in the struggle for territory disputed with agribusiness and illegal mining, institutional, ethnic, and cultural violence, has caused the "psychological genocide" of these people, legitimized by the Brazilian State[23]. By late 2022, this process of exclusion and multiple acts of violence, became more evident with the (re)advent of illegal mining, lack of inspection, relaxation of forestry laws, non-demarcation of land, and absence of agencies to protect indigenous people, which adversely affected their health conditions and way of life[24]. Contamination arising from mining, persecution, the murders of indigenous leaders, and isolation, have resulted in various problems, such as a lack of food, access to health services and, as a consequence, hunger, extreme poverty, disease, and intense psychological suffering[25].

In relation to job categories, the high number of suicides in agricultural workers can be highlighted. In countries which have a history of agrarian, neocolonial, and slave-based exploitation, such as Brazil, events of suffering in the work environment are common, but rarely visible[22-27]. This data strongly imprints the racial issue as a determinant factor for suffering and suicide, principally for these workers who, in the majority, are black. In Brazil, being black or of mixed race appears to increase suicidal thoughts[2,16]. This data is not listed in the overall suicide estimates identified on the SIM, but becomes evident when agricultural workers are observed. In addition to this is the nature of the environment, which is distant from the large urban centers, receives very few inspections, and is generally unprotected. Precarious access to education and income means that rural workers are even more vulnerable since they are subject to employment agreements without guaranteeing their protective references. We highlight that a considerable many of these workers do not have labor records and, therefore, are not included in the estimates[22,24].

Rural work in Brazil is inscribed in processes which present multiple origins of suffering. These historic labor relations sustain a model of humiliation and multiple acts of violence, which favor various forms and intensities of suffering, such as gender violence (which may have contributed towards the highest percentage of suicides among married, rather than single, women); financial hardship; expropriation of land and resources by corporations and banks; in addition to the absence of State social protection policies[24]. Historicity and the dispossessive and exclusionary productive models of agribusiness are key to explaining the suicides[22,24].

Hanging and the use of firearms were the most commonly used methods for suicide. Self-induced intoxication by pesticides features in third places for causes of death by suicide among agricultural workers, where agrochemicals are available. Unlike the other suicide methods, agrochemicals simultaneously represent a means and cause. Easy access, in addition to being an instrument for death, fosters the genesis of diseases, such as cancer and psychopathologies, including organically-based mental disorders which may produce hallucinations. Continuous exposure produces suffering[22,26]. Their increased use in the Brazilian agricultural context further

exacerbates this outlook[22,28], since the Brazilian economy has had a greater focus on the export of basic products in recent years, which has increased the export of agricultural commodities, and strengthened agribusiness as the main national economic matrix, reinforcing the use of agrochemicals[22,29]. Measures such as curbing/restricting their use may contribute towards reductions in sickness, accidental deaths, and suicide, principally in this occupational group, which is strongly affected[30].

In addition, suicide affects other occupational groups which we will present, not only by highlighting their numbers, but also their striking characteristics. More deaths by suicide of police officers are registered than any other cause[31], placing security workers in second place in suicide rates. Among the factors which assist in understanding this data, we highlight occupational stress, critical incident traumas, shift work, relationship problems, alcohol abuse, and experiencing a culture of violence, disseminated as something inherent to the job, pressuring these workers towards violent behavior, often against themselves[18].

Health workers (in the 3rd position) experience the suffering of others, a chronic overload and precarious working conditions on a daily basis, especially in nursing, which results in mental health problems and suicide [32]. The absence of social recognition raises the sources of pain and suffering. This also occurs with education workers (7th position) who, historically, experience similar precarious conditions, in addition to stagnated salaries, increases in the volume of work, and fear of unemployment. These factors result in family conflicts, sleep disorders, and mental suffering, in this category[33-35].

With precarious working conditions due to productive restructuring, the relaxation of labor laws, and scenario of economic crisis in Brazil, formal employment has become even more precarious, and underemployment rates have increased. In addition, State assistance has decreased, and there have also been decreases in income and access to consumer goods and services[36]. In this context of curtailing rights, the "half-shift" and "half-salary" have emerged, founded in the discourse of "better than nothing", which has occurred with domestic service workers (6th position in suicides); and the "entrepreneurial fallacy" sold to transport and delivery app workers (5th position, together with other transport and post office professionals). This alternative to access income emerged in a setting of increased unemployment, sustained by the false idea of entrepreneurship. This new system outlines the "Uberization" of labor relations which, at the same time, restricts employer depersonalization, with transformation onto digital screens, and the absence of labor and social security rights[36,37].

Brazilian industry occupied fifth position in absolute numbers of suicides, and 11th position when the rate is observed. Various mechanisms produce suffering in these work environments: rigid controls, continuous insertion of new technologies to expand production, little flexibility, numerous harassment incidents, and the fear of unemployment. This set of characteristics "dehumanizes, bestializes, and causes man to perish [...]"[13] (p. 156). In O'Brien's studies[14], evidence was given of the reduction in jobs and consequent unemployment, principally in middle-age adults (over the age of 30), due to the industrial automation process. These workers, with little formal education, faced with a lack of prospects and future opportunities, and no social protection, resort to abusive use of alcohol and other drugs, developing into homicide cases, deaths from heart disease, and suicide. The authors coined these events as "Deaths of Despair".

In this context of death, independent of the order which each category occupies, and the particularities of each one, attention is drawn to the regime of continuing precarious work in any of these occupations. The concept of "Suicidation" emerges from here; the term molds suicide, not as an individual phenomenon, but a process; the result of social determination originating from the form of capitalist production, in which individuals "did not commit suicide, but were killed by society"[13]. This process is defined from expressions of historic forms of alienation imposed on workers, and degrading living and working conditions, which drive them to suicide, almost like a product expected from this complex system to (re)produce and expropriate life.

Despite this outlook, determining a nexus between work and suicide is no easy task. Even if the suicide takes place in the work environment, or there is a report which confirms work as the reason for suffering, the nexus is hampered by the hegemonic arguments of invisibilizing the world of work, and explanations of individual inadaptation, or lack of personal control, at the genesis of the event. Finazzi-Santos and Siqueira[38] highlight the emblematic silence of work colleagues and managers following a banker's suicide, symbolically exonerating the institution

of its responsibilities. Thus, the labor organization remains disconnected from the genesis of such a tragic incident. According to Dejours and Bégue[11], work-related suicide uncovers the rupturing in tissue of the solidarity of work collectives, and reflects the individualism originating from encouraging competitiveness.

According to the WHO, 90% of suicide cases can be avoided[1], with social support being the best protection/prevention strategy, through public/institutional policies, or those emanating from emotional bonds, which offer listening, a welcome, and inclusion. The dimension of belonging, reinforced in displays of support and receptivity, are fundamental to subsidize actions to tackle the issue[39]. Discussions from far-reaching, multidimensional approaches are urgent and necessary, and also to understand the health-disease process[40,41]. Traditionally, events such as suicide are concealed, and in second place, when only numbers are observed, which are generally considered of low impact. We need to go beyond the rates and individualizations of the phenomenon. We need to go beyond employers' convenient discourses of blaming the individual, and understand that there are also impacts on the entire community which suffers, whether family members, or work colleagues.

All of these factors need to be understood as symptoms, or warning signs: some distal, others closer to suicide; therefore, they form part of a chain of socially referenced events, which have forms of producing life, and how they are established at work as the backbone, since basic needs, desires, pleasures and social relations are inscribed in this, establishing the social fabric in which life is organized[11]. Events which constitute the phenomena, such as "Suicidation" and "Deaths of Despair" are expressions of the rupture of this social fabric. They demonstrate the failure of social protection mechanisms and expose the vulnerability in which workers are found, increasingly at the mercy of precarious relations and relaxations that legalize the absence of protection and safety at work. Pain and suffering are increased and agglutinate in these contexts. Thus, without a voice, without someone to listen, isolated, oppressed and frightened, workers consider their extermination as relief and the only possible way out of the insurmountable trap in which they were compulsorily placed.

This study presents a series of contributions to dimension suicide in Brazil, and to acknowledge its relation with work. However, there is a series of limitations which need to be considered. The information derives from databases of a varying quality. There are distortions in record quality, on account of missing or inconsistent information. For example, various CBO registered on the SIM were not found on the MTE database, resulting in a loss of information. Another important problem resides with the population databases used to estimate the mortality rates, since they present various distortions, and there are no easily accessible databases. The search for information corresponds to producing a patchwork quilt, in which we laboriously sought to obtain the most reliable data possible. Due to the difficulties in accessing the population database by the strata of interest, we had to work with projections from previous census data. The need to use various databases has compromised the standardization desired for comparisons, which reduced the validity of the study. Several strategies were used to minimize this problem: direct contacts with professionals for the data sources consulted, specialists, and a range of simulations.

Recomposing the path of suicide with work remains challenging. This study is an attempt at this approximation. Similar efforts have been made in other studies[12]. There is no register on the SIM of whether the person was working, or not, at the time of their suicide. Thus, in this study, the EAP with a CBO record defined the assumption of work. There are multiple limitations to these procedures, but registration is important, above all to reconsider the collection of information on suicide and its connection to work. A problem which is not seen is a problem which persists and grows. Forms of improving the information system are urgently required, especially when faced with the possibility of an ongoing epidemic – as the data appears to indicate.

Work is historically unseen as the central element to explain the occurrence of sickness/death; therefore, analyses which throw light on these processes, using the SUS data source, may contribute significantly to health actions. These reflections need to unfold into efforts which surpass the barriers of concealing the work-suicide relation, producing actions which intervene in the dynamics which produce suffering. Researchers, workers, and society, should be involved, with the objective of uncovering something which still remains concealed, for such a complex, and equally tragic, phenomenon.

Collaborations

TF Palma participated in all phases, from the conception of the idea, to the research, analysis and writing. TM de Araújo conceived, supervised, evaluated and wrote. JRB Teixeira, M Bandini and SR de Lucca evaluated and suggested insertions in the writing.

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