The geography of femicide in Sergipe, Brazil: matriarchy, human development and income distribution

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Abstract

Objective: This research analyzed the joint spatial distribution and explored possible associations between epidemiological aspects and feminicide rates, in the municipalities of the State of Sergipe located into northeastern Brazilian. ***Methodology:*** An exploratory ecological study investigated the global spatial autocorrelation of epidemiological aspects with feminicide rates from municipalities of the State of Sergipe – Brazil (n= 75), in the 2013-2017 period, using the "global" and "local" Moran statistic method and a multiple spatial regression, having as variables of exposure the socioeconomic status, the demographic status, the services and health status, feminicide rates. The software used was Stata 11.0, SPSS 18.0 and GeoDa 0.95-i. ***Results:*** The spatial distribution of the femicide rates was not random and showed high spatial autocorrelation and predominance of significant spatial groupings of municipalities with the highest mortality rates due to feminicide in the central region of Sergipe State. In the multiple regression, the percentage of women heads of families and the Municipal Human Development Index were positively associated with the rates of femicide in Sergipe's municipalities in the studied period ($p < 0.05$). The opposite situation occurred between the GINI Index and the rates of femicide. ***Conclusions:*** This is the first study that analyze the factors associated with the spatial clusters of feminicide rates in a geographical space where there is a predominance of patriarchal culture. There was an increase in femicide in locations where there is lowest social inequality, greater human development and greater authority exercised by women in the family environment.

Keywords: Homicide. Gender-Based Violence. Mortality. Epidemiology. Ecological Studies. Spatial Analysis.

Resumo

Objetivo: Esta pesquisa analisou a distribuição espacial conjunta e explorou possíveis associações entre aspectos epidemiológicos e taxas de feminicídio, nos municípios do Estado de Sergipe, localizados no nordeste brasileiro. ***Metodologia:*** Um estudo ecológico exploratório investigou a autocorrelação espacial global de aspectos epidemiológicos com taxas de feminicídio em municípios do Estado de Sergipe - Brasil (n = 75), no período 2013-2017, utilizando a estatística de Moran "global" e "local" e uma regressão espacial múltipla, tendo como variáveis a condição socioeconômica, a situação demográfica, os serviços e estado de saúde, taxas de feminicídio. Os softwares utilizados foram Stata 11.0, SPSS 18.0 e GeoDa 0.95-i. ***Resultados:*** A distribuição espacial das taxas de feminicídio não foi aleatória e apresentou elevada autocorrelação espacial e predomínio de agrupamentos espaciais significativos de municípios com as maiores taxas de mortalidade por feminicídio na região central do Estado de Sergipe. Na regressão múltipla, o percentual de mulheres chefes de família e o Índice de Desenvolvimento Humano Municipal associaram-se positivamente às taxas de feminicídio nos municípios sergipanos no período estudado (p <0,05). Situação oposta ocorreu entre o Índice GINI e as taxas de feminicídio. ***Conclusões:*** Este é o primeiro estudo que analisa os fatores associados aos clusters espaciais das taxas de feminicídio em um espaço geográfico onde há predomínio da cultura patriarcal. Houve aumento do feminicídio em localidades onde há menor desigualdade social, maior desenvolvimento humano e maior autoridade exercida pelas mulheres no ambiente familiar.

Palavras-chave: Homicídio. Violência baseada no gênero. Mortalidade. Epidemiologia. Estudos Ecológicos. Análise espacial.

Femicide is rooted in gender inequality and contributes to perpetuate the subordinate position of women in society at a legal, social and economic level, being considered a serious public health problem already described by the World Health Organization over 30 years ago [1,2].

Brazil ranks 5th on the world scale of femicide, preceded only by El Salvador, Colombia, Guatemala and Russia [3]. The Map of Violence in Brazil (2015) already illustrated rising rates of female deaths from aggression in the 1980-2013 period and rising mortality rates in the period ranging from 2.3/100,000 - 4.8/100,000 women, respectively [4]. This trend has remained over time, as described in the latest edition of the Atlas of Violence in Brazil in 2019, which shows upward results in 2017, about 13 murders deaths by aggression per day - making a total of 4,936 women murdered by aggression in this year, the highest recorded since 2007 [5]. There was an increase of 30.7% in the number of women murdered by aggression during the years 2007-2017, with an increase of 6.3% between 2016-2017. The northeastern region of the country stood out for presenting expressive rates of women murdered by aggression in 2017: *Rio Grande do Norte* (67.4), followed by *Ceará* (64.0), *Pernambuco* (62.3), *Sergipe* (58, 9), *Bahia* (55.3), *Alagoas* (53.9), *Paraíba* (33.9), *Maranhão* (31.9) and *Piauí* (20.9) [5]. Among Brazilian states, Sergipe draws attention for presenting the highest increase in the rate of femicide per 100 thousand women (163.9%) between the years 2017 and 2018 [5].

It is clear that despite the promulgation of what is known as the "*Maria da Penha* Law" which aimed to create mechanisms to curb domestic and family violence against women, female mortality from aggression in Brazil has increased more than twice in the last 30 years (*Maria da Penha* Law, Law n. 11.340, August 7th, 2006; Meneghel et al., 2013). It is not known for sure whether the increase in police records of

femicide reflects an increase in the number of cases, or a decrease in underreporting, since the "*Maria da Penha* Law" is relatively new, so that there may be an ongoing learning process by the judicial authorities [5]. On the other hand, this can had happened because this device often left room for reprisals that often culminated in femicide [8,9]. In order to change this sad Brazilian reality, another important law called the "Femicide Law" was implemented with the purpose of being even more rigorous in coercing aggressors and making this phenomenon still visible. With the amendment of article 121 of the Brazilian Penal Code, femicide becomes qualified in the list of heinous crimes (Femicide Law, Law n. 13.104, March 9th, 2015; Teles, 2018).

Studies have shown an increase in femicides in capitals and large Brazilian cities, in the three-year periods of 2007-2009 and 2011-2013, mainly among young, poor, black, single and low-educated women [3]. Paradoxically, some studies on femicide have pointed out that poor women are more affected, since they observed a positive association between poverty and female deaths [12,13]. The contexts of women's homicides are diverse and obey distinct social dynamics and peculiarities to the geographic context of origin, in which the gender marker is always present [3].

In addition, northeastern society, especially that of the state of Sergipe, culturally preserves provincial habits and traditions in a peculiar way, whose valorization of families with surnames, titles and economic possessions is an indelible mark in the history of the patriarchy present in the Northeast of Brazil [14,15]. In this sense, it is important to highlight that there is evidence that points to an increase in this type of violence in places where patriarchal culture is still perpetuated [16], being justified by the fact that in more conservative communities, gender norms are more rigid and women remain submissive, strictly fulfilling and supporting for long periods the roles assigned to them by the culture [3].

In this context, the present study aims to analyze the joint spatial distribution and explore possible associations between epidemiological aspects and feminicide rates, in the 2013-2017 period, in the municipalities of the state of Sergipe located in northeastern Brazil.

Materials and methods

This exploratory ecological study, approved by the Ethics Committee of the Federal University of Sergipe (CAEE 17504319.0.0000.5546), included secondary data from the Sergipe population, which is freely available in Brazilian databases.

Sergipe is the smallest Brazilian state and sixth least populous in the country, has a geographical area of 21,926.908 km² and a population of 2,068,017 people, being divided into 8 territories (*Agreste Central, Alto Sertão, Baixo São Francisco, Centro Sul, Grande Aracaju, Leste, Médio Sertão, Sul*) and 75 municipalities, whose greatest distance from the capital of the state is around 200 km.[17]. Sergipe is 20th in the national ranking of the Human Development Index and 4th in the ranking in this category among the states of the Northeast. Its capital, Aracaju is a true social and economic oasis of opportunities for other municipalities in the state, it concentrates the best development rates and indicators in Sergipe and thus offers the best job and service opportunities; aspects that have attracted to the capital the population residing in the interior of the state [17]. Since more than half of the municipalities of Sergipe's State have a low Human development index and high social vulnerability index [18].

The geographic and spatial data of each municipality in Sergipe, considering its latitude, longitude, perimeter, area and location were obtained from the website of the Brazilian Institute of Geography and Statistics [17].

The dependent variable of this study was determined from the female mortality rates due to aggression, calculated according to each municipality in Sergipe, in the period from 2013 to 2017. The coefficients were grouped into five years to decrease the temporal and geographic oscillations common in events of small magnitude. Gross mortality data due to aggression of women were retrieved from the Brazilian Ministry of Health's Mortality Information System and causes of death were be considered

according to the categories of the 10th edition of the International Classification of Diseases (ICD-10) in the range of X85 to Y09 [19]. The data of the total resident population in each municipality in the state of Sergipe in the period corresponding to the study were based on the 2010 population census and estimates for the inter-census years that were obtained on the website of the Brazilian Institute of Geography and Statistics [17]. Femicide rates were calculated by dividing the data on mortality from aggression by women in each of the Sergipe's municipalities by the data on the total female population residing in the same place.

The independent variables selected for this study were collected in several national databases in the studied period (2013-2017), being estimated the averages of the data available for each of these variables. These variables are described in detail below:

Socioeconomic status: Municipal Human Development Index (MHDI), Income Concentration Index (GINI Index), average household income per capita, percentage of the population with less than ½ minimum wage, percentage unemployed and percentage of female heads of household were recovered from the Brazilian Institute of Geography and Statistic website [20]; and the Social Vulnerability Index (SVI) was obtained from the Institute of Applied Economic Research[18].

Demographic status: percentage of civil and/or religious marriage, percentage of Catholics, percentage of Evangelicals, percentage of the population without religion, percentage of the urban population, percentage of the rural population were recovered from IBGE website [20].

Services and health status: percentage of population covered by the Unified Health System, mortality rate from Human Immunodeficiency Virus, maternal mortality

rate, cervical cancer mortality rate that were retrieved from the Health Information System websites of the Brazilian Ministry of Health [19].

Univariate exploratory analysis of spatial data was performed to investigate global spatial autocorrelation of femicide rates in Sergipe's municipalities using the Moran I index, under the assumptions of normality and randomization [21]. The distribution of Moran index values varies between -1,0 and +1,0 and tests whether connected areas present greater similarity in relation to the studied indicator, than would be expected in a random pattern. Thus, spatial autocorrelation measures the number of nearby objects compared to other nearby objects using the Moran I index, which can be classified as positive, negative and without spatial autocorrelation.

The variables in this study were grouped into three blocks to jointly assess the indicators associated with femicide by Pearson's correlation coefficient (r), where the direction and magnitude of the associations between the independent variables were assessed using a correlation matrix: 1) socioeconomic status; 2) demographic status and 3) services and health status. For this analysis, all variables were standardized with a mean of zero (0.0) and standard deviation equal to one (1.0), due to their different dimensions, which could impair their inclusion and interpretation in the model.

Multiple spatial regression was performed in the last analysis phase. The quality of the fit of the spatial regression model is similar to the traditional linear regression model, verified by the residual analysis and also based on the Moran I index [22]. The following criteria were used to include or remove variables from the model: 1) Selection of the variable with the highest statistical correlation; 2) Inclusion of variables that, when analyzed together, obtained a higher F in the simple regression analysis; This inclusion does not prevent variables from the same block from being included as "adjustment variables", regardless of their association. 3) Inclusion of variables that,

once in partial correlation, controlled by modeled variables, showed significant correlation with the dependent variable. The final model exclusion criteria for the variables were the value of p ≥0,05. The software used was Stata 11.0, SPSS 18.0 and GeoDa 0.95-i.

Results

A standardized average mortality rate of 26,80 *death/100,000* women in Sergipe's municipalities. The spatial distribution of femicide rates are illustrated in Figure 1. It is observed that the highest rates occurred in Sergipe's territories that correspond to the *Grande Aracaju* (45.54 death/100,000 women), *Sul* (32.97 death/100,000 women), *Agreste Central* (32.44 death/100,000 women)*, Médio Sertão* (27.37 death/100,000 women), Centro Sul (26.39 death/100,000 women)*, Baixo São Francisco* (17.59 death/100,000 women), Alto Sertão (16.79 death/100,000 women) and *Leste* (16,04 death/100,000 women), successively. Among the 75 municipalities in the state of Sergipe, its capital Aracaju is in 37th position in the ranking of femicide.

There was not a random distribution of this rate with positive spatial autocorrelation (I=0,0993881; p-valor = 0,001 for 999 permutations). It is possible to observe the occurrence of spatial autocorrelations of the "high-high" type, indicating a grouping of municipalities in Sergipe with the highest mortality rates due to feminicide located in the central region of Sergipe (*Areia Branca, Malhador, Santa Rosa de Lima, Ribeirópolis*) and the "low-low" type, considered the group with the lowest rate, represented by the municipalities *of Nossa Senhora de Lourdes*, *Propriá*, *São Francisco* and *Japaratuba* (Fig. 2). It was also observed the occurrence of spatial autocorrelations of the "low-high" type, in the municipality of *Maruim*, meaning that the municipality or the spatial group presents low values regarding the rates of femicide, but high rates in the surrounding municipalities (Fig. 2). An inverse condition was observed in the municipalities of *Lagarto, Aquidabã* and *Carmópolis*, where spatial autocorrelations of the "high-low" type occurred, a scenario in which these municipalities present high rates of femicide, but their surrounding municipalities have low rates (Fig. 2).

Moran Local's Statistics I (Fig. 3) is also of great importance for the analysis, since it shows the degree of significance of certain groups. According to the Local Space Association Indicator (LISA), the municipalities with the highest rates of femicide are Santa Rosa de Lima and Aquidabã. The analysis identified significant LISA sector clusters. The significance of this indicator in the period considered implies the existence of positive multidirectional externalities of the rates of femicide in the municipalities of the State of Sergipe.

In the bivariate analysis (table 1), the percentage unemployed and the percentage of women heads of families (matriarchy had a statistically significant positive correlation with the rates of femicide ($p< 0,01$ and $p < 0,05$, respectively). There were also negative significant correlations between the proportion of the population with less than ½ minimum wage and feminicide rates ($p < 0.05$).

Table 2 illustrates the results of the final spatial regression analysis model. The percentage of women heads of families (matriarchy) and the Municipal Human Development Index (MHDI) were positively associated with the rates of femicide in Sergipe's municipalities in the period between 2013 and 2017 ($p <0.05$). The opposite situation occurred between the Income Concentration Index (GINI Index) and the rates of femicide in these municipalities in the period studied.

Discussion

This study has some limitations inherent to the methodology used. The possibility of ecological fallacy cannot be excluded, since an association observed between aggregates does not necessarily mean that the same association occurs in an individual level [23]. The low construct validity is another possibility that cannot be ruled out, since not all explanatory outcomes of the variables may have been included in the methodology used [24]. In order to reduce some of these limitations, this study worked with variables available in several national databases and may present differences in quality inherent to the use of indirect estimates [25].

The results of the present study show a very uneven distribution of the rates of femicide per 100 thousand women in the Sergipe's municipalities in the period studies, whose rates standardized ranged between 11.74 death/100,000 women and 87.80 death/100,000 women (Figure 1). In order to adjust the differences in the distribution by sex of the population and, consequently, a possible confounding effect of the latter on the rates of feminicide in the municipalities of Sergipe, the direct method of standardization of these rates was employed [26], since there is a possibility of an increase or reduction of the female population to the detriment of the male population in some municipalities. In addition, the selection of women's deaths from aggression with a feminicide proxy variable could overestimate this phenomenon. However, a percentage of underreporting deaths of 24% in the Northeast region of Brazil should be expected [2,17,27], which could compensate for underreporting or even the ill-defined diagnosis of the cause of death due to female aggression.

There was a predominance of significant spatial groupings of femicide rates in the central Sergipe region (Fig. 2), which was confirmed by LISA (Fig. 3). Studies also show the possibility of some peculiar context in the central region of Sergipe,

despite not having found spatial dependence on the rates of femicide in the Sergipe's municipalities in 2017 [28], despite the findings of Grana [29] and Meneghel & Portella [30] suggest that the incidence of femicide is higher in urban agglomerations and cities with a higher population density. It is known that the scenarios of feminicides are diverse and present peculiar geographical contexts that are associated with the female gender [30]. There is an increase in femicide in places where there is a predominance of patriarchal culture, an indelible mark of Sergipe society [14,31,32]. This fact could be observed in the groupings of municipalities in Sergipe that presented spatial autocorrelations of the "high-high" type. This is because in these agglomerations there is intense livestock activity, with an appreciation of male gender roles, in which the courage, strength and virility of men are considered essential to work with cattle, usually extending to gender relations and daily life. Similar conditions were found in other regions of Brazil that also have this economic matrix and still maintain strong traditional patriarchal values and the submission of women to men [33].

In multiple spatial regression, the Municipal Human Development Index (MHDI) was directly associated with the rates of femicide. This fact makes evident the contradiction between the increase in femicide in places with higher human development rates [30,34]. Contrasting results of other studies, which describe an inverse relationship between the occurrence of feminicide with economic development and the quality of life of the population, respectively [35].

The income concentration, estimated from the GINI index, showed an inverse association with the femicide rates in the final spatial model. Suggesting that in the places with the lowest social inequality are found the highest rates of femicide. This result is contradicting the findings of Leite et.al. (2017) [35] that they reported the presence of a direct relationship between social inequality and the rates of femicide. On

the other hand, in this same study, it is reported in a peculiar some regionals exceptions about the trends of social inequity found as in Espírito Santo State, which it presented better inequality and high indicators of the female mortality rates due to aggression compared to others Brazilian States analyzed [35]. Being extremely important to highlight in this moment that although lost socioeconomic issues linked to femicide, the factors that permeate violence in general go beyond poverty and social inequality. This is reinforcing the multifactorial nature of violence against women, resulting from the interaction of individual, relational, social, cultural and environmental factors [35,36].

The matriarchy was positively associated with the rates of femicide in Sergipe's municipalities in the period studied. Suggesting that the change in traditional gender roles is a potential generator of conflicts for challenging the patriarchal thinking of society [2,3]. Thus, the achievement of women's socioeconomic autonomy in patriarchal societies is able to tension traditional gender patterns, increasing the risk of feminicide [37,38].

In this context, it is clear that despite the socioeconomic condition being closely related to feminicide, this phenomenon has multifactorial characteristics that result from the interaction between individual, relational, social, cultural and environmental conditions [1]. Feminicide has its roots in gender inequality, presenting diverse contexts that obey distinct social dynamics and peculiar to the geographic context of origin.

This is the first study that analyzed the factors associated with spatial clusters of femicide in a geographic space where there is a predominance of patriarchal culture. Although public policies to combat femicide have already completed more than a decade in Brazil, this study shows a very uneven distribution of rates of femicide that showed a direct association with human development and matriarchy, and an inverse

association with concentration of income. These findings reinforce the fact that of violence against women as a multifactorial phenomenon, resulting from the interaction of individual, relational, social, cultural, and environmental factors. Making it imperative to carry out further studies to unravel the possible factors that predispose as high rates of femicides in in the municipalities of the State of Sergipe. It is suggested the need for local redirection of Brazilian public policies to combat femicide, since feminicide has its roots in gender inequality, having different contexts that obey social dynamics and peculiarities to the geographical context of its origin.

References

1.   Krug E, Dahlberg L, Mercy J, Zwi A, Lozano R. Informe mundial sobre la violencia y la salud. *Rev Inst Med Trop Sao Paulo*. Published online 2003. doi:10.1590/s0036-46652003000300014

2.   Meneghel SN, Hirakata VN. Femicídios: homicídios femininos no Brasil. *Rev Saude Publica*. 2011;45(3):564-574. doi:10.1590/S0034-89102011000300015

3.   Meneghel SN, Rosa BAR da, Ceccon RF, Hirakata VN, Danilevicz IM. Feminicídios: estudo em capitais e municípios brasileiros de grande porte populacional. *Cien Saude Colet*. 2017;22(9):2963-2970. doi:10.1590/1413-81232017229.22732015

4.   Waiselfisz JJ. *O Mapa Da Violência 2015: Homicídios de Mulheres No Brasil*. FLACSO; 2015. https://www.mapadaviolencia.org.br/pdf2015/MapaViolencia_2015_mulheres.pdf

5.   IPEA. *Atlas Da Violência 2019*.; 2019. http://www.ipea.gov.br/portal/index.php?option=com_content&id=34784&Itemid=432

6.   Meneghel SN, Mueller B, Collaziol ME, Quadros MM de. Repercussões da Lei Maria da Penha no enfrentamento da violência de gênero. *Cien Saude Colet*. 2013;18(3):691-700. doi:10.1590/S1413-81232013000300015

7.   Brasil. *Lei Maria Da Penha, Lei Nº 11.340 de 7 de Agosto de 2006*.; 2006. http://www.planalto.gov.br/ccivil_03/_ato2004-2006/2006/lei/l11340.htm

8.   Porto RTC. A implementação das práticas restaurativas na prevenção ao feminicídio enquanto política pública para os homens autores de violência de gênero no Brasil. Published online 2016.

https://repositorio.unisc.br/jspui/handle/11624/1051

9.   Osava M. Mulheres-Violência: Lei brasileira ainda não evita mortes.
     IPS/Envolverde. Published 2019. Accessed November 6, 2019.
     http://www.ipsnoticias.net/portuguese/2009/03/america-latina/mulheres-
     violencia-lei-brasileira-ainda-nao-evita-mortes/

10. Brasil. *Lei Do Feminicídio, Lei Nᵒ 13.104, de 9 de Março de 2015*.; 2015.
     http://www.planalto.gov.br/ccivil_03/_ato2015-2018/2015/lei/L13104.htm

11. Teles MVS. A Lei do Feminicídio e a promessa de redução da violência letal
     contra a mulher: o caminho do reconhecimento do direito da mulher. *Rev UFG*.
     Published online 2018. doi:10.5216/revufg.v17i21.51712

12. Campbell JC, Glass N, Sharps PW, Laughon K, Bloom T. Intimate partner
     homicide: Review and implications of research and policy. *Trauma, Violence,
     Abus*. Published online 2007. doi:10.1177/1524838007303505

13. Carcedo A. *No Olvidamos Ni Aceptamos: Femicidio En Centroamérica 2000-
     2006*. Cefemina y Horizons; 2010.

14. Cachapuz R. Da família patriarcal à família contemporânea. *Rev Jurídica
     Cesumar*. 2004;4(1):69-77.

15. Mello JC de. MULHERES NA JURISPRUDENCIA SERGIPANA: A
     DESEMBARGADORA CLARA LEITE EM SERGIPE E SUA TRAJETÓRIA.
     Interfaces Científicas - Direito. Published online 2014. doi:10.17564/2316-
     381x.2014v3n1p95-106

16. Costa MC da, Lopes MJM, Soares J dos SF, Costa MC da, Lopes MJM, Soares J
     dos SF. Violence against rural women: gender and health actions. *Esc Anna Nery
     - Rev Enferm*. 2015;19(1):162-168. doi:10.5935/1414-8145.20150022

17. IBGE. Instituto Brasileiro de Geografia e Estatística. Estatísticas do Registro

Civil 2009. Published 2010. Accessed July 6, 2019.

http://www.ibge.gov.br/home/presidencia/noticias/imprensa/ppts/0000000205.pd

f

18. Andrade CB de, Santos AJ da R, Cruz F dos SL, et al. Vulnerabilidade social no

Estado de Sergipe. In: Costa MA, Margut BO, eds. *Atlas Da Vulnerabilidade*

Social Nos Municípios Brasileiros. IPEA; 2015.

http://repositorio.ipea.gov.br/bitstream/11058/8908/1/Vulnerabilidade

Sergipe.pdf

19. DATASUS. Informações de Saúde: Estatísticas Vitais Mortalidade e Nascidos

Vivos. Brasil. Ministério da Saúde. Departamento de Informática do SUS.

Published 2020. Accessed July 25, 2016.

http://www2.datasus.gov.br/DATASUS/index.php?area=0205

20. IBGE. Instituto Brasileiro de Geografia e Estatística: Cidades@. Instituto

Brasileiro de Geografia e Estatística. Published 2020. Accessed February 4, 2020.

http://cidades.ibge.gov.br/xtras/perfil.php?codmun=510790

21. Druck S, Carvalho S, Câmara G, Monteiro A. *Spatial Analysis and*

Geoprocessing. Spatial Analysis of Geographic Data. EMBRAPA; 2004.

22. Anselin L. Exploring spatial data with GeoDaTM: a workbook. *Urbana*.

2005;51:61801.

https://www.csiss.org/clearinghouse/GeoDa/geodaworkbook.pdf%5Cnpapers2://

publication/uuid/E0873286-D4F0-4180-97A0-880162216293

23. Szklo M, Javier-Nieto F. *Epidemiology: Beyond the Basics*. 3rd ed. Jones &

Bartlett Publishers; 2012.

24. Schwartz S. The fallacy of the ecological fallacy: the potential misuse of a

concept and the consequences. *Am J Public Health*. 1994;84(5):819-824.

doi:10.2105/AJPH.84.5.819

25.   Frias PG De, Pereira PMH, Andrade CLT De, Szwarcwald CL. Sistema de
       Informações sobre Mortalidade: estudo de caso em municípios com precariedade
       dos dados. *Cad Saude Publica*. 2008;24(10):2257-2266. doi:10.1590/S0102-
       311X2008001000007

26.   Beaglehole R, Bonita R. *Basic Epidemiology.Pdf*.; 2002.

27.   Soares-Filho AM, Souza M de FM de, Gazal-Carvalho C, et al. Análise da
       mortalidade por homicídios no Brasil. *Epidemiol e Serviços Saúde*. Published
       online 2007. doi:10.5123/s1679-49742007000100002

28.   Marques WTS, Santos SM dos, Santos M de S, Oliveira MGD de, Nery FS.
       Distribuição espacial do feminicídio no estado de Sergipe. In: *Congresso
       Internacional de Enfermagem*. UNIT; 2019.
       https://eventos.set.edu.br/index.php/cie/article/view/11335

29.   Grana SJ. Sociostructural considerations of domestic femicide. *J Fam Violence*.
       Published online 2001. doi:10.1023/A:1012229011161

30.   Meneghel SN, Portella AP. Feminicídios: conceitos, tipos e cenários. *Cien Saude
       Colet*. 2017;22(9):3077-3086. doi:10.1590/1413-81232017229.11412017

31.   Leão LH da C, Vasconcellos LCF de. Cadeias produtivas e a vigilância em saúde,
       trabalho e ambiente. *Saúde e Soc*. 2015;24(4):1232-1243. doi:10.1590/S0104-
       12902015136460

32.   Godoi H, de Mello ALSF, Caetano JC. [An oral health care network organized by
       large municipalities in Santa Catarina State, Brazil]. *Cad Saude Publica*.
       2014;30(2):318-332. doi:10.1590/0102-311X00084513

33.   Leites GT, Meneghel SN, Hirakata VN. Female homicide in Rio Grande do Sul,
       Brazil. *Rev Bras Epidemiol*. 2014;17(3):642-653. doi:10.1590/1809-

4503201400030006

34. Faludi S. *Backlash: O Contra-Ataque Na Guerra Não Declarada Contra as Mulheres*. Rocco; 2001.

35. Leite FMC, Mascarello KC, Almeida APSC, et al. Análise da tendência da mortalidade feminina por agressão no Brasil, estados e regiões. *Cien Saude Colet*. 2017;22(9):2971-2978. doi:10.1590/1413-81232017229.25702016

36. Dahlberg LL, Krug EG. Violência: um problema global de saúde pública. *Cien Saude Colet*. 2006;11(suppl):1163-1178. doi:10.1590/S1413-81232006000500007

37. Gartner R, Baker K, Pampel FC. Gender Stratification and the Gender Gap in Homicide Victimization. *Soc Probl*. Published online 1990. doi:10.2307/800584

38. Schraiber LB, Gomes R, Couto MT. Homens e saúde na pauta da Saúde Coletiva. *Cien Saude Colet*. 2005;10(1):7-17. doi:10.1590/S1413-81232005000100002
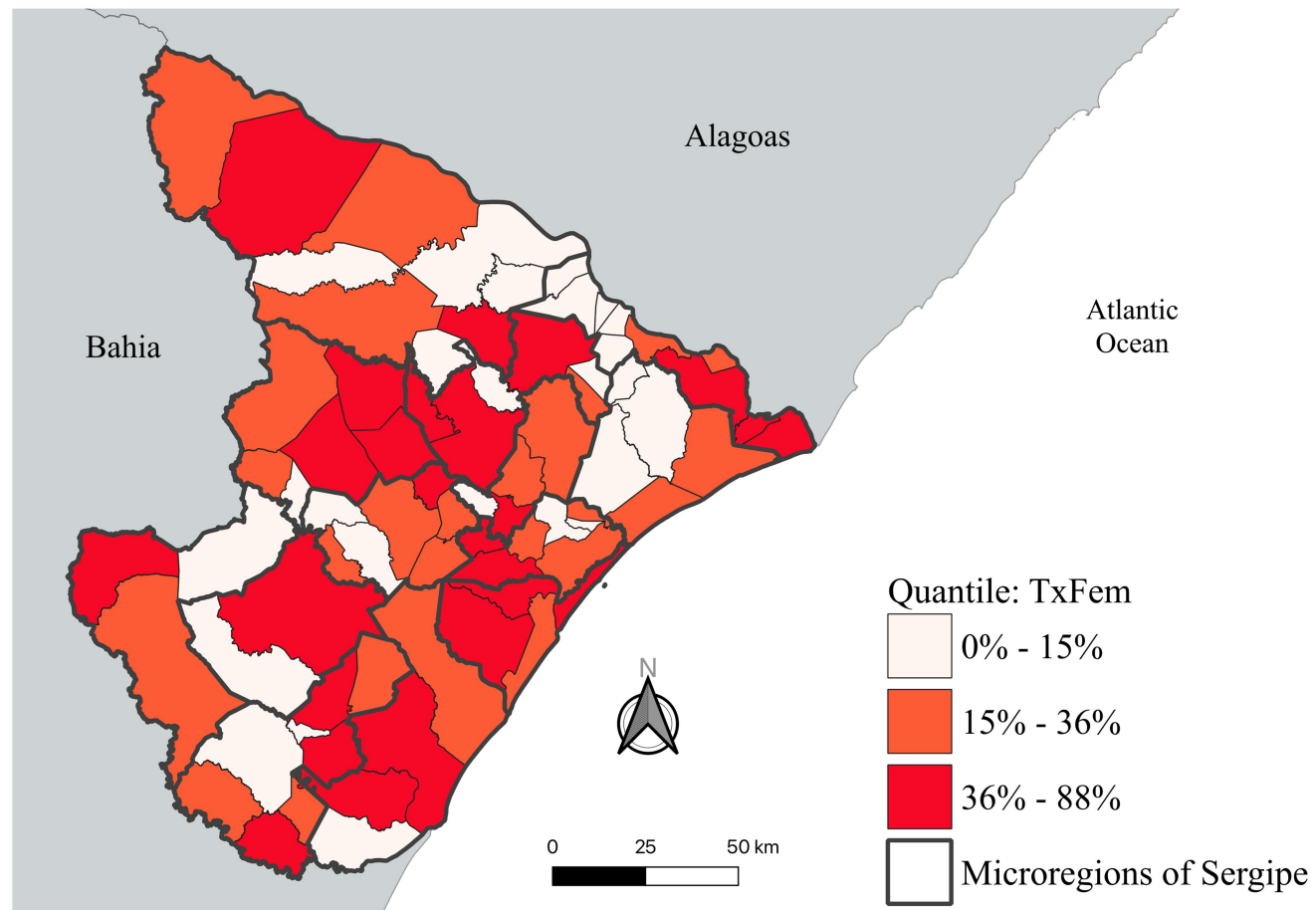
Fig. 1. Femicide rates per 100 thousand female inhabitants, in Sergipe's municipalities, in the period 2013-2017, according to tercil.

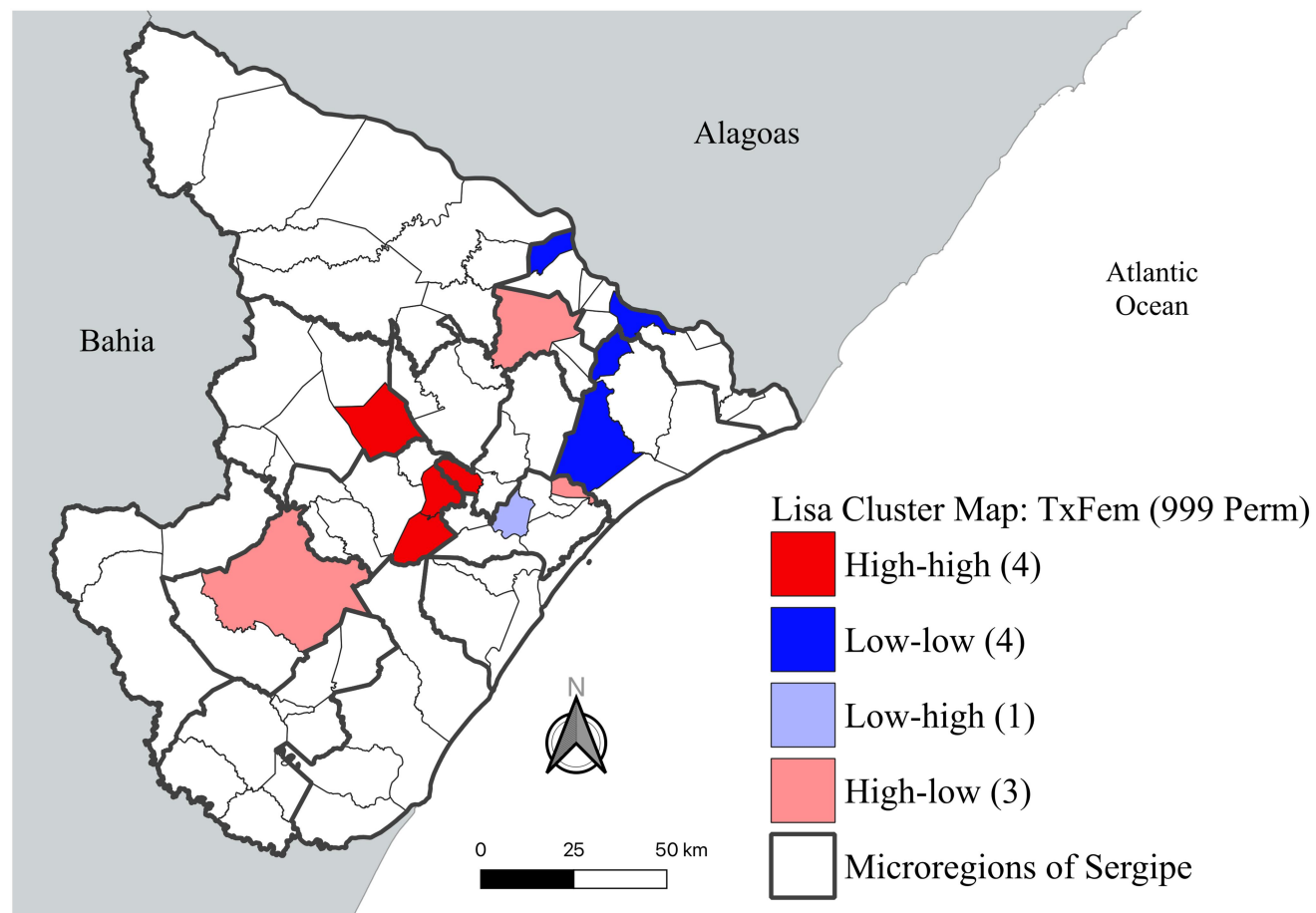*Source:* research results (2020).

Fig 2. Moran's dispersion map for the rates of femicide per 100 thousand inhabitants, in Sergipe's municipalities, in the period 2013-2017.
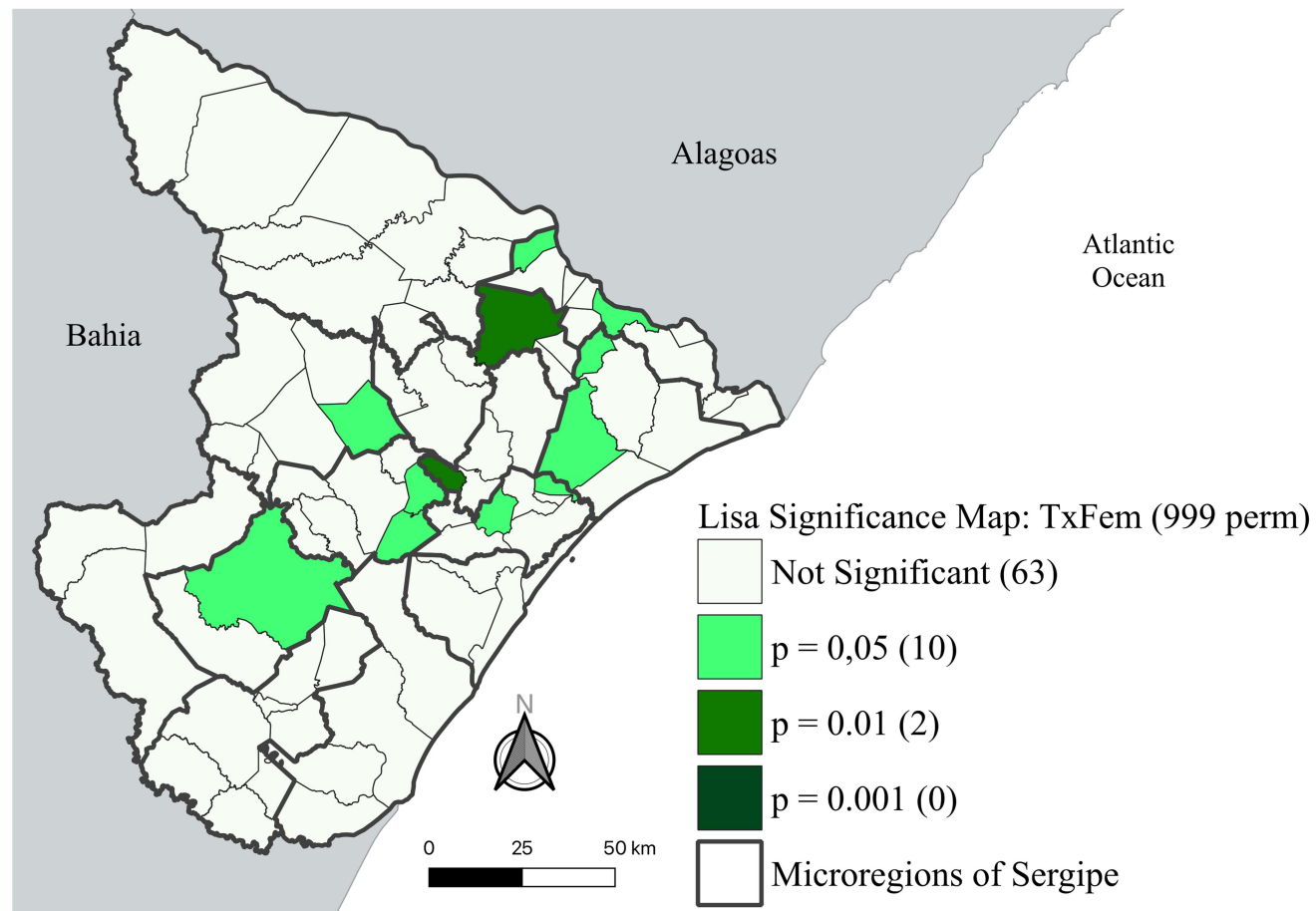
Source: research results (2020).

Fig. 3. Identification of the occurrence of significant clusters, based on the analysis of the local Moran index, for the rates of femicide per 100 thousand inhabitants, in Sergipe's municipalities, in the period.

Source: research results (2020).

Table 1. Correlation matrix among feminicide rates standardized by 100 thousand women in Sergipe's municipalities, in the period 2013-2017, and the variables selected in the different blocks of analysis.

ZTXFEM	ZTXFEM	ZIDHM	ZGINI	ZRENDA	ZPOBRE	ZIVS	ZDES	ZMATRI	ZCASA
	1	0,026	0,065	-0,211	-,522**	0,104	,588**	,246*	-0,077
ZTXFEM	ZCAT	ZEVA	ZSRELI	ZURB	ZRUR	ZSUS	ZHIV	ZMMAT	ZMCC
	-0,077	0,045	0,037	0,15	-0,156	0,089	-0,115	0,009	0,168

** $p<0,01$

* $p<0.05$

ZTXFEM: feminicide rates standardized by 100 thousand women in Sergipe's municipalities; Z MHDI: average municipal human development index; ZGINI: average Gini Index; ZINCOME: average household income per capita; ZPOOR: proportion of the population with less than ½ minimum wage; ZVSI: Social Vulnerability Index; ZUE: percentage unemployed; ZFHH: percentage of female heads of household (matriarchy); ZM: percentage of civil and/or religious marriage; ZCAT: percentage of catholics; ZEVA: percentage of evangelicals; ZWRELI: percentage of the population without religion; ZURB: percentage of the urban population; ZRUR: percentage of the rural population; ZSUS: percentage of population covered by the Unified Health System; ZHIV: average of mortality rate from Human Immunodeficiency Virus; ZMMR: maternal mortality rate; ZMCC cervical cancer mortality rate.

Source: research results (2020).

Table 2. Spatial Multiple Regression Model of feminicide rates standardized by 100 thousand women in Sergipe's municipalities and associated factors, between 2013-2017.

Variables	Coefficients	Standard error	t	p-value
CONSTANT	-1.1329	0.557672	-2.03154	0.04594
MATRIARCHY	0.00914008	0.00359773	2.54051	0.01326
MHDI	4.35668	1.64747	2.64447	0.01006
GINI	-3.18472	1.06176	-2.99946	0.00373

Source: research results (2020).