Suicide in young Brazilian adults: 1997-2019 time series

Vilmeyze Larissa de Arruda (https://orcid.org/0000-0003-1105-3880) [1]
Bruna Hinnah Borges Martins de Freitas (https://orcid.org/0000-0002-6652-593X) [1]
Samira Reschetti Marcon (https://orcid.org/0000-0002-5191-3331) [1]
Fabiana Yanes Fernandes (https://orcid.org/0000-0002-6367-5289) [1]
Nathalie Vilma Pollo de Lima (https://orcid.org/0000-0001-5558-972X) [1]
Juliano Bortolini (https://orcid.org/0000-0003-0126-3040) [2]

Abstract *This study aimed to analyze the time series of suicide mortality in Brazilian young adults between 1997 and 2019. This is an ecological study on time series with individuals aged 20 to 29 years. The Prais-Winsten regression was used for trend analysis. The mean suicide coefficient in young Brazilians was 6.36/100 thousand inhabitants in the period, showing increasing overall, females, and male trends. Regarding marital status, there was a higher proportion of suicide among single people (79.02%). As for the Brazilian regions, the South presented the highest mean mortality coefficient (9.18/100 thousand inhabitants), and the Northeast, North, and Southeast regions showed an increasing trend. Most deaths occured at home (54.93%), and there was an increasing trend both at home, at health establishments, and other places. We conclude that the suicide trend in Brazilian young adults was increasing in the period, with more significant proportions among single people. Brazilian regions showed different trends, and households, health facilities, and other locations followed an increasing trend toward suicide deaths in young adults.*

Key words *Suicide, Time series studies, Young adult*

[1] Faculdade de Enfermagem, Universidade Federal de Mato Grosso (UFMT). Av. Fernando Corrêa da Costa 2367, Bairro Boa Esperança. 78060-900 Cuiabá MT Brasil. brunahinnah@hotmail.com
[2] Departamento de Estatística, UFMT. Cuiabá MT Brasil.

Introduction

Suicide is understood as any self-inflicted injury, the intention of which, even if ambivalently, is death[1]. It is a complex and multifactorial phenomenon that affects family members, communities, and countries, generating destructive impacts on the people who were part of the victims' social bonds[2].

In 2016, the global suicide rate was 10.5/100 thousand inhabitants, making it the 15th leading cause of death and the second leading cause among young people aged 15 to 29. Almost 800,000 people commit suicide every year, equivalent to one person every 40 seconds[2]. Globally, suicides kill more than homicides and wars combined[3], and about 79% of cases occur in low- and middle-income countries[2].

In the same year, Brazil had an overall rate of 6.5/100 thousand inhabitants, with 10/100 thousand inhabitants in the male population and 3.1/100 thousand inhabitants in the female population[2]. This difference between genders may be due to men's greater propensity to alcohol abuse, the choice of more lethal methods in the attempt, greater inclination towards violence, and externalizing behaviors, compared to women[4].

In the 2000s, suicide mortality declined, with the most significant falls observed in some Eastern European countries. The downward trends were followed by an increase concomitant with the 2008 global crisis in some countries, including Greece, the Netherlands, and the United Kingdom, while the downward trends before the crisis remained in Germany, Italy, and Spain. The analysis also revealed an upswing in Brazil, Mexico, the U.S., and Australia[5].

In a survey carried out in Brazil, a progressive increase in suicide-related deaths was observed in the general population in all regions from 1996 to 2015[6]. Among Brazilian regions, a growing suicide trend was identified in the North, Northeast, and Southeast. The difference between the others can occur due to different socioeconomic, cultural, and environmental characteristics and conditions. However, in all regions, the 20-29 years age group recorded the highest proportion of suicide-related deaths[6].

It is a notifiable condition, but data related to this act are not reliable due to underreporting[7], which makes us believe that these indicators are even more significant than those described. The global financial crisis, natural disasters, air pollution, and secondhand tobacco use are associated with rising suicide rates. At the individual level, we have a history of attempted suicide, depression, substance poisoning, loss or separation of parents, and other stressful events in life[8].

The home stands out as the primary environment of choice for the suicidal act due to the easy access to the necessary means to consume the act, such as toxic substances, medications, rat poison, and hanging[9,10]. Another place of the high occurrence of the event is hospitals[9,10]. Different methods can cause death by suicide, and statistics show that hanging, exogenous poisoning, and firearms are prevalent in the global population[2,11,12].

Seen as severe public health and primary prevention problem, and considering that only 28 countries have a national prevention strategy, the World Health Organization (WHO) has set a goal to reduce the global suicide rate[2]. However, quality information is necessary to understand the phenomenon and obtain subsidies for the elaboration of prevention policies[7]. In this sense, this study aims to analyze the time series of suicide mortality in young Brazilian adults from 1997 to 2019.

Methods

Study design

This is an ecological study of time series. The time series is a way of organizing quantitative data by time, foreseeing the distribution of diseases in the population and factors capable of modifying this distribution[13].

Participants

Study participants were considered people aged 20-29 years who had suicide as the primary cause of death (codes X60-X84), as per the International Statistical Classification of Diseases and Related Health Problems (ICD-10). The information stems from official mortality statistics of the Ministry of Health's Mortality Information System (SIM/MS).

Data collection procedure

Data were collected from the Ministry of Health's Mortality Information System (SIM/MS) on the website of the Informatics Department of the Unified Health System (DATASUS). Population estimates by gender, age group (20-29 years), and regions were obtained from the

Brazilian Institute of Geography and Statistics (IBGE).

The study was carried out with data from Brazil, the largest country in South America and the fifth-largest on Earth. It is subdivided into five regions (North, Northeast, Southeast, South, and Midwest) and has 27 Federative Units.

The study period was from 1997 to 2019, totaling 23 points, that is, 23 years. It is not recommended to use less than seven points to analyze series, as the trends tend to be non-significant due to the small statistical power of the regression analysis[13].

Variables

The variable studied was the specific suicide mortality rate (X60-84). Location of residence (Brazil, regions, and state), gender (female and male), group of causes (intentional self-harm/X70-X84 and self-poisoning/X60-X69), marital status (single, married, widowed, legally separated, and other), and place of death (hospital, another health facility, home, public roads, and others) were also analyzed. Among the places of occurrence identified as 'another health facility', those that do not comprise the hospital service are considered, and the places of occurrence classified as 'other' referred to those not fitting into any type of health establishment, home, or public road.

Data analysis

Concerning the calculation of the specific crude suicide mortality rate, the number of suicide-related deaths of residents (X60-84) was considered as the numerator and the total resident population adjusted in the middle of the year, the denominator, multiplied by 100 thousand[14]. Mortality coefficients were calculated for overall suicide and by gender, region, Federative Unit, and proportional mortality for the other variables.

Prais-Winsten regression was used in the trend analysis to calculate the Annual percent change (APC) of the coefficients, as described by Antunes and Cardoso[13]. This model provides for the adjustment of the first-order autocorrelation. The dependent variable was the logarithm of the coefficients, and the independent variable was the historical series' years. The trend's quantitative estimation was calculated by the following expression: APC=[− 1 + 10^b] * 100%. For the calculation of the confidence intervals (CI):

95%CI=[− 1 + 10$^{b±t*se}$.] * 100%. Where "b" corresponds to the annual growth rate. The values of "b" and standard error (*se*) were extracted from the regression analysis, and the Student's t-distribution table will provide the "t" value. The series was considered increasing when the rate was positive, decreasing when negative, and stationary when there was no significant difference between its value and zero (p>0.05)[13]. This analysis was performed using the STATA 11.1 software package.

Ethical issues

The Health Research Ethics Committee (CEP) of the Federal University of Mato Grosso approved this study.

Results

From 1997 to 2019, 48,076 suicide deaths were recorded in young Brazilians. In the period, the overall gross mean coefficient was 6.36 per 100 thousand inhabitants, 2.34 per 100 thousand inhabitants for women, and 10.39 per 100 thousand inhabitants for men. Figure 1 shows the trend in the suicide mortality coefficient in young Brazilian adults, which evidenced an increasing trend in the overall (APC: 1.26; 95%CI: 0.60; 1.93), female (APC: 1.45; 95%CI: 0.60; 2.32) and male coefficients (APC: 1.00; 95%CI: 0.57; 1.43).

Concerning the trend of proportional mortality by group of causes related to suicide, 87.18% (n=41,913) of deaths in the period were related to the group of self-harm (X70-X84), with a stationary trend (APC: 0.09; 95%CI: -0.18; 0.36) and 12.82% (n=6,163) corresponded to the self-poisoning group (X60-X69), with a decreasing trend (APC: -1.79; 95%CI: -3, 30; -0.24).

The South was the one with the highest mean coefficient of suicide mortality (9.18/100 thousand inhabitants) among the regions of the country, with a stable trend over the analyzed period. A growing trend was observed in the suicide mortality rate in young Brazilian adults in the Northeast, North, and Southeast, as shown in Table 1.

In the country, the three Federation Units (UF) with the highest suicide mortality rate were: Roraima (13.54/100 thousand inhabitants); Mato Grosso do Sul (11.40/100 thousand inhabitants), and Rio Grande do Sul (10.30/100 thousand inhabitants). According to Table 1, the trend was increasing in Acre, Amazonas, Bahia, Maranhão,
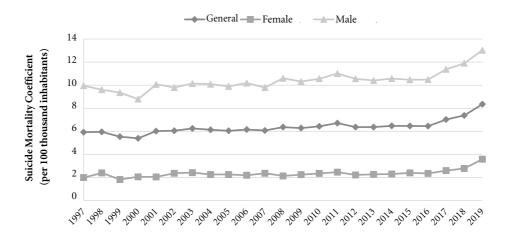
Figure 1. Trend in the suicide mortality rate in young Brazilian adults, general and by gender. Brazil, 1997 to 2019.

Source: Mortality Information System (SIM), Ministry of Health, 1997 to 2019.

Mato Grosso do Sul, Minas Gerais, Pará, Paraíba, Piauí, Sergipe and Tocantins among the 27 UFs. Only Rio Grande do Sul showed a decreasing trend in deaths.

The home was the place with the highest occurrence of the event (n=26,406; 54.93%), followed by the hospital (n=9,115; 18.96%). The growing trend of suicide at home, health facilities, and elsewhere (Table 2) stands out.

A higher proportion of suicide was observed among singles (n=37,988; 79.02%). The trend was decreasing among the married, and stationary in the other marital statuses (Table 3).

Discussion

The time trend of the coefficient of crude suicide mortality in young Brazilian adults from 1997 to 2019 increased in males and females. The rates studied showed different patterns by regions, UFs, places where the event occurred, and marital status. The variables with an upward trend in the period were the North, Northeast, and Southeast regions; UFs Acre, Amazonas, Bahia, Maranhão, Mato Grosso do Sul, Minas Gerais, Pará, Paraíba, Piauí, Sergipe and Tocantins; deaths occurring at home, in other health establishments, and other places.

Recent research in other countries also points to a sharp increase in the suicide rate among the

youngest, as in Japan[15], the U.S.[16], Portugal[17], and Ecuador[18]. This is a productive phase of life and conducive to significant events, such as definitions of professional vocation, leaving the parents' home, possible love relationship, entering a higher education course, and easier access to psychoactive substances, which depend on the individual's coping capacity, can trigger psychological distress[19,20], predisposing these young people to suicide. Moreover, the economic crisis has affected thousands of young workers in several countries and explains this increase in suicide rates[8,15].

It is worth mentioning that these numbers are probably underestimated, considering the underreporting in low- and middle-income countries with insufficient capacity in the registration systems and because suicide is a subject surrounded by stigma and taboo[2]. Another aspect refers to the difficulty in recording the cause of death, such as, for example, an automobile accident, drowning, and death due to an unspecified cause, and these contribute to conceal the actual dimension of the problem[6,21].

Among genders, the higher coefficients of suicide mortality among men compared to women corroborate global findings[2,17]. Other countries such as Ecuador[18] and Portugal[17], for example, also show the most significant occurrence of the phenomenon among men. However, while men are more likely to commit suicide, this

Table 1. Number and percentage of deaths, mean coefficient per 100,000 inhabitants, and trend in the suicide mortality coefficients, by Regions and Federative Unit. Brazil, 1997-2019.

Regions and Federative Unit	Deaths		Mean coefficient	APC[a]	95%CI[b]	Interpretation
	N	%				
Midwest	4,841	10.07	8.30	0.87	-0.10;1.84	Stationary
Federal District	792	1.65	6.90	0.06	-1.69; 1.85	Stationary
Goiás	2,005	4.17	8.07	0.99	-0.29; 2.29	Stationary
Mato Grosso	944	0.93	7.65	0.13	-1.41; 1.70	Stationary
Mato Grosso do Sul	1,101	2.29	11.40	1.94	0.32; 3.59	Increasing
North	4,371	9.09	6.57	2.47	1.93; 3.01	Increasing
Acre	270	0.56	9.29	5.55	2.40; 8.80	Increasing
Amazonas	1,229	2.56	8.12	3.81	1.98; 5.67	Increasing
Amapá	275	0.57	9.78	2.32	-0.55; 5.27	Stationary
Pará	1,392	2.90	4.46	1.80	0.41; 3.20	Increasing
Rondônia	513	1.07	7.63	0.98	-1.08; 3.07	Stationary
Roraima	242	0.50	13.54	-0.69	-2.71; 1.36	Stationary
Tocantins	449	0.93	7.81	4.14	1.50; 6.84	Increasing
Northeast	11,068	23.02	5.16	2.74	1.51; 3.98	Increasing
Alagoas	599	1.25	4.80	0.81	-0.64; 2.29	Stationary
Bahia	1,953	4.06	3.35	3.66	1.72; 5.64	Increasing
Ceará	2,681	5.58	8.00	1.57	-0.47; 3.65	Stationary
Maranhão	1,132	2.35	4.25	7.00	5.36; 8.66	Increasing
Piauí	1,125	2.34	9.16	6.18	4.21; 8.19	Increasing
Pernambuco	1,735	3.61	7.33	2.23	-1.38; 5.98	Stationary
Paraíba	639	1.33	4.26	6.78	3.85; 9.79	Increasing
Rio Grande do Norte	674	1.40	5.29	0.88	-0.49; 2.27	Stationary
Sergipe	530	1.10	6.16	2.74	0.24; 5.30	Increasing
South	9,635	20.04	9.18	-0.01	-1.30; 1.28	Stationary
Paraná	3,451	7.18	8.40	0.35	-1.83; 2.57	Stationary
Rio Grande do Sul	4,054	8.43	10.30	-1.06	-1.59; -0.52	Decreasing
Santa Catarina	2,130	4.43	8.70	0.70	-0.26; 1.67	Stationary
Southeast	18,161	37.78	5.79	1.00	0.20; 1.80	Increasing
Espírito Santo	734	1.53	5.20	0.00	-1.52; 1.55	Stationary
Minas Gerais	5,348	11.12	6.90	2.0	0.95; 3.06	Increasing
Rio de Janeiro	1,924	4.00	3.30	1.93	-0.59; 4.51	Stationary
São Paulo	10,155	21.12	6.20	0.38	-0.85; 1.62	Stationary

[a] Annual percent change. [b] APC confidence interval.

Source: Mortality Information System (SIM), Ministry of Health, 1997 to 2019.

Table 2. Number and percentage of deaths and trend of proportional suicide mortality by place of occurrence. Brazil, 1997-2019.

Place of occurrence	Deaths		APC[a]	95%CI[b]	Interpretation
	N	%			
Hospital	9,115	18.96	-3.94	-4.34; -3.53	Decreasing
Health facility	590	1.23	7.36	3.46; 11.40	Increasing
Home	26,406	54.93	1.19	0.87; 1.50	Increasing
Public roads	3,407	7.09	-1.00	-2.01; 0.02	Stationary
Other	8,009	16.66	0.51	0.08; 0.94	Increasing
Unknown	549	1.14	-11.40	-13.52; -9.23	Decreasing

[a] Annual percent change. [b] APC confidence interval.

Source: Mortality Information System (SIM), Ministry of Health, 1997 to 2019.

Table 3. Number and percentage of deaths and trend of proportional suicide mortality by marital status. Brazil, 1997-2019.

Marital status	Deaths		APC[a]	95%CI[b]	Interpretation
	N	%			
Single	37,988	79.02	0.05	-0.33; 0.43	Stationary
Married	4,558	9.48	-4.49	-5.13; -3.85	Decreasing
Widower	88	0.18	-0.43	-2.96; 2.17	Stationary
Separated	546	1.14	0.63	-1.04; 2.32	Stationary
Other	1,837	3.82	4.60	-5.50; 15.78	Stationary
Unknown	3,059	6.36	0.65	-0.32; 1.63	Stationary

[a] Annual percent change. [b] APC confidence interval.

Source: Mortality Information System (SIM), Ministry of Health, 1997 to 2019.

study showed an increase in suicide rates in both genders.

The disparities in suicide rates between genders can be attributed to the different social roles played by each individual since men are seen as the economic providers and are burdened with stressors related to work and financial provision issues. Women are less exposed to these suicide risk factors. However, they face health, family, and history of physical and sexual abuse issues, which can also be determinants for the suicidal act[17,21,22]. It is also emphasized that men are less concerned with their health, primarily mental health[23], and, consequently, seek health services less frequently.

Another important factor when discussing the difference in suicide between men and women refers to the method used, with men commonly displaying more impulsive features, opting for more lethal means, such as hanging, firearms, while women use reversible means, such as drug poisoning[12,17].

The self-inflicted injuries (X70-X84) had a higher proportion than self-poisoning (X60-X69) in this research. Other studies developed in Brazil have also identified that suicide deaths occur mainly from self-harm[21,24]. Self-inflicted injury is the violence that the subject inflicts on himself by firearm, bladed weapon, blunt objects, hanging, strangulation, fall from height or other[25], the most lethal and most commonly used means by men[12].

It is a fact that accessibility to the means can be decisive for the outcome of the phenomenon[12,26]. A study carried out in Portugal that aimed to identify the trend pattern of suicide registered in the country from 2007 to 2014 evidenced an increase in deaths by firearms, and a hypothesis for this finding refers to the facilitated access through sales of illegal weapons[17]. A literature review showed that access to firearms is a predictor of the high suicide rate among police and armed forces professionals[27]. A large number of illegal firearms in circulation and easy access to them is a risk factor for the individual since when faced with a problem, the weapon will be seen as a solution, which can lead to an increase in suicide[28].

The Australian government has reduced access to firearms through campaigns and measures to control the purchase and possession of firearms to prevent suicide, contributing significantly to its decline in the general population[29]. A systematic review pointed to evidence for preventing suicide, such as the restricted access to lethal means, especially concerning the control of painkillers and access points for suicide by fall from height. Pharmacological and psychological treatments for depression are also crucial in this prevention[30].

The South had the highest suicide mortality coefficient as described by other Brazilian studies[6,21], keeping a stable trend over the years. However, a previous study carried out with the Brazilian population identified a decreasing trend in the South. The stabilization/reduction may occur due to improved notifications and investments in actions to raise awareness among professionals about the importance of filling out the forms[6]. Again, in this region, Rio Grande do Sul was the only UF with a decreasing trend, which may be due to the actions developed by the "Suicide Prevention Program" created to establish a line of care and professional training in the iden-

tification of suicide risks[6], which could be used as a successful experience in encouraging such a strategy for other Brazilian states.

The suicide trend in young adults is increasing in the Northeast, North, and Southeast regions, and nine among the 11 UFs that showed growth are from the North and Northeast. The territorial characteristics related to living conditions, such as increased exposure to situations of vulnerability involving social inequality, lack of access to health, low schooling, exposure to violence, and other factors, can adversely affect the health of individuals, triggering psychological suffering and leading them to suicide[21]. Thus, despite the cultural, socioeconomic, and demographic diversity of each region, it is essential to develop strategies to prevent and curb suicide cases in different contexts.

As in this study, another research carried out in Mexico that aimed to present the suicide trend from 1990 to 2011 in the general population identified a more significant occurrence of the suicidal act in the home, as it is a place that is easier to execute it and an emotionally charged space, generating more significant impact on family members[31]. Concerning health facilities, several factors contribute to the occurrence of the phenomenon, which are team unpreparedness, lack of institutional infrastructures, such as unprotected windows, very accessible means, medications, sharp instruments, and emotional situations related to prolonged hospitalization and deteriorated clinical condition, can trigger anxiety and depression, which are suicide risk increasing factors[10].

Singles had the highest proportion of suicide cases, as in other studies[32,33]. One hypothesis for such a finding would be the greater exposure to social isolation by singles, which is a predisposing factor for suicidal behavior[10]. On the other hand, married couples recorded a decline in the suicide mortality rate. The consolidation of social bonds and family networks has been widely described in the literature as protective factors against suicide[31].

While with limitations specific to the study type, the results obtained are unprecedented and relevant to understand the phenomenon, as they portray the suicide trend in young Brazilian adults over a 23-year analysis. In this sense, the study's findings show the relevance of the theme as a public health issue and allow the understanding of suicidal behavior in this age group, necessary for the elaboration of national and regional health policies aimed at mental health promotion and suicide prevention programs, and the timely treatment of mental disorders or disabilities resulting from previous attempts.

Conclusion

We can conclude that the trend of suicide mortality rates in young adults aged 20-29 years in Brazil from 1997 to 2019 increases in this age group and both genders. A growing suicide trend was recorded in the North, Northeast, and Southeast regions, which occurred at home, other health facilities, and other places.

The study outlined the situational diagnosis of the phenomenon in the country, and it can serve as a current outlook to support the formulation of policies by private and government agencies. Also, health professionals should act in an interprofessional, interdisciplinary, and intersectoral fashion in the face of the event, especially in the implementation of evidence-based practices.

Collaborations

VL Arruda contributed to the study design, data collection and analysis, data interpretation, and paper writing. BHBM Freitas and SR Marcon contributed to the conception and design of the study and the critical review of the paper. FY Fernandes and NVP Lima collaborated with data collection and critical review of the paper. J Bortolini participated in the study design and the critical review of the paper. All authors approved the version to be published.

References

1. Vieira RG, Almeida CFR, Rodrigues G, Gonçalves SS, França AS, Oliveira MB. Prevalência e risco de suicídio no Brasil e na cidade de Barra do Garças (MT): revisão de literatura. *Rev Debate Psiquiatr* 2017; 19(3):445-453.

2. World Health Organization (WHO). *Suicide data.* Geneva: WHO; 2018.

3. Minayo MCS, Pinto LW, Assis SG, Cavalcante FG, Mangas RMN. Trends in suicide mortality among Brazilian adults and elderly, 1980-2006. *Rev Saude Publica* 2012; 46(2):300-309.

4. Geulayov G, Casey D, McDonald KC, Foster P, Pritchard K, Wells C, Clements C, Kapur N, Ness J, Waters K, Hawton K. Incidence of suicide, hospital-presenting non-fatal self-harm, and community-occurring non-fatal self-harm in adolescents in England (the iceberg model of self-harm): a retrospective study. *Lancet Psychiatry* 2018; 5(2):167-174.

5. Alicandro G, Malvezzi M, Gallus S, La Vecchia C, Negri E, Bertuccio P. Worldwide trends in suicide mortality from 1990 to 2015 with a focus on the global recession time frame. *Int J Public Health* 2019; 64(5):785-795.

6. D'Eça Júnior A, Rodrigues LS, Meneses Filho EP, Costa LDLN, Rêgo AS, Costa LC, Batista RFL. Mortalidade por suicídio na população brasileira, 1996-2015: qual é a tendência predominante? *Cad Saude Coletiva* 2019; 27(1):20-24.

7. Figueiredo AEB. Suicida: avaliação e manejo. *Cien Saude Colet* 2016; 21(11):3633-3634.

8. Sinyor M, Tse R, Pirkis J. Global trends in suicide epidemiology. *Curr Opin Psychiatry* 2017; 30(1):1-6.

9. Bahia CA, Avanci JQ, Pinto LW, Minayo MCS. Lesão autoprovocada em todos os ciclos da vida: Perfil das vítimas em serviços de urgência e emergência de capitais do Brasil. *Cien Saude Colet* 2017; 22(9):2841-2850.

10. Botega NJ. Comportamento suicida: Epidemiologia. *Psicol USP* 2014; 25(3):231-236.

11. Melo CDF, Sousa JC, Martins SM, Frota PC. Brazilian population perception about suicide. *Rev Pesqui Cuid Fundam Online* 2018; 10(4):1085.

12. Ribeiro NM, Castro SS, Scatena LM, Haas VJ. Time-trend analysis of suicide and of health information systems in relation to suicide attempts. *Texto Context Enferm* 2018; 27(2):1-11.

13. Antunes JLF, Cardoso MRA. Uso da análise de séries temporais em estudos epidemiológicos. *Epidemiol Serv Saude* 2015; 24(3):565-576.

14. Brasil. Ministério da Saúde (MS). Perfil epidemiológico das tentativas e óbitos por suicídio no Brasil e a rede de atenção à saúde. *Bol Epidemiol* 2017; 48(30):1-14.

15. Kino S, Jang SN, Gero K, Kato S, Kawachi I. Age, period, cohort trends of suicide in Japan and Korea (1986–2015): A tale of two countries. *Soc Sci Med* 2019; 235:112385.

16. Spiller HA, Ackerman JP, Spiller NE, Casavant MJ. Sex- and Age-specific Increases in Suicide Attempts by Self-Poisoning in the United States among Youth and Young Adults from 2000 to 2018. *J Pediatr* 2019; 210:201-208.

17. Nunes AM. Suicide in Portugal: Image of the country. *J Bras Psiquiatr* 2018; 67(1):25-33.

18. Gerstner RM, Lara Lara F. Análisis de tendencias temporales del suicidio en niños, adolescentes y adultos jóvenes en Ecuador entre 1990 y 2017. *An Sist Sanit Navar* 2019; 42(2010):9-18.

19. Ribeiro JM, Moreira MR. An approach to suicide among adolescents and youth in Brazil. *Cien Saude Colet* 2018; 23(9):2821-2834.

20. Sobrinho AT, Campos RC. Perceção de acontecimentos de vida negativos, depressão e risco de suicídio em jovens adultos. *Anal Psicol* 2016; 34(1):47-60.

21. Machado DB, Santos DN. Suicídio no Brasil, de 2000 a 2012. *J Bras Psiquiatr* 2015; 64(1):45-54.

22. Stone DM, Holland KM, Schiff LB, McIntosh WLKW. Mixed Methods Analysis of Sex Differences in Life Stressors of Middle-Aged Suicides. *Am J Prev Med* 2016; 51(5):S209-S218.

23. Soares RJO, Nascimento FPB. Suicídio e Tentativa de Suicídio: Contribuições da Enfermagem Brasileira. *J Health Sci* 2017; 1(19):19-24.

24. Fernandes FY, Freitas BHBM, Marcon SR, Arruda VL, Lima NVP, Bortolini J, Gaíva MAM. Tendência de suicídio em adolescentes brasileiros entre 1997 e 2016. *Epidemiol Serv Saude* 2020; 29(4):e2020117.

25. Monteiro RA, Bahia CA, Paiva EA, Sá NNB, Minayo MCS. Hospitalizations due to self-inflicted injuries – Brazil, 2002 to 2013. *Cien Saude Colet* 2015; 20(3):689-700.

26. Santos EGO, Oliveira YOMC, Azevedo UN, Nunes ADS, Amador AE, Barbosa IR. Spatial temporal analysis of mortality by suicide among the elderly in Brazil. *Rev Bras Geriatr Gerontol* 2017; 20(6):845-855.

27. Franco FM. Fatores de risco, fatores protetivos e prevenção do suicídio entre policiais e outros agentes da lei : perspectiva internacional. *Rev Psicol Saude Ment Segurança Publica* 2018; 7:97-114.

28. Almeida LB, Neres WFS. *A fragiliade e ineficácia do estatuto do desarmamento frente ao combate de armas de fogo ilegais no estado de Goiás* [Internet]. Comando da Academia da Polícia Militar de Goiás. Programa de Estudos Pós-Graduação da PMGO Turma Golf.; 2018 [acessado 2019 dez 10]. Disponível em: https://acervodigital.ssp.go.gov.br/pmgo/bitstream/123456789/921/3/Lucas Bueno D Almeida.pdf.

29. Martin G. On guns and suicide. *Adv Ment Heal* 2013; 11(2):118-121.

30. Zalsman G, Hawton K, Wasserman D, van Heeringen K, Arensman E, Sarchiapone M, Carli V, Höschl C, Barzilay R, Balazs J, Purebl G, Kahn JP, Sáiz PA, Lipsicas CB, Bobes J, Cozman D, Hegerl U, Zohar J. Suicide prevention strategies revisited: 10-year systematic review. *Lancet Psychiatry* 2016; 3(7):646-659.

31. Jiménez-Ornelas RA, Cardiel-Téllez L. El suicidio y su tendencia social en México: 1990-2011. *Papeles Poblac* 2013; 19(77):205-229.

32. Oliveira LR, Benedetti ADOC. Suicídio em Mato Grosso - Brasil: 1996 a 2015. *J Heal Biol Sci* 2018; 6(4):391.

33. Vidal CEL, Gontijo ECDM, Lima LA. Tentativas de suicidio: Factores pronósticos y estimativa del exceso de mortalidad. *Cad Saude Publica* 2013; 29(1):175-187.