CIÊNCIAS DA SAÚDE / HEALTH SCIENCES

Spatial distribution of suicides in Mato Grosso, Brazil, from 2008 to 2018

Vagner Ferreira do Nascimento[1*] , Alisséia Guimarães Lemes[2], Lúbia Maieles Gomes Machado[3], Tarciso Feijó da Silva[4], Fernanda Rocha Anjos de Oliveira Souza[1], Ana Cláudia Pereira Terças-Trettel[1] and Margarita Antonia Villar Luis[2]

[1]Universidade do Estado de Mato Grosso, Avenida Inácio Bittencourt, 6967, 78301-532, Tangará da Serra, Mato Grosso, Brasil. [2]Escola de Enfermagem de Ribeirão Preto, Universidade de São Paulo, Ribeirão Preto, São Paulo, Brasil. [3]Faculdade de Medicina, Universidade Federal de Mato Grosso, Cuiabá, Mato Grosso, Brasil. [4]Universidade do Estado do Rio de Janeiro, Rio de Janeiro, Rio de Janeiro, Brasil. *Author for correspondence. E-mail: vagnernascimento@unemat.br

ABSTRACT. In the last few decades, it is believed that the state of Mato Grosso has been the stage of a substantial increase in suicide rates. However, the extension of this issue in the health regions of the state is still unknown. Therefore, the goal of this study was to analyze the spatial distribution of suicides in Mato Grosso, Brazil, from 2008 to 2018. This is an ecological study, with spatial-temporal distribution. Data collection took place in 2020 and was carried out in the Information System on Mortality for the period from January 2008 to December 2018. The suicide rates were calculated and smoothed using the empirical Bayes method, aided by the software GeoDa 1.12. To construct the maps, we used the software ArcGis 10.5. There were 1,977 recorded suicides in Mato Grosso, especially in males (79.3%), single (50.6%), from 20 to 29 years old (23.7%), brown (55.4%), with low educational levels (52.2%). Most suicides were carried out by intentional self-harm by hanging, strangulation and suffocation in the residence. The spatial-temporal distribution showed that the mesoregions North and Northeast had the highest rates, especially in cities in the health regions of Mid-Araguaia (for both sexes) and Garças Araguaia (for males). Suicides have followed a random, unequal pattern throughout Mato Grosso, but focused in areas of little development, showing the need to invest in health, and to strengthen and value policies to bring human resources to attend to these demands. The health care network must be structured to do so.

Keywords: public health; mortality; premature; suicide; anthropology; medical.

Introduction

Suicide is a phenomenon considered to have an intimate connection to both individual and collective issues (Schütz, 2018). The understanding of suicide throughout history has changed significantly. The practice was seen as brave/heroic (Ancient Greece), criminal (Ancient Rome), and sinful (Middle Ages), before it began to be understood as a mental health problem (19th century) and a public health problem which affects people from all ages, genders, and social classes (20th and 21st century), which can be prevented and treated (Santos & Maas, 2019).

Suicide rates, globally, decreased 36% in 20 years (from 2000 to 2019). The exception was the Americas, where these rates increased by 17% in the period. Regarding genders, women attempt suicide more often, but men are more successful in their attempts (12.6/100 thousand men and 5.4/100 thousand women) (Organização Pan-Ameriacana de Saúde, Organização Mundial da Saúde [OPAS/OMS], 2021; D'eça Júnior, Rodrigues, Meneses Filho, Costa, Rêgo, Costa, & Batista, 2019; Nascimento & Soares, 2019; Organização Pan-Ameriacana de Saúde, Organização Mundial da Saúde [OPAS/OMS], 2021). Suicide rates in men are generally higher in countries with greater income (16.5/100 thousand); among women, they are higher in countries with low mean income (7.1/100 thousand) (OPAS/OMS, 2021).

Regarding factors that influence and/or increase the risk of suicide, the most frequent are sociodemographic and psychic aspects, and issues that affect human life, from childhood to adulthood (Félix, Oliveira, Lopes, Parente, Dias, & Moreira, 2016). Another remarkable factors include the fact that 20% of people who commit suicide do so after prior attempts; 28% have abused some form of psychoactive substance (PAS); and 42% have weak or conflictive affective relationships (The Lancet Public Health, 2018). In Brazil, this is associated to a history of physical or sexual abuse for women, and to cases of suicidal behavior in the family (Botti, Cantão, Silva, Dias, Menezes, & Castro, 2018).

Countries that are mostly Christian present a higher rate of suicide in both women and men, while Hindu countries show the lowest rates (Alothman &Fogarty, 2020). Regarding time frames, worldwide, Monday is the day with the greatest number of suicides, especially in the spring and beginning of summer. Age is the component with the strongest relationship when it comes to suicide rates (Galvão, Souza e Silva, & Silva, 2017). In Brazil, in some places of Mato Grosso, suicides take place more often at the end of the state's rainy summers (autumn), especially in April, usually on the weekends, especially on Sundays (Silva, Marques Júnior, & Suchara, 2018). This is also true for other types of violence (Nascimento, Baggio, Nascimento, Fonseca, Silva, Terças, & Hattori, 2017).

In the last two decades, it is believed that Mato Grosso has presented a significant increase in suicide rates. In 2018 alone, while the national mean was 6.0/100 thousand, the mean in the state was 8.6/100 thousand (Ministério da Saúde, 2021). Nonetheless, literature about suicides in Mato Grosso, in addition to being scarce, often goes unnoticed, due to a tendency of grouping this data with that from the Midwest of the country as a whole, making it more difficult to observe related epidemiological behavior in this territory, specifically. As a result, this study aimed to analyze the spatial distribution of suicides in Mato Grosso, Brazil, from 2008 to 2018.

Materials and methods

This is an ecological study to determine the spatial-temporal distribution of suicides in Mato Grosso, including all suicides recorded from January 2008 to December 2018. This particular state was chosen as it is the third largest one in Brazil; has several shortcomings in assistance, due to large distance between its cities caused by characteristics of the territory; and because the health services that are supposed to attend to the mental health demands of the population are unevenly distributed throughout the state.

Data collection took place in 2020, in the Information System on Mortality (SIM), through the database of epidemiological surveillance of the State Secretariat of Health of Mato Grosso (SES/MT), with the permission of the coordination and filtering of data by a responsible party in the sector. The responsible for the sector made a codified version of the database available to researchers. All self-inflicted deaths were considered to be suicides, in accordance with the International Classification of Diseases (ID), 10th revision (X60 through X84). Inclusion criteria considered cases recorded as suicides in Mato Grosso in the period analyzed. Exclusion criteria included records with no identification of sex.

We analyzed spatial distribution of mean rates of deaths by suicide, stratified by sex and health region. To do so, we used, as a denominator, the total number of cases between the sexes, divided by the population of each of the 16 health regions, multiplied by the constant 100 thousand. Then, we created a map with the ratio between sexes for the entire period, using the male sex as a numerator and the female sex as a denominator in the 141 cities.

To carry out the spatial-temporal distribution, we built maps that included the yearly rates of death by suicide in each city in the state. To calculate rates per 100 thousand inhabitants, we smoothed the data with the empirical Bayesian method through the software GeoDa 1.12. The technique reduced random fluctuation from large differences in the population between the cities analyzed. In our calculation, we considered all first-order neighboring cities as a neighborhood matrix.

It is noteworthy that the use of this technique aimed to recreate the maps of suicide rates in the cities of Mato Grosso. Thematic maps with smoothed rates are more adequate to understand the spatial effects caused by close neighbors. These allow the visualization of spatial disease patterns, risk spaces, and the influence of small populations. All maps were generated using the software ArcGis 10.5.

The study respected all ethical aspects in research, and, despite the fact we only used secondary data, we submitted the project and obtained approval from the Ethics Committee for Research with Human Beings at the Universidade do Estado de Mato Grosso (UNEMAT), being approved under CAAE 14274919.0.0000.5166 and opinion No. 3.401.789 (February 19, 2019).

Results

In the period investigated, we recorded 1,977 suicides in Mato Grosso. Since all records included information on sex, no case was excluded. 1,567 suicides were men (79.3%), while 410 (20.7%) were women, showing a ratio of 3.8:1. Most were single (1000; 50.6%) and had less than 8 years of formal education (1032; 52.2%). For both men and women, the most common age group was from 20 to 29 (468; 23.7%). Regarding skin color/ethnicity, most were brown (1095; 55.4%). Concerning the cause of death, according to ICD-10, most were in the category X70

(intentional self-harm by hanging, strangulation and suffocation - residence) (1635; 82.7%) and X60 (intentional self-poisoning by and exposure to nonopioid analgesics, antipyretics and antirheumatics) (263; 13.3%).

Figure 1 shows the spatial distribution of mean death rates in the period analyzed, according with health region and sex.
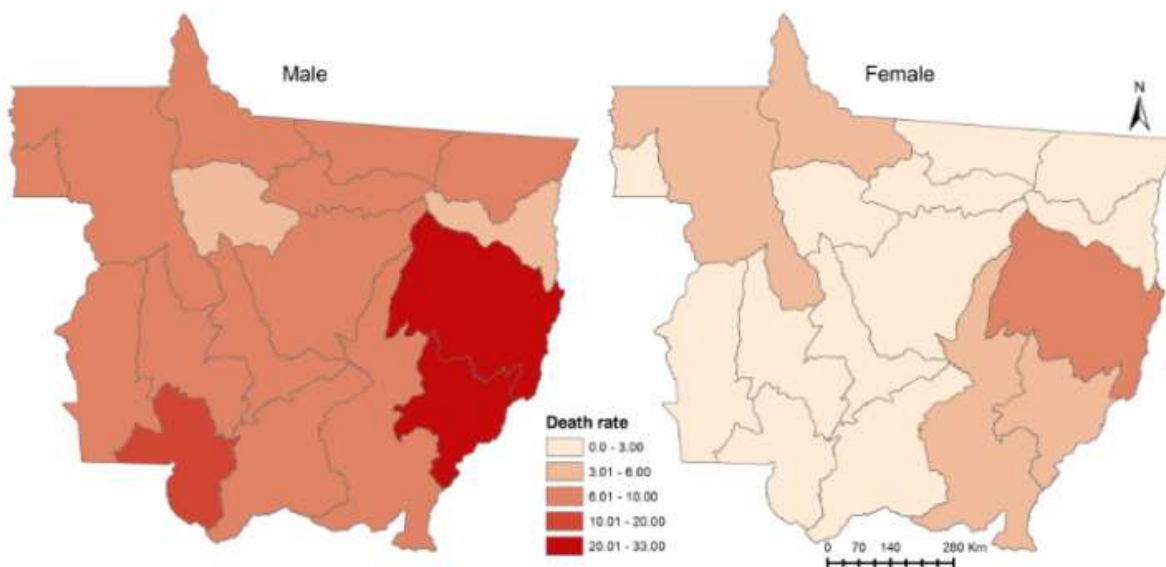
Figure 1. Spatial distribution of the mean rate of deaths by suicide (/100 thousand inhab.), per health region and sex, Mato Grosso, 2008-2018.

For both sexes, the highest mean rates were found in the region Middle Araguaia, followed by Garças Araguaia. For males, the rates varied from 5.3 (North Araguaia Karajá) and 32.9 deaths/100 thousand inhab. (Mid-Araguaia). For females, they varied from 0.8 (North) to 6.9 deaths/100 thousand inhab. (Mid-Araguaia). Figure 2 shows a map with the ratio between sexes for the record of deaths by suicide in the cities of Mato Grosso.
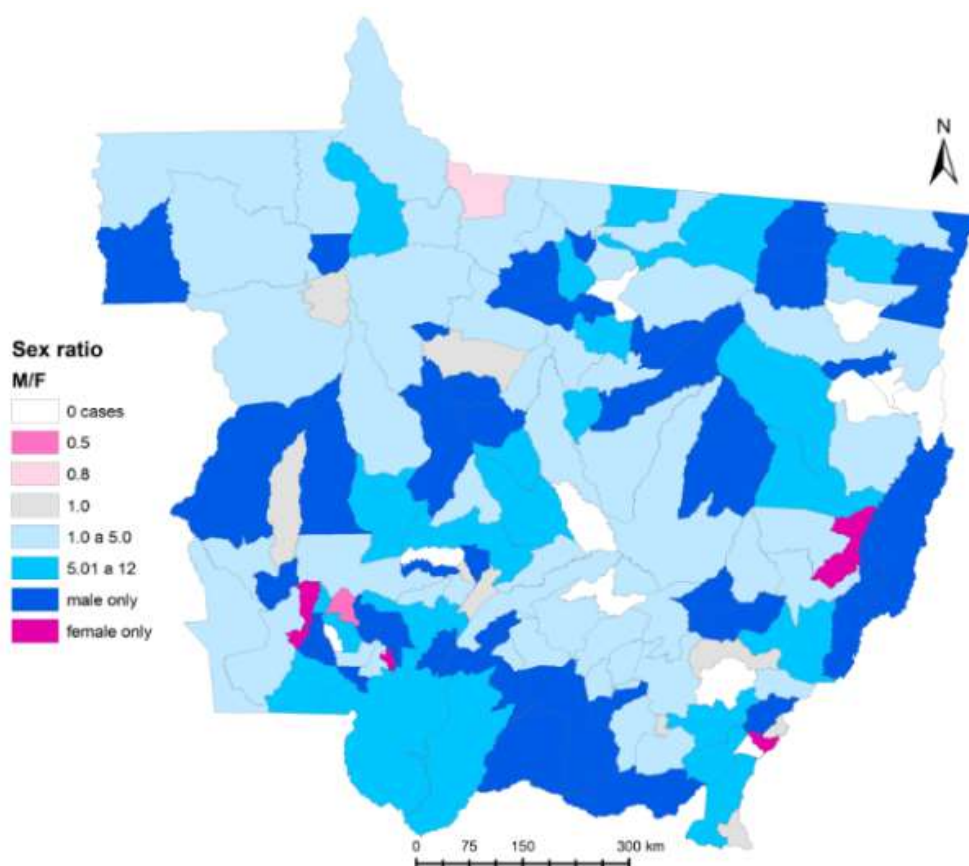

Figure 2. Ratio of the sexes (male/female) regarding deaths by suicide, per city of Mato Grosso, 2008-2018.

Most of the 141 cities had a higher number of suicides among males, with 41 presenting only suicides by men. In four cities, all suicides were committed by women (Vale de São Domingos, Curvelândia, Ponte Branca, Nova Nazaré). Eight cities showed no difference between sexes, and eleven had no recorded suicides in the period.

Figure 3 showed the spatial-temporal distribution of death rates between the cities, smoothed using the local empirical Bayes method.

The mesoregion North presented the highest rates at the beginning of the analysis (2008), while the mesoregion Northeast presented the lowest at the end (2018). Additionally, throughout the period, higher rates were focused on the cities in the health regions of Mid-Araguaia and Garças Araguaia.
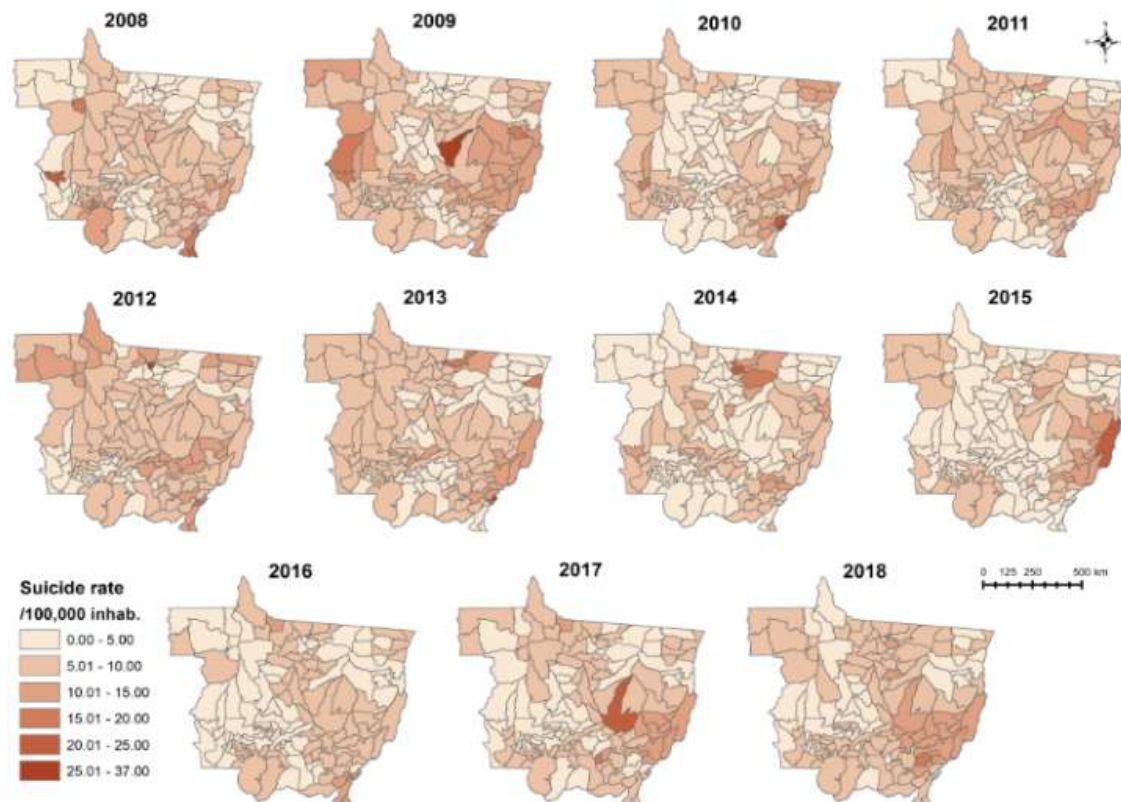
Figure 3. Spatial-temporal distribution of rates of death by suicide, smoothed by the local empirical Bayes method, per city in Mato Grosso, 2008-2018.

Discussion

The predominance of suicides among females in small Mato Grosso towns can indicate the presence of prevalent psychic disorders (anxiety, depression, and post-traumatic stress disorder), as well as situations of oppression, such as domestic violence, very common in cities with this profile of population density due to the characteristics of their support networks (absent, insufficient, and/or unknown by the population) and/or other cultural aspects, which contribute for the undernotification of complaints and search for help (Oliveira, Oliveira, Araújo, Silva, Crispim, & Lucindo, 2017). Other Brazilian settings have presented a significant relationship between women victims of violence and suicide attempts (Amarante & Kind, 2020).

In addition, women may often feel like they do not belong to their communities, questioning the social roles they perform (Vasconcelos Neto, Moreira, Oliveira Júnior, & Ludermir, 2020). This reduces their ability to deal with (individual and collective) issues of their daily lives, predisposing them to suicidal behavior (ideation, planning, attempt, or suicide itself) (Melo, Oliveira, Soares, & Bevilacqua, 2020).

Although in some locations there are more suicides among women, in most regions of health of Mato Grosso, prevalence is higher among men. This prevalence is in accordance with national and international literature. One of its main risk factors is unemployment, unqualified or unpaid manual work, identity conflicts, social demands, and the use of more lethal options when attempting suicide (CDC, 2020). Furthermore, mental suffering in men can also involve the use/abuse of alcohol and other drugs, which, associated to the male reticence to attend health services in the territory, which leads them to seldom be present in these places, favors the development of extra disorders and several triggers that can make suicide more likely (Setti, 2017).

According to Decree No. 7.508 from June 28, 2011 (Martinelli et al., 2023). A health region should contain, at least, actions and services of: I - primary care; II - urgency and emergency; III - psychosocial attention; IV - specialized and hospital ambulatory care; and V - health surveillance. Population estimates indicate that Mato Grosso has 3,344,544 inhabitants, divided into 16 health regions that involve 141 municipalities. These health regions are: Upper Tapajós (6), Araguaia Xingú (7), Baixada Cuiabana (11), Center North (7), Garças Araguaia (10), Mid-Araguaia (8), Mid-North (10), Mato Grosso Northwest (7), North Araguaia Karajá (5), Mato Grosso North (6), Mato Grosso West(12), Mato Grosso Southwest (10), Mato Grosso South (19), Teles Pires (14), Vale do Arinos (4), and Vale do Peixoto (5). Each health region has a Regional Health Office (RHO) in a city, which functions as the hub for the region. This office is associated to the State Health Secretariat (Paiva et al., 2019; Martinelli et al., 2022).

The RHO presence is a strategy to facilitate access to the different levels of complexity, overcoming the fragmentation of actions, qualifying SUS management, and constructing integrated health systems (Viana, Bousquat, Melo, Negri Filho, & Medina, 2018). In this study, we found that the health region Mid Araguaia has the highest mean rate of suicides. However, it is the sixth in Psychosocial Health Care Center (CAPS) coverage.

In Mato Grosso, there are 48 CAPSs, distributed in 37 municipalities, most are type I (35). Regarding distribution of these services in the health regions, most are focused on Baixada Cuiabana and Mato Grosso South (nine CAPSs each), followed by Teles Pires (five), Garças Araguaia and Mato Grosso West (four), Mid-Araguaia and Mid-North (three), Vale do Peixoto, and Araguaia Xingu (two each), while in seven regions there is only one type of CAPSs. Concerning the expansion of this service in Mato Grosso, from 1998 (implementation of the first CAPS) to 2004, 27 CAPSs were activated (I-20, II-1, i-2, AD II-4); from 2005 to 2008, there were 7 (I-5, II-1, AD II-1); 7 others from 2009 to 2013 (I-4, II-1, i-2); 2 from 2014 to 2018 CAPS (I-2); and, from 2019 to 2022, 5 (I-4, i-1) (Mato Grosso, 2023). This evolution shows a timid expansion of the service, indicating that the rhythm and place of the implementation of these services is not in accordance with the epidemiological behavior of suicide cases.

It should be noted that Mato Grosso cities that only have Primary Health Care Services (PHC) presented few to none suicide records, which raises two points of interest. The first is that, in regions where there are no specialized mental health services, PHC services absorb the demand associated with emotional suffering, possibly aided by actions from the mental health hubs. The second point is that the people under mental suffering from these cities can have suicidal ideation or even attempts, but the death can be a result of other clinical conditions, such as cardiac and cerebrovascular diseases which have a strict relationship with psychic issues (Figueiredo, Silva, Pereira, & Oliveira, 2017; Pérez-Piñar, Ayerbe, González, Mathur, Foguet-Boreu, & Ayis, 2017; Mal, Awan, Ram, & Shaukat, 2019).

Regarding climactic factors, we found that altitude had no impact on the distribution of suicides in Mato Grosso, since mesoregions Southwest and Center-South have the highest altitudes (800m-1118m), but not the highest rates (3.1/100 thousand inhab. for females; 9.9/100 thousand/inhab. - males). There is also clinical evidence indicating that hypobaric hypoxia has the potential to promote suicide (Kious, Kondo, & Renshaw, 2018).

Regarding vegetable coverage, in the Netherlands, populations who had more contact with natural vegetation and greener cities throughout their lives seem to have developed a preventive behavior regarding suicide (Helbich, O'Connor, Nieuwenhuijsen, & Hagedoorn, 2020). Mato Grosso is in *Cerrado*, which is one of the biomes that suffers the most with the loss of vegetation and maintained high suicide rates in this study. This could be a sign that reduced vegetal coverage or even environment changes in these areas in Mato Grosso can also be a factor in suicidal behavior. A global meta-analysis showed that this change in natural spaces increased temperatures and lowered levels of rain, which has shown association with suicide levels (Frangione et al., 2021).

An Israeli study carried out in a place with similar characteristics to those of Mato Grosso, including the dry climate in certain periods of the year and the loss of vegetable coverage, associated these features to suicidal behaviors, particularly in individuals who had made prior attempts of suicide (Yarza, Vodonos, Hassan, Shalev, Novack, & Novack, 2020). A prior study in Mato Grosso showed a tendency for the recurrence of self-provoked lesions when compared to the total number of suicide attempts (Sousa, Teixeira, Vedana, & Miasso, 2021), which should be a warning to the health workers in these health regions.

Although the health regions Mid-Araguaia and Garças Araguaia are developing, there are several cities which, in addition to presenting environmental changes which can have repercussions on the wellbeing and quality of life of the population, have a low gross domestic product (GDP) when compared to other regions in the state. There, opportunities for employment and professional growth are not evenly distributed among age

groups and levels of education. On the other hand, although a study with elders in Hong Kong found spatial variation in suicides that could not be explained by the levels of social vulnerability of the population (Guo, Chau, Chang, Woo, Wong, & Yip, 2020), in youth from Paraná (PR), socioeconomic deprivation, at a municipal level, was one of the determinants of suicide, influencing the formation of a cluster in regard to this health issue (Alarcão et al., 2020). This was also observed in Portugal (Loureiro, Almendra, Costa, & Santana, 2018).

Regarding occupational issues, Mato Grosso regions received different groups during colonization, especially from the states of Paraná, Rio Grande do Sul, São Paulo, and Minas Gerais, often arriving to the region in the search of success in farming, cattle-raising, and mining. In addition, the South and Southeast of Brazil presented, in the historical series of decades preceding the pandemic, the highest levels of suicide in the country (Vieira, Almeida, Rodrigues, Gonçalves, França, & Oliveira, 2017; Palma, Santos, & Ignotti, 2020). This is associated with the occurrence of suicides, be it for cultural reasons (internalization, struggles, abstractions, ambitions, and human values) remaining from the pioneer population, or for the slow growth of some cities when as opposed to the expectations and needs of the youths (the population most often affected by suicide in Mato Grosso).

Spatial-temporal distribution showed yearly variations, and the same behavior was found in the Brazilian Northeast (Santos & Barbosa, 2017), where suicides followed a random and uneven pattern. However, starting with the identification of more persistent clusters, managers may be able to directly intervene in the health care network (HCN), considering the influence of environmental aspects. To do so, there must be greater investments, be it on increasing the coverage of specialized mental health services, in revamping the amplitude of these services, or in training PHC teams (Martins, Alencar, Lima, Martins, & Carvalho, 2022; Ximenes Neto et al., 2022), in order to actually embrace this demand, as current policies and legislation require, with the adequate technical-practical support and further resources to manage the demand.

In this regard, educational and health care actions must be targeted at raising the awareness of the population in regard to risk factors for suicide, while also going through more vulnerable environments and contexts associated with this health issue, to provide spaces and moments to promote life and a culture of peace. In the context of this intervention, the adolescent population is the main group that must be targeted by these actions, since they have been through a stage of transition, being highly vulnerable to suicide (Simões, Santos, & Martinho, 2020).

There should also be training of both workers and other social agents, such as community leaderships, to identify, care and/or follow up people with suicidal behaviors (Liba et al., 2016). In this process of training, the participation of epidemiological surveillance and of the Medical-Legal Institution (IML) is essential, with an understanding that data which includes notifications, technical reports, and a historical series of suicide cases allow recognizing the evolution and impact of this issue, as well as carrying out diagnosis and predictions. Furthermore, this issue must be communicated with the sectors of education and social assistance, in order to share experiences and responsibilities in the creation of joint plans that can reach this population and minimize its occurrence.

Among study limitations, we highlight the use of secondary data, associated to the particularities of recording notifications, information, and other input to the information system. As a contribution to the practice, the pioneer analysis of the spatial distributions of suicides per health region in Mato Grosso allows identifying areas under a greater risk, which is essential to plan more effective actions targeted at welcoming patients, preventing and monitoring this phenomenon with the population.

Conclusion

The spatial distribution of suicides in Mato Grosso, from 2008 to 2018, was heterogeneous, with the mesoregion North presenting the highest mean rates in the beginning of the period, while the mesoregion Northeast presented the highest rates at the end. Most suicides were in cities in the health regions of Mid-Araguaia (for both sexes) and Garças Araguaia (for males). We found that geopolitical factors can contribute to this setting of suicides, requiring attention from health surveillance services.

The concentration of suicides in regions that are not well developed shows the need to increase health investments, and to strengthen and value policies to bring/keep human resources to deal with these demands, especially regarding the structuring of the HCN, never neglecting, for these actions, locations which, so far,

have low rates or no records of suicide. Additionally, even in regions where there are CAPSs, PHC professionals must understand that this type of demand is also part of their responsibilities.

Acknowledgements

References

Alarcão, A. C., Dell'Agnolo, C. M., Vissoci, J. R., Carvalho, E. C. A., Staton, C. A., Andrade, L., ... Carvalho, M. D. (2020). Suicide mortality among youth in southern Brazil: a spatiotemporal evaluation of socioeconomic vulnerability. *Brazilian Journal of Psychiatry, 42*(1), 46-53. DOI: https://doi.org/10.1590/1516-4446-2018-0352

Alothman, D., & Fogarty, A. (2020). Global differences in geography, religion and other societal factors are associated with sex differences in mortality from suicide: An ecological study of 182 countries. *Journal of Affective Disorders, 260*, 67-72. DOI: https://doi.org/10.1016/j.jad.2019.08.093

Amarante, L. R. F. A., & Kind, L. (2020). Violências e tentativas de suicídio em narrativas de mulheres jovens. *Psicologia em Revista, 26*(2), 535-555. Retrieved from http://periodicos.pucminas.br/index.php/psicologiaemrevista/article/view/23699/18732

Botti, N. C. L., Cantão, L., Silva, A. C., Dias, T. G., Menezes, L. C., & Castro, R. A. S. (2018). Características e fatores de risco do comportamento suicida entre homens e mulheres com transtornos psiquiátricos. *Cogitare Enfermagem, 23*. DOI: http://dx.doi.org/10.5380/ce.v23i1.54280

Centers for Disease Control and Prevention [CDC]. (2020). *Centers for Disease Control and Prevention. Preventing suicide*. Retrieved from https://www.cdc.gov/violenceprevention/suicide/fastf act.html

D'eça Júnior, A., Rodrigues, L. S., Meneses Filho, E. P., Costa, L. D. L. N., Rêgo, A. S., Costa, L. C., & Batista, R. F. L. (2019). Mortalidade por suicídio na população brasileira, 1996-2015: Qual é a tendência predominante? *Cadernos Saúde Coletiva, 27*(1), 20-24. DOI: https://doi.org/10.1590/1414-462X201900010211

Félix, T. A., Oliveira, E. N., Lopes, M. V. O., Parente, J. R. F., Dias, M. S. A., & Moreira, R. M. M. (2016). Fatores de risco para tentativa de suicídio: produção de conhecimento no Brasil. *Revista Contexto & Saúde, 16*(31), 173–185. DOI: https://doi.org/10.21527/2176-7114.2016.31.173-185

Figueiredo, J. H. C., Silva, N., Pereira, B. B., & Oliveira, G. M. M. (2017). Major depression and acute coronary syndrome-related factors. *Arquivos Brasileiros de Cardiologia, 108*(3), 217-227. DOI: https://doi.org/10.5935/abc.20170028

Frangione, B., Villamizar, L. A. R., Lang, J. J., Colmand, I., Lavigne, E., Peters, C., ... Villeneuve, P. J. (2021). Short-term changes in meteorological conditions and suicide: A systematic review and meta-analysis. *Environmental Research, 207*. DOI: https://doi.org/10.1016/j.envres.2021.112230

Galvão, P. V. M., Souza e Silva, H. R., & Silva, C. M. F. P. (2018). Temporal distribution of suicide mortality: A systematic review. *Journal of Affective Disorders, 228*, 132-142. DOI: https://doi.org/10.1016/j.jad.2017.12.008

Guo, Y., Chau, P. P. H., Chang, Q., Woo, J., Wong, M., & Yip, P. S. F. (2020). The geography of suicide in older adults in Hong Kong: An ecological study. *International Journal of Geriatric Psychiatry, 35*(1), 99-112. DOI: https://doi.org/10.1002/gps.5225

Helbich, M., O'Connor, R. C., Nieuwenhuijsen, M., & Hagedoorn, P. (2020). Greenery exposure and suicide mortality later in life: A longitudinal register-based case-control study. *Environment International, 143*. DOI: https://doi.org/10.1016/j.envint.2020.105982

Kious, B. M., Kondo, D. G., & Renshaw, P. F. (2018). Living high and feeling low: Altitude, suicide, and depression. *Harvard Review of Psychiatry, 26*(2), 43-56. DOI: https://doi.org/10.1097/hrp.0000000000000158

Liba, Y. H. A. O., Lemes, A. G., Oliveira, P. R., Nascimento, V. F., Fonseca, P. I. M. N., Volpato, R. J., ... Cardoso, P. C. (2016). Percepções dos profissionais de enfermagem sobre o paciente pós-tentativa de suicídio. *Journal Health NPEPS, 1*(1), 109-121. DOI: https://doi.org/10.30681/25261010

Loureiro, A., Almendra, R., Costa, C., & Santana, P. (2018). Mortality from suicide in the municipalities of Mainland Portugal: Spatio-Temporal Evolution between 1980 and 2015. *Acta Médica Portuguesa, 31*(1), 38-44. DOI: https://doi.org/10.20344/amp.9423

Mal, K., Awan, I. D., Ram, J., & Shaukat, F. (2019). Depression and anxiety as a risk factor for myocardial infarction. *Cureus, 11*(11). DOI: https://doi.org/10.7759/cureus.6064

Martinelli, N. L., Costa A. A. S., Scatena J. H. G., Soares N. R. F., Charbel, S. C., Castro M. L., ...Silva, L. M. A. (2022). Regionalização e Rede de Atenção à Saúde em Mato Grosso. *Saúde e Sociedade, 31*(4). DOI: https://doi.org/10.1590/S0104-12902022210195pt

Martinelli, N. L., Scatena J. H. G., Castro, M. L., Soares N. R. F., Charbel, S. C., Souza N. F. S., ...Souza, D. P. O.(2023). Análise da estruturação da Rede de Atenção à Saúde no estado de Mato Grosso, Brasil, no contexto da Regionalização. *Ciência & Saúde Coletiva, 28*(2). DOI: https://doi.org/10.1590/1413-81232023282.12952021

Martins, D. C., Alencar, A. B., Lima, L. L., Martins, F. D. C, & Carvalho, L. E. (2022). Perspectivas de Enfermeiros em saúde mental sob a ótica da atenção psicossocial. *Journal Health NPEPS*, *7*(2). Retrieved from https://periodicos.unemat.br/index.php/jhnpeps/article/view/6507

Mato Grosso. (2023). *Guia de Serviços: Saúde Mental. Área Técnica de Saúde Mental da Secretaria de Estado de Saúde de Mato Grosso*. Retrieved from http://www.saude.mt.gov.br/cidadao/345/guia-de-servico

Melo, C. M., Oliveira, T. S., Soares, M. Q., & Bevilacqua, P. D. (2020). Óbitos violentos e tentativas de suicídio por intoxicação exógena em mulheres: eventos preditores da violência doméstica. *Oikos: Família e Sociedade em Debate,31*(1), 7–39. DOI: https://doi.org/10.31423/oikos.v31i1.8983

Ministério da Saúde, Secretaria de Vigilância em Saúde. (2021). Mortalidade por suicídio e notificações de lesões autoprovocadas no Brasil. *Boletim Epidemiológico*, *52*(33). Retrieved from https://bitlybr.com/KjOvv

Nascimento, F. P. B., & Soares, R. J. O. (2019). Revisão integrativa sobre suicídio e tentativa de suicídio na adolescência. *Estácio Saúde, 8*(1), 34-39. Retrieved from http://revistaadmmade.estacio.br/index.php/saudesantacatarina/article/view/4373

Nascimento, V. F., Baggio, E., Nascimento, V. F., Fonseca, P. I. M. N., Silva, R. G. M., Terças, A. C. P., & Hattori, T. Y. (2017). Características da violência no trânsito por meio de uma mídia televisiva. *Revista Baiana de Saúde Pública*, *41*(2), 466-478. DOI: https://doi.org/10.22278/2318-2660.2017.v41.n2.a2423

Oliveira, L. N., Oliveira, F. S., Araújo, L. M., Silva, L. L., Crispim, Z. M., & Lucindo, V. B. D. B. (2017). Violência doméstica e sexual contra a mulher: revisão integrativa. *Holos*, *8*, 275-284. DOI: https://doi.org/10.15628/holos.2017.1903

Organização Pan-Ameriacana de Saúde, Organização Mundial da Saúde [OPAS/OMS]. (2021). *Uma em cada 100 mortes ocorre por suicídio, revelam estatísticas da OMS*. Retrieved from https://bitlybr.com/XUqHW

Paiva, R. P. N., Aguiar, A. S. C., Cândido, D. A., Monteiro, A. R. M., Almeida, P. C., Roscoche, K. G. C., ...Reis, P. A. M. (2019). Análise do perfil de usuários atendidos em um Centro de Atenção Psicossocial. *Journal Health NPEPS*, *4*(1), 132–143. Retrieved from https://periodicos.unemat.br/index.php/jhnpeps/article/view/3360

Palma, D. C. A., Santos, E. S., & Ignotti, E. (2020). Análise dos padrões espaciais e caracterização dos suicídios no Brasil entre 1990 e 2015. *Cadernos de Saúde Pública, 36*(4), 1-13. DOI: https://doi.org/10.1590/0102-311X00092819

Pérez-Piñar, M., Ayerbe, L., González, E., Mathur, R., Foguet-Boreu, Q., & Ayis, S. (2017). Anxiety disorders and risk of stroke: A systematic review and meta-analysis. *European psychiatry : the journal of the Association of European Psychiatrists, 41*, 102-108. DOI: https://doi.org/10.1016/j.eurpsy.2016.11.004

Santos, E. G. O., & Barbosa, I. R. (2017). Conglomerados espaciais da mortalidade por suicídio no nordeste do Brasil e sua relação com indicadores socioeconômicos. *Cadernos Saúde Coletiva, 25*(3), 371-378. DOI: https://doi.org/10.1590/1414-462X201700030015

Santos, J. L., & Maas, W. (2019). Espectro da morte em duas narrativas de Thomas Bernhard: O Náufrago e Árvores abatidas – uma provocação. *Pandaemonium Germanicum*, *22*(36), 257-272. DOI: https://doi.org/10.11606/1982-88372236257

Schütz, J. A. (2018). O pensamento sociológico de Émile Durkheim e seus vínculos com a educação. *Revista Saberes Sabores Educacionais,5*(1), 87-107. Retrieved from http://revistas.faifaculdades.edu.br/index.php/pedagogicos/article/view/536

Setti, V. M. G. (2017). Políticas Públicas e prevenção do suicídio no Brasil. *ÎANDÉ : Ciências e Humanidades, 1*(1), 104-113. DOI: https://doi.org/10.36942/iande.v1i1.23

Silva, E. S., Marques Júnior, J., & Suchara, E. A. (2018). Perfil de suicídios em município da Amazônia Legal. *Cadernos Saúde Coletiva, 26*(1), 84-91. DOI: http://dx.doi.org/10.1590/1414-462x201800010135

Simões, R. M., Santos, J. C., & Martinho, M. J. (2020). Programa psicoterapêutico de prevenção do suicídio em adolescentes: estudo de delphi. *Journal Health NPEPS*, *5*(2), 75-88. Retrieved from https://periodicos.unemat.br/index.php/jhnpeps/article/view/4802

Sousa, N. T. B., Teixeira, L. O. O., Vedana, K. G. G., & Miasso, A. I. (2021). Preditores de recorrência de lesões autoprovocadas e de óbitos por suicídio em um estado brasileiro. *Research, Society and Development*, *10*(2). DOI: https://doi.org/10.33448/rsd-v10i2.12142

The Lancet Public Health. (2018). Suicide in the USA: a public health emergency. *Lancet Public Health*, *3*(7), e304. DOI: https://doi.org/10.1016/S2468-2667(18)30115-4

Vasconcelos Neto, P. J. A., Moreira, R. S., Oliveira Júnior, F. J. M., & Ludermir, A. B. (2020). Tentativa de suicídio, transtorno de estresse pós-traumático e fatores associados em mulheres do Recife. *Revista Brasileira de Epidemiologia, 23*, 1-14. DOI: https://doi.org/10.1590/1980-549720200010

Viana, A. L. D., Bousquat, A., Melo, G. A., Negri Filho, A., & Medina, M. G. (2018). Regionalização e redes de saúde. *Ciência & Saúde Coletiva*, *23*(6), 1791-1798. DOI: https://doi.org/10.1590/1413-81232018236.05502018

Ximenes Neto, F. R. G., Pessoa, C. V., Santos, F. D., Lourenção, L. G., Vasconcelos, L. F. Q., Oliveira, E. N., Freire, N. P., ... Machado, M. H. (2022). Gestão da educação de enfermeiros da Estratégia Saúde da Família. *Journal Health NPEPS*, *7*(1). DOI: http://dx.doi.org/10.30681/252610106296

Vieira, R. G., Almeida, C. F. R., Rodrigues, G., Gonçalves, S. S., França, A. S., & Oliveira, M. B. (2017). Prevalência e risco de suicídio no brasil e na cidade de Barra do Garças (MT): revisão de literatura. *Debates em Psiquiatria*, *7*(2), 10-14. DOI: https://revistardp.org.br/revista/article/view/96

Yarza, S., Vodonos, A., Hassan, L., Shalev, H., Novack, V., & Novack, L. (2020). Suicide behavior and meteorological characteristics in hot and arid climate. *Environmental Research,184.* DOI: https://doi.org/10.1016/j.envres.2020.109314