

## ORIGINAL ARTICLE

# Spatial distribution of domestic violence against women

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## Abstract

**Introduction:** Violence against women is motivated by domination in power relations, including male over female violence, defined as violent action that can cause physical, sexual or mental injury or suffering, as well as intimidation, deprivation of rights to freedom or coercion carried out inside and outside the home. This aggravation has been growing more and more throughout the world, and deserves to be discussed and combated in the scope of public policies.

**Objective:** To analyse the spatial distribution of domestic violence against women in the municipality of João Pessoa, Paraíba, Brazil.

**Methods:** It is a quantitative cross-sectional study of the census type that analysed all the reported cases of domestic violence against women resident in the municipality, the study scenario, in the year 2017. The data source was of the secondary type, in the two Specialized Police Offices for Women's Affairs - DEAM, present in the municipality.

**Results:** We observed spatial patterns of domestic violence against women, as well as agglomerations throughout the capital, from the most affluent exclusive neighbourhoods to those living on the margins of society, proving that this violence has no class distinction.

**Conclusion:** The study reached the proposed goal by analysing the spatial distribution of domestic violence in the research scenario based on spatial patterns.

**Keywords:** violence against women, gender identity, geoprocessing.

## Why was this study done?

To analyze the spatial distribution of domestic violence against women in the city of João Pessoa-PB and compare it with a previous study to verify the spatiality of the phenomenon.

## What did the researchers do and find?

A spatial analysis was made that allowed to identify the increase in occurrences of domestic violence against women and the areas at greatest risk for such a phenomenon.

## What do these findings mean?

That the use of spatial statistical methods offers a better support for decision making in a more precise way. Thus, the use of spatial statistics provides better support for which decisions are taken more precisely, because they allow the development and implementation of public policies aimed at the affected population in to bring greater quality of life to these women, mainly because of the difficulty in combating this so silent violence.

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## ■ INTRODUCTION

The attempt to conceptualize violence is challenging, considering the complexity of this phenomenon, in addition to several definitions, some of them agreeing with each other, others not. In the legal field, violence is defined as the transgression of rules and laws; in the sociological field there is an emphasis on the importance of understanding violence as a process in which the subject is considered<sup>1</sup>.

Within this perspective, violence is motivated through domination in power relations; violence throughout human history is permeated by means of subjugation, the exploitation of man by man, and is capable of modifying gender, social and affective relations through the use of power and submission<sup>2</sup>. This same power, according to the same author, can be understood as a correlation of forces directed at control, or the domination exercised between the dominator and the dominated, and is rooted in social, cultural, political, economic and sexual relations.

Thus, within the existing inequalities in power relations, it is of fundamental importance to understand how these are part of the social field and how they are constructed. In this way, understood intrinsically in these relations is the male domination over the female, with its concept of symbolic domination in which it is emphasized that the activities attributed to each of the sexes not only ratify the male domination, but also do not need to be justified, making androcentric vision legitimate<sup>3</sup>.

Thus, despite many transformations, society still produces many problems generated due to the asymmetry between men and women and the desire for domination, among which is the violence against women that still endures strongly today, defined by the United Nations<sup>4</sup> in Article 1 of the Declaration on the Elimination of Violence against Women (VAW) as any violent action endorsed in the genre and that can generate injuries or suffering in the physical, sexual or mental scope of the woman, besides the possible intimidation, deprivation of the right to freedom or coercion carried out inside and outside the home.

In the same context, according to the Pan-American Health Organization<sup>5</sup>, the term “intra-family violence” was initially used when referring to violence against women perpetrated by their intimate partner, but after some modifications, they adopted the term “gender-based violence” or “violence against women” when they referred to the wide range of acts that women and children suffer, commonly by their relatives, partners and close members of the family. However, the term domestic violence against women (DVAW) was used by the United Nations (UN) at its General Assembly in 1993, with the terminology chosen for this research<sup>6</sup>.

According to global estimates of violence by men against women produced by the World Health Organization<sup>7</sup>, one in three women have suffered physical and/or sexual violence at some point in their lives. In Brazil, the data presented in a survey by the Data Senado Institute<sup>8</sup> show that in 2017 the percentage of women victims of some type of domestic violence corresponded to 29%, a rise of 11% in relation to 2015. In the state of Paraíba, according to the Secretariat for Policies for

Women (SPM), the number of women reporting some type of aggression increased by more than 51% between 2015 and 2016, from 749,024 to 1,133,345. In the region of João Pessoa, according to the Judgment on DVAW, in the year 2016 alone, 8,658 lawsuits were filed against violence against women, a very high number in the case of a city with a population of less than one million.

In view of the above problem, it is important to use statistical techniques as tools to express the difficult reality experienced by women today, and especially the problems concerning DVAW. Thus, when spatial statistical techniques are combined with the Geographic Information System (GIS), it is possible to generate maps that allow a better visualization of the problem according to the locations involved and, consequently, make it possible to define priority areas for interventions. Thus, the objective is to analyse the spatial distribution of domestic violence against women in the municipality of João Pessoa, Paraíba, Brazil.

## ■ METHODS

This is a quantitative, cross-sectional, census-type study that analysed all reported cases of DVAW in the municipality of João Pessoa-PB in the year 2017. One of the advantages of the cross-sectional study is that it enables the researcher to observe the problem studied, allowing the data to be collected more quickly, without the need for following up with volunteers, and thus generates results in a more accelerated way<sup>9</sup>.

The study site was the city of João Pessoa, capital of Paraíba, with a population of 800,323 inhabitants, estimated for the year 2018, and an area of 210,45 km<sup>2</sup>, corresponding to about 0.3% of the State of Paraíba<sup>10</sup>.

The source of data collection was of the secondary type, from the bulletins of occurrences recorded by the two Specialized Attendance Offices for Women (DEAM) located in the municipality and operating during this period. The variables used for this research were related to the month and neighbourhood of the occurrence of the event, as well as information about the type of aggression committed (physical, sexual and psychological), all taken from the police reports issued by the police stations. Subsequently, a database with all variables was constructed after authorization from the Paraíba Secretariat of State for Security and Social Defence to collect data.

After the construction of the database, exploratory analysis was carried out, where DVAW occurrences were analysed, together with an elaboration of choropleth maps containing their spatial distribution. Also analysed were the existence of areas of greater risk of DVAW in the municipality, as well as the SCAN scan map for the identification of the spatial agglomerations. For the entire analysis, software R version 3.1.1 was used and the level of significance adopted throughout the study was 5%.

### Spatial statistics applied to health

Within the health area, the term “risk map” can have several constructions, one of which is when it uses the incidence rates of a given event, an approach being

widely used in public health for this purpose. This is one of the precepts of statistics, in which it is explained that the probability of a phenomenon that occurred in the past is similar to the risk of that same phenomenon in the future<sup>11</sup>.

In order to achieve the objective of this study, it is essential to use some indicator to demonstrate the magnitude of the problem in question, that is, the risk of occurrence of X, denoted by  $\theta$ , which represents the quotient between the occurrence of the facts in a given area and the incident population regarding the event<sup>11</sup>. Thus, the relative risk is obtained as follows:

$$\theta_i = \frac{x_i/n_i}{\sum_{i=1}^a x_i / \sum_{i=1}^a n_i} \quad (1)$$

Where a denotes contiguous and disjoint areas denoted by A1, A2, ..., Aa. Then, xi and ni are the numbers of events and the population of each area, respectively. Thus, the relative risk of an area Ai, denoted by  $\theta_i$ , represents the quotient between the incidence of the observed event in this area i and the incidence observed over the entire region of the study<sup>12,13</sup>.

In this same perspective, for the application of the SCAN scan map in order to identify spatial agglomerations, we used the Poisson probabilistic model. In this model, through the calculated radius, the values of p(z) and q(z) are responsible for the maximization of the likelihood function, dependent on the totality of recorded events, and can be verified by Equation (2) below<sup>14</sup>.

$$KN = \max_{z \in Z} \frac{L(\hat{z}, \hat{p}(z), \hat{q}(z))}{L_0} \quad (2)$$

Where p is the probability of occurrence inside the circles and q, outside of them. Z corresponds to the localities that can exist as agglomerations and  $L_0$  is calculated as follows:

$$L_0 = \frac{C^C (M - C)^{M-C}}{M^M} \quad (3)$$

Where C represents the cases recorded in a given area and M corresponds to the ratio between the entire population and the entire region studied, both for the areas of the circle:

$$L(z) = \frac{\exp[-p \cdot n_z - q(M - n_z)]}{C!} p^{c_z} q^{C-c_z} \prod_i C_i \quad (4)$$

Where exp is the exponential,  $C_z$  represents the number of cases observed within the circle z and  $n_z$  is the element representing the number of people at risk in the circle z.

Thus, the SCAN scan map works as follows: First you must calculate the distance between the centroid of the area in question in relation to the other centroids, and then create a circle on top of the centroid that has had its radius increased to encompass a new centroid<sup>14</sup>. Thus, for the new point entered, the amount of occurrence  $c_z$  and its population  $n_z$  within the circle is calculated. After this step, the value of  $K_N$  given by Equation (2) is acquired, and its largest value is written. Finally, the Monte Carlo simulations are calculated, where random numbers are generated and the p-value is calculated according to the distribution generated, in order to verify their significance<sup>15</sup>.

According to the SCAN test, the hypothesis  $H_0$  to be tested corresponds to the homogeneity test, where the absence of spatial agglomerates is observed. If  $H_0$  is rejected, it is understood that there are risks in the studied sites<sup>16</sup>.

## RESULTS

In order to reach the objective of this study, choropleth maps were originated from the 1053 records of cases of domestic violence against women, scattered in the 63 districts of the city, that occurred in 2017. To understand how these facts behaved throughout the year, Figure 1 shows the monthly quantities, which presented some significant oscillations.

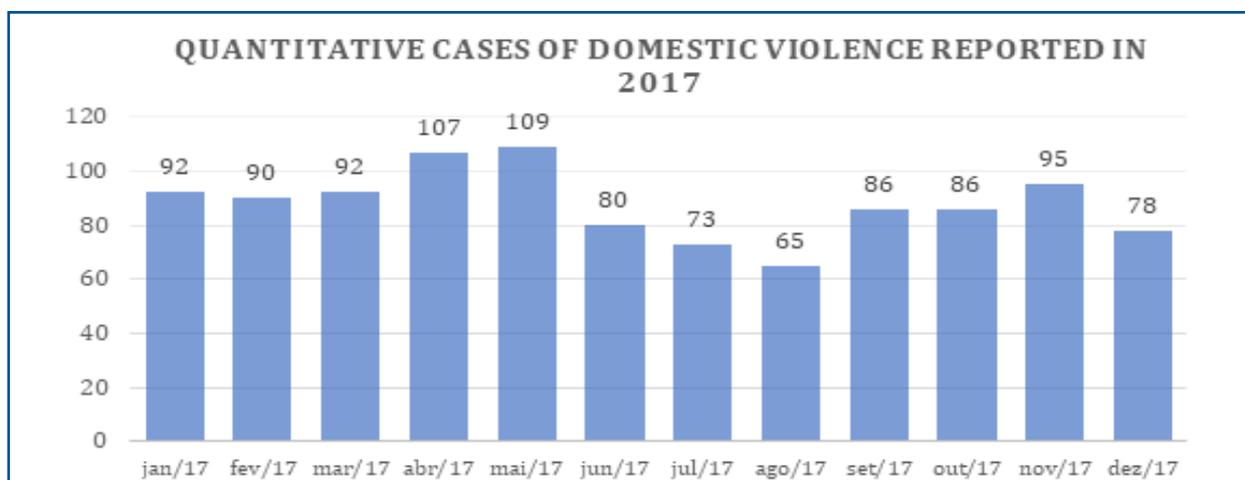
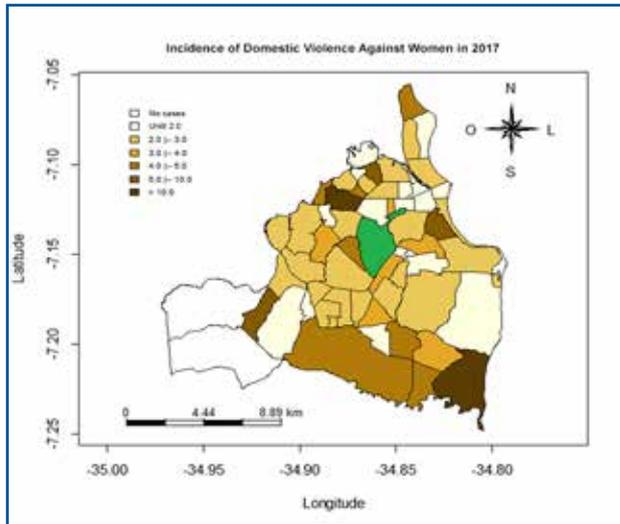


Figure 1: Monthly quantification of DVAW cases in 2017. João Pessoa, Paraíba, Brazil, 2018.

According to the figure above, the months of highest incidence were May and April, with 109 and 107 occurrences, respectively, and no event was identified that explained such an increase. This was in contrast to August, which had the lowest index with only 65 cases.

Concerning the incidents that occurred in the capital of Paraíba, some neighbourhoods presented higher concentrations of cases in relation to others, as shown in Figure 2, in which the incidences are described for each of the districts of the municipality, with a proportion (1/1,000 inhabitants per neighbourhood) shown below.

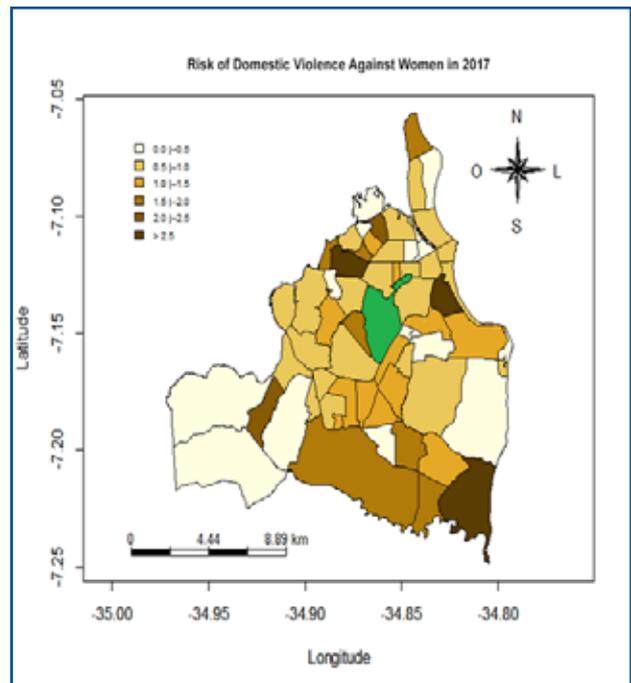


**Figure 2:** Map of incidence of Domestic Violence Against Women in the city of João Pessoa, Paraíba, Brazil.

According to the aforementioned map, the districts that stood out due to their higher incidence of DVAW were Barra de Gramame and Centro, which presented more than 10 cases per 1000 female inhabitants. By contrast, in 16 neighbourhoods, only two cases of domestic violence were registered during the year, corresponding to about 25.39% of the neighbourhoods of the capital. Neighbourhoods with up to three cases accounted for 39.68% of the total neighbourhoods, and were located predominantly in the central area of the city. The incidence is given by the ratio between the number of domestic violence crimes committed and the number of women residing in that neighbourhood. In order to obtain this value, the results of the last census carried out in 2010 in João Pessoa by the Brazilian Institute of Geography and Statistics (IBGE) were used. In addition to these neighbourhoods, a few others also showed relevant results, such as Mandacarú, Altiplano and Bairro das Indústrias, all with levels of incidence between 5 and 10 occurrences per 1000 residents.

Thus, to better visualize the relative risk of DVAW in every part of the city, Figure 3 provides the chances of occurrence of the event for each neighbourhood.

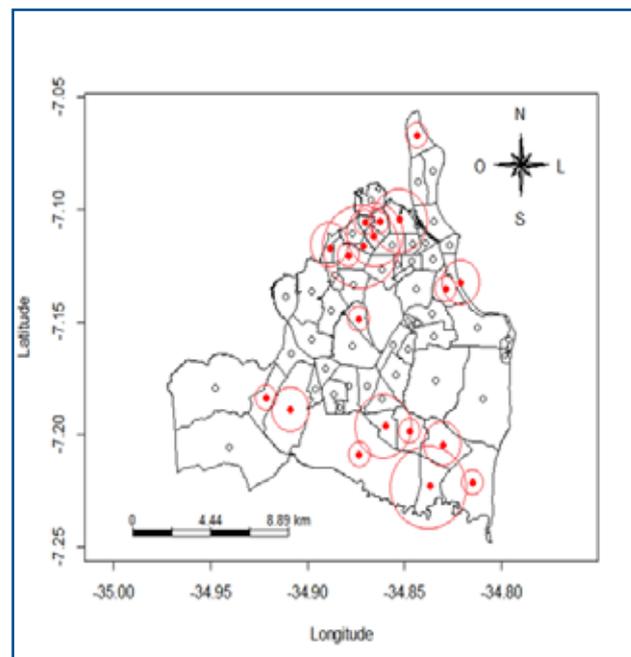
In agreement with the incidence, the highest risks shown in Figure 3 were also concentrated in the Barra de Gramame, Centro and Altiplano districts, with a two and a half times greater risk of being involved in DVAW. In sequence, with levels greater than 2–2.5 times the probability of occurrence of this violence are Mandacarú



**Figure 3:** Relative risk map of DVAW in João Pessoa, Paraíba, Brazil.

and Bairro das Indústrias. All the neighbourhoods mentioned above are considered as being on the periphery, with the exception of the Altiplano, an affluent district of the city.

According to the SCAN scan map, the best results were obtained with 3% of the population, as shown in Figure 4.



**Figure 4:** SCAN scan map of DVAW cases registered in João Pessoa, Paraíba, Brazil.

According to Figure 4, in the southern portion of the city, we can see the Muçumagro neighbourhood with a high chance of occurrence, due to the presence of the larger circle, which also covers parts of Gramame, Paratibe and Barra de Gramame. In the northern area of the capital, there

were larger outbreaks, and presence of circles of DVAW in the neighbourhoods of Centro, Varadouro, Tambaía, Treze de Maio, Padre Zé and Mandacarú, both with high chances of this violence. It is worth noting that in the eastern part, the affluent districts of Altiplano and Cabo Branco also had their areas encompassed within the circles of violence, which implies that they are also within the danger zones that prevailed in the humbler neighbourhoods, such as the central part of the city and the southern zone, but incidents did not cease to occur also in areas of greater purchasing power.

## ■ DISCUSSION

Using spatial statistics techniques together with GIS, important tools are built to combat violence, since they allow the identification of problems related to this issue. From there, they allow the implementation of public policies aimed at confronting the issue.

Domestic violence against women is a social phenomenon and, consequently, must be addressed socially or jointly, not only by the public power, but also through the awareness of the entire population, as shown by the work of researchers which identifies that the majority of the population still hold the view that violence against women is the responsibility of the victim, in addition to emphasizing the need for a network to confront the public sectors concerned with this issue. But that still needs improvement in Brazil, which makes it difficult to fight against this type of violence<sup>17</sup>.

In order to present the difficult reality faced by many women, this work provided a dimension of registered cases of DVAW in the city of Joao Pessoa in 2017, noting also that the numbers shown are still far from portraying the true reality, since many other cases are under-reported due to the naturalization of this violence, the fear it generates and the precariousness of data systematization, as another study in the literature emphasizes<sup>18</sup>. Another point that deserves to be highlighted is the lack of support and necessary care that should be provided within public health and safety institutions, as identified in other research carried out, which discusses the quality of these services in Brazil<sup>19-23</sup>.

Through the results described in this study, we observed some spatial patterns of domestic violence against women; in general, the phenomenon affects the entire territory studied. When analysing the relative risk map, the neighbourhoods where incidents were most likely to occur were Barra de Gramame, Altiplano and Centro, the latter characterized by having several areas of prostitution. In sequence, the districts of Mandacarú and Bairro das Indústrias appear, all considered peripheral. The great exception among these neighbourhoods was the district of Altiplano, which has some peculiar characteristics with respect to other districts of the capital. It includes three classes in its social topography, as presented in another study<sup>24</sup>, where part of its territory is considered affluent due to the presence of buildings of high purchasing power, known as Noble Altiplano. In contrast with this reality is the Altiplano Hill, considered of medium size, since the houses are more modest, and the Communities of the Altiplano, which are considered of a low standard because they are constructions regarded as encroachments.

In the context of domestic violence, comparing this study with a study that also analysed the cases of domestic violence against women in the city of João Pessoa in the years 2002 to 2005<sup>25</sup>, we can see that the neighbourhoods of Mandacarú and Centro have continued to have greater risks of occurrence, and surprisingly that the Barra de Gramame neighbourhood went from the “low risk” category in the previous study to the highest level in this study. Another location that also underwent significant changes was the Bairro das Indústrias, which also showed increases in incidence when compared to previous years, as well as in its relative risk levels.

Corroborating these questions and strengthening the results observed in the Relative Risk Map (Figure 3), the SCAN scan map, which aims to identify the risks of occurrence of an event within the areas delimited by red circles (Figure 4), also identified spatial clusters throughout the city, from the most affluent neighbourhoods, such as Altiplano and Cabo Branco, to the humblest, such as Varadouro, Muçumagro, and Mandacarú, among others. Thus, it can be seen that the presence of violence does not respect any class distinction, and may occur at all social levels, but with a higher prevalence in the lower social strata. There the causes include the lack of education and income, as indicated by another study<sup>26</sup>, in addition to the Survey of Socioeconomic Conditions and Domestic and Family Violence against Women – PCSVDFMulher conducted in 2016. In this survey, where pregnant women from several north-eastern capitals, including João Pessoa, who suffered this type of violence were evaluated, it was verified that the prevalence was ten times higher among women who had incomplete elementary education or no education, compared with those who had higher education<sup>27</sup>.

In addition to these issues, a study on DVAW emphasizes that the guiding principle of this violence is the power relations existing between males and females<sup>28</sup>, historically constructed and socially naturalized, that are present in public institutions, such as the police itself. These make the victim feel uncomfortable about denouncing a perpetrator, which often leads to under-reporting of violence, one of the main limitations in studies dealing with DVAW.

Thus, studies that address this issue are important in dealing with this problem and are essential in the current conjuncture, where feminism and women’s participation in the social scene are increasing. In this scenario, work like this gives visibility to the issue, characterizing it as being of public utility, since it gives a stronger basis to the discourses on tackling domestic violence, as well as greater empowerment of women, thus allowing a reduction of this serious national public health problem. Addressing issues such as machismo and feminicide, among others, is still considered controversial but is of paramount importance, having never been so essential, especially among young people and children. And for that reason, it is becoming necessary to resort to another intrinsic category of violence, which is the power relations that exist within the family. We speak of fear as one of the conductors of behaviours that make decisions to deconstruct the circle of violence impossible.

## ■ CONCLUSION

The objective of this study was to analyse the spatial distribution of domestic violence against women in the city of João Pessoa, Paraíba, Brazil. It was identified that the use of spatial statistics techniques offers better support for decisions to be taken more precisely, since they allow the development and implementation of public policies aimed at the affected population in order to bring a higher quality of life for these women, who suffer mainly because of the difficulty in combating this violence that is so silent.

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It has been verified that, with the increase in the occurrences of domestic violence against women, it is necessary to work together with the whole of society, since all are involved, in the search for a better understanding of the individual and collective human positions on violence against women.

It is identified that, despite the mobilization for changes in the posture and actions of men in society, we still live in a conflictive collectivity, where constant power disputes occur.

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## Resumo

**Introdução:** A violência contra a mulher é motivada por meio da dominação existente nas relações de poder, entre elas a masculina sobre a feminina, definida como ação violenta que possa gerar lesões ou sofrimentos no âmbito físico, sexual ou mental, além de intimidações, privações do direito à liberdade ou coerções realizadas dentro e fora de casa. Esse agravo vem crescendo cada vez mais no mundo inteiro, merecendo ser discutido e combatido no âmbito das políticas públicas.

**Objetivo:** Analisar a distribuição espacial da violência doméstica contra a mulher no município de João Pessoa, Paraíba, Brasil.

**Método:** Trata-se de um estudo quantitativo, transversal, do tipo censo, que analisou todos os casos denunciados de violência doméstica contra a mulher e que residissem no município, cenário do estudo, no ano de 2017. A fonte de dados foi do tipo secundária, nas duas Delegacias Especializadas de Atendimento da Mulher – DEAM, presentes no município.

**Resultados:** Observou-se padrões espaciais da violência doméstica contra a mulher, como também aglomerados por toda a capital, desde os bairros considerados mais nobres, até os que vivem à margem da sociedade, comprovando que essa violência não tem distinção de classe.

**Conclusão:** O estudo atingiu o objetivo proposto analisando a distribuição espacial da violência doméstica no cenário da pesquisa a partir dos padrões espaciais.

**Palavras-chave:** violência contra a mulher, identidade de gênero, Geoprocessamento.

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