social sciences

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Analysis of the Location and Spatial Distribution of Violence Against Women in Peru

Manuel J. Ibarra-Cabrera [1], Eliana M. Ibarra-Cabrera [2], Yolanda García Vázquez [3] and Carlos Ferrás [4,*]

[1] Computer and Systems Engineering, Micaela Bastidas National University, Apurímac 03001, Perú; mibarra@unamba.edu.pe
[2] Department of Psychology, National University of San Antonio Abad, Cusco 08000, Perú
[3] Health, Sexuality and Gender Research Group, Faculty of Education and Social Work, University of Vigo, 32004 Ourense, Spain
[4] Mujeres Vulnerables Lab, Institute of Studies and Development of Galicia (IDEGA), University of Santiago de Compostela, 15782 Santiago de Compostela, Spain
* Correspondence: carlos.ferras@usc.es

Abstract: Violence against women in Peru is a serious social problem, and prevention and intervention strategies to address it are a priority in social policies. The results of a research project that aims to develop a location map of violence against women in Peru are presented, analyzing its territorial distribution at the level of municipal districts and its link with socio-environmental variables. The spatial analysis of data carried out shows a direct relationship between the violence against women with low population density, the rural environment, poverty, illiteracy and the ratio of women of reproductive age and adolescent mothers. Our spatial analysis of the data can facilitate decision-making and territorial planning of social and healthcare services for women who suffer violence. The classification of the Rate of Violence against Women into quartiles by municipal districts allows us to locate areas of intervention, differentiating those municipal districts with the highest and lowest prevalence.

Keywords: violence against women; gender violence; decision-making; planning; social and health services

Academic Editors: Sofia Neves and Anita Santos

Received: 18 September 2024
Revised: 13 January 2025
Accepted: 24 January 2025
Published: 30 January 2025

Citation: Ibarra-Cabrera, Manuel J., Eliana M. Ibarra-Cabrera, Yolanda García Vázquez, and Carlos Ferrás. 2025. Analysis of the Location and Spatial Distribution of Violence Against Women in Peru. *Social Sciences* 14: 76. https://doi.org/10.3390/socsci14020076

1. Introduction

The term violence against women was defined at the "Inter-American Convention on the Prevention, Punishment and Eradication of Violence against Women" of the Organization of American States (OEA 1994) held in Belém do Pará and ratified by the Peruvian state. The Convention defines violence against women as physical, sexual and psychological violence that can be exercised in the family, in any interpersonal relationship, in the community or in any public or private institution. Violence against women includes intimate partner violence, sexist violence, gender violence, domestic violence and family violence (Crisóstomo 2021).

In Peru, the most recent data from the Demographic and Family Health Survey show that 67.6% of women over 18 years of age suffered psychological and/or physical and/or sexual violence (INEI-ENDES 2019). On the other hand, the National Survey of Social Relations indicates that 79.6% of women aged 18 and over were victims of psychological and/or physical and/or sexual violence, and 59.6% of them were victims of economic violence by their husbands or partners at some point in their lives. In addition, the high

rate of social tolerance towards violence against women aged 18 and over stands out, which was 58.9% (INEI-ENARES 2020). That is why it constitutes a serious social problem that requires priority attention from government social policies (Viviano Llave 2020).

In this context, the research we have carried out is aimed at the spatial analysis of violence against women in Peru. Specifically, the locations of those places are arranged from highest to lowest prevalence to draw up the map of this type of violence against Peruvian women at the smallest possible scale of disaggregation. With this, we want to contribute to the planning of prevention and care services for women in vulnerable situations with respect to abuse and violence. The aim of this study is to address the following question: What is the spatial distribution of violence against women? Furthermore, the paper examines the sociodemographic and environmental characteristics of areas with higher levels of violence against women.

2. Materials and Methods

Social and demographic data were obtained from the District Information System for Public Management of the National Institute of Statistics and Informatics of Peru (INEI 2024). The aforementioned information system allows the following demographic, social, economic, municipal statistics, environment and science and technology data to be obtained. The updated information on the last census carried out in Peru is from 2017 and is detailed by 24 departments plus the constitutional province of Callao, 196 provinces and the 1872 municipal districts of Peru. Table 1 shows a summary of the number of municipal districts by departments and provinces of Peru.

Table 1. Distribution of the number of provinces, municipal districts and number of CEMs by departments in Peru.

Nº	Department	Nº Provinces	Nº Districts	Nº CEMS
1	*Amazonas*	7	84	9
2	*Ancash*	20	166	29
3	*Apurímac*	7	84	12
4	*Arequipa*	8	109	24
5	*Ayacucho*	11	119	15
6	*Cajamarca*	13	127	16
7	*Callao*	1	7	8
8	*Cusco*	13	112	26
9	*Huancavelica*	7	100	10
10	*Huánuco*	11	84	14
11	*Ica*	5	43	18
12	*Junin*	9	124	18
13	*La Libertad*	12	83	23
14	*Lambayeque*	3	38	12
15	*Lima*	10	170	85
16	*Loreto*	8	53	13
17	*Madre de Dios*	3	11	5
18	*Moquegua*	3	20	6
19	*Pasco*	3	29	7
20	*Piura*	8	65	18
21	*Puno*	13	110	20
22	*San Martín*	10	77	19
23	*Tacna*	4	28	9
24	*Tumbes*	3	13	7

25	*Ucayali*	4	17	8
	Total	196	1872	431

In addition, data were obtained from the Ministry of Women and Vulnerable Populations (MIMP 2024) of the Government of Peru; its information system contains data statistics related to the number of registered cases of violence against women in the Women's Emergency Centers (CEM 2024) for the year 2023, with specific information on their location, organized by departments, provinces and districts.

The Ministry of Women and Vulnerable Populations (MIMP 2024) is responsible for the CEMs and the development of the national program for the prevention and eradication of violence against women in Peru. The CEMs are free public services specialized in the care and prevention of family and sexual violence. These services offer legal information, employment guidance, legal defense and psychological support, as well as prevention and promotion actions with the population to prevent violence from continuing to spread and affect more people (CEM 2024).

The procedure for reporting a case of violence against women in Peru includes that the victim can report to the corresponding authorities or civil organizations with implantations in each municipal district, such as the National Police of Peru (PNP), Public Prosecutor's Office, Women's Emergency Center CEM, by telephone and/or chat to line 100, Justices of the Peace of each municipal district, the Municipal Ombudsman's Office for Children and Adolescents called DEMUNA, the Health Center and civil society organizations that work on issues of gender violence. The reported cases are directed to the CEMs Women's Emergency Centers to proceed with protection, accompaniment, advice and support. From the CEMs, cases are referred to public and/or private health establishments if the victim so wishes to receive the socio-emotional support and the required physical or mental health intervention. The victim can also request protection measures against the aggressor.

We start from the data recorded on applications for aid in the 431 CEMs, which are geographically distributed throughout the country in 196 provinces and 431 of the 1872 total municipal districts, which are the state administrative units closest to the citizens. The data collected in the CEMs allow for statistical analysis. Table 1 shows the number of CEMs by department and province. It should be noted that all Peruvian provinces have one or more CEMs at the service of the resident population in their respective municipal districts. Women who suffer violence go to the CEMs in the province closest to their homes. The average of current CEMs is 2.2 for each Peruvian province.

For this research work, the projected population data for the year 2024 were obtained from the 2017 Population Census carried out in each of the municipal districts of Peru (INEI 2024). The projection method applied is endorsed by the United Nations and its Economic Commission for Latin America and the Caribbean (INEI-CEPAL 2009; INEI 2020; Ritchie and Rodés-Guirao 2024). The projection method is based on population developments, fertility, mortality and international migration. Likewise, the data reported by the MIMP of vulnerable women in each CEM of Peru for the year 2023 were considered. According to statistical data from the MIMP (MIMP 2024), between the months of January and October 2023, a total of 281,604 cases of violence against women have been attended to throughout Peru, including cases of violence against children and adults.

On the other hand, the map of Peru and its respective districts has been used in the "shapefile" format provided by the INEI and published by "Geogpsperu", updated to the year 2017 (Geogpsperu 2024).

To analyze the spatial data on violence against women at the municipal district level, we proceeded to develop a statistical inference process (Ferrás et al. 2023):

1. Data on the total population at the district level in 2024 were obtained. At the level of the whole country, the average population per district is 16,675.02 inhabitants, with a minimum of 166 and a maximum of 1,114,319 inhabitants.
2. At the municipal district level, the Violence against Women Rate was calculated, TVM. NVD is the number of cases of violence against women registered in the CEMs by municipal district, and PPD_i is the population by district. In those districts where there is no CEM, the Rate of Violence against Women was calculated from the Rate of Violence against Women of the province to which the district belongs and according to the proportion of the number of inhabitants with respect to the provincial total:

$$\mathrm{TVM}_i = \frac{\mathrm{NVD}_i \times 1000}{PPD_i}; i = 1, \ldots, 1872$$

3. The data at the municipal district level were exported to a Geographic Information System (QGIS). Spatial statistical treatment was carried out, with a statistical analysis of the interquartile intervals of TVM data and their cartographic representation. The analysis was performed in R language using the RStudio software 2024.
4. For all districts and for each interquartile interval, sociodemographic indicators and indices were calculated based on the official statistical records of the Peruvian Government. On the one hand, those referring to the volume of the total population, the demographic density (inhabitants/km^2), the ratio of rural population to the total defined as the population residing in settlements with fewer than 2000 inhabitants, the average age of the total population of the district, the number of adult elderly women of childbearing age aged between 15 and 49 years, total adolescent women and adolescent women with children aged between 12 and 19 years, the population over 60 years of age and the average age of the total population; and, on the other hand, indicators referring to the number of illiterate people with respect to the total population and the indicators of monetary poverty expressed in the ratio of the population that does not have basic subsistence resources.
5. For the spatial and cartographic analysis, each district is classified into one of four categories using the four interquartile intervals calculated from the 1872 district Violence against Women Rates (TVMs).
6. Once the TVM was calculated for each of the districts, a map of the location and distribution of the TVM by districts in Peru was generated. For this, the Geographic Information System "QGIS" was used. For its spatial graphic representation, the map of Peru in "shapefile" format (Geogpsperu 2024) was used; this map is divided by districts. It should be noted that there is a contradiction in the map of districts of the Government of Peru: on the one hand, according to the map of "Geogpsperu", which was published in 2017, Peru has 1876 districts; on the other hand, according to the Population Census of Peru carried out in 2017, 1889 districts are counted in total. Therefore, there is a difference of 13 districts that have been ignored because they are not georeferenced.
7. An interquartile analysis has been carried out for the study variables, bearing in mind that quantiles are cut-off points that divide the range of a probability distribution into continuous intervals with equal probabilities or divide the observations of a sample in the same way and that we have a quantile less than the number of groups created. Quantiles are referred to as quartiles (four groups), deciles (ten groups), and percentiles (one hundred groups); therefore, a quartile is a particular quantile that divides the ordered data into four segments, or quarters, of approximately identical size.

   We used the *IQR* interquartile range as a measure of statistical dispersion, i.e., to analyze the dispersion of the data. *IQR* can also be called "midspread", "middle"

(50%), "fourth spread" or "H-spread". It is defined as the difference between the 75th and 25th percentiles of the data.

To calculate the *IQR*, the dataset was divided into quartiles or four parts, ordered uniformly by linear interpolation. These quartiles are denoted by Q1 (also called the bottom quartile), Q2 (the median) and Q3 (also called the top quartile). The bottom quartile corresponds to the 25th percentile, and the top quartile corresponds to the 75th percentile, so: $IQR = Q3 - Q1$.

3. Results

Figure 1 shows the location of Peru in South America. There are 24 departments in total, of which the most important departments in terms of economy and population are shown in pink, and the less important departments are shown in green.

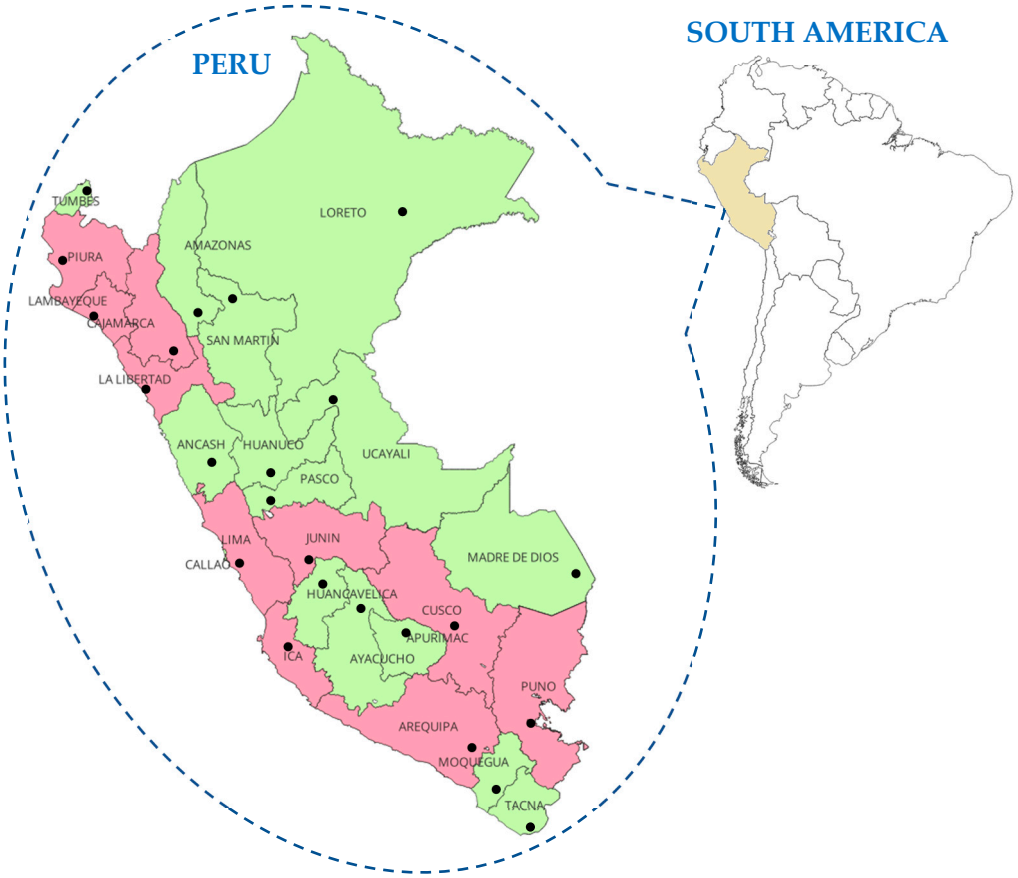

Figure 1. Map of Peru and its departments, located in South America. The 10 departments and capital cities with the highest number of inhabitants stand out in pink; they bring together 73.6% of the total population of Peru.

An interquartile analysis of the Violence against Women Rate (TVM) was carried out, and the results show that the highest TVM is concentrated in the southern zone and the coast of Peru (Q4), while the lowest TVM is concentrated in the northern jungle area of Peru (Q1). The cartography shown in Figure 2 allows us to observe the spatial distribution of the TVMs and the variables analyzed.

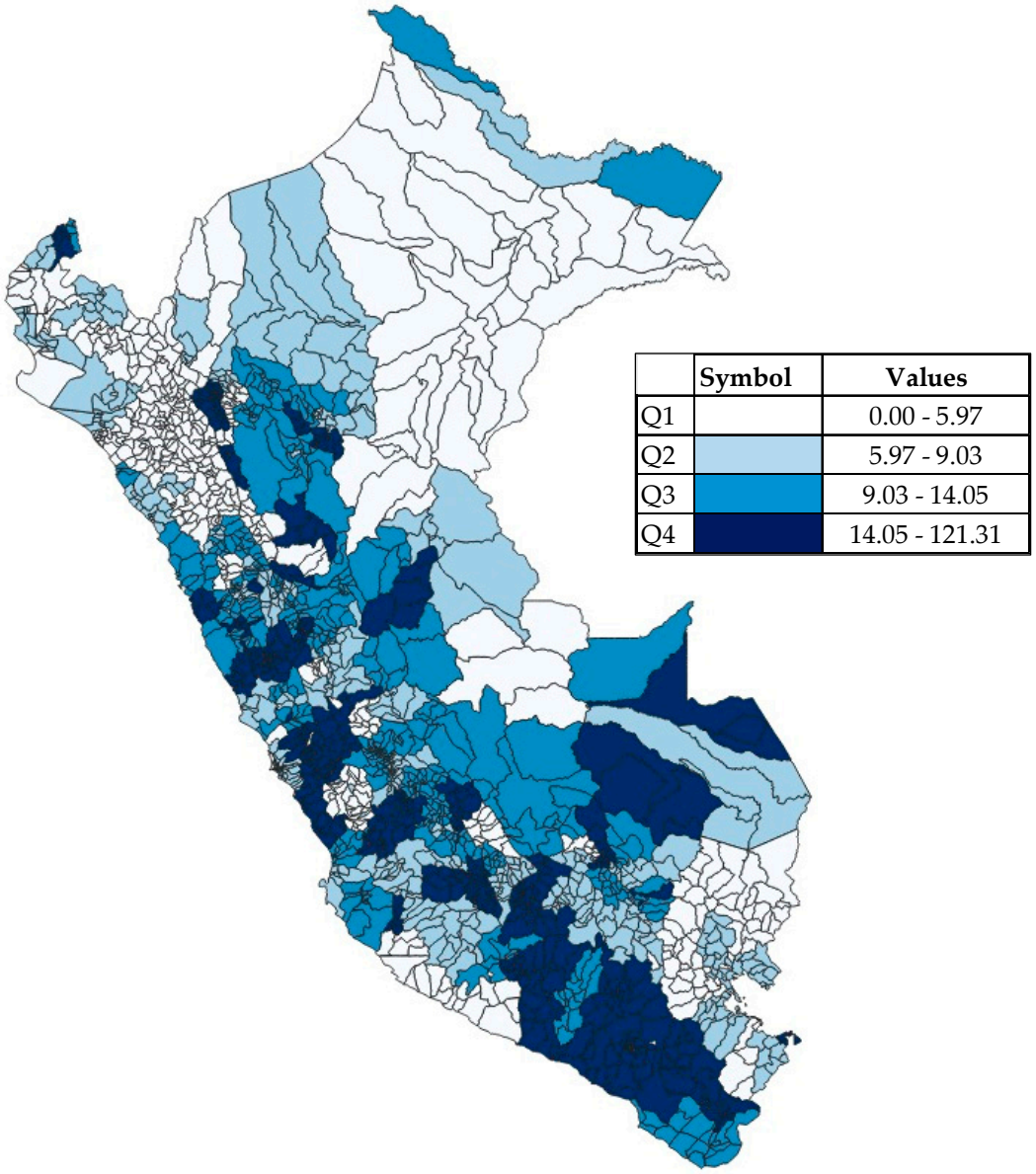

Figure 2. Rate of Violence against Women TVM of Peru. Information by districts (2023) (rate per 1000 inhabitants). Prepared by the author based on data from the Government of Peru: INEI Population Censuses and Registries of the CEMs Women's Emergency Centers.

Figure 2 allows us to observe the location and spatial distribution of the TVM with respect to the variables analyzed. A dichotomy is observed between the north of Peru, which has a lower TVM per municipal district, versus the center and the south, which have a higher TVM. In the north, the Q1 and Q2 quartiles with the lowest TVM are in the municipal districts and provinces closest to the border with Colombia, in Loreto, Piura, Cajamarca and La Libertad, in the extreme south of the country, the province and municipal districts of Puno on the border with Bolivia, in addition to a large part of the jungle provinces of the provinces of Amazonas and Loreto. It is worth highlighting the municipal districts with the largest number of inhabitants, more densely populated and with the highest TVM (quartiles Q3 and Q4) located in central Peru, on the western slope of the Andean Mountain chain, especially around the city of Lima and its metropolitan area.

In the south and center of the country, we find a greater presence of the municipal districts with the highest TVM, quartiles Q3 and Q4, located both in the Andean regions

above 2000–3000 m of altitude, in the provinces and districts of Cusco, Ayacucho, Junín, Pasco and the valleys of the Apurimac, Ene and Mantaro rivers, as well as on the Pacific slopes and in the jungle province of the Amazon called Madre de Dios. We also have the representation of quartile Q4, the one with the highest TVM, concentrated in the southwestern region of the country around the city of Arequipa and its southern area of influence. It is also necessary to point out that the map shows some very pronounced gradients in terms of the TVM between adjacent municipal districts, Q4 together with Q1, which is precisely related to variables such as lower population density and greater monetary poverty, ratio of women of childbearing age and illiteracy in those less urbanized districts.

On the other hand, according to the descriptive statistical analysis, the data confirm that the TVM is lower in districts with larger demographic sizes. Table 1 shows the distribution of the population of Peru by districts ordered in interquartile intervals based on the values of the TVM. Table 2 shows that from quartile Q2 (mean = 31,940.25) to Q4 (mean = 7965.89), there is a tendency to decrease the interquartile population mean, so it can be inferred that in districts where there is a smaller population, there is a higher TVM, and in districts where there is a larger population, there is a low TVM. However, the exception is that in quartile Q1, the districts have a lower average population than in quartile Q2.

Table 2. Population (inhabitants). Source: authors◎elaboration based on data from INEI and CEMs.

	Mean	SD	IQR	0%	25%	50%	75%	100%	*n*
Q1	16,150.90	40,172.07	10,081.00	221.00	2355.00	5967.50	12,452.00	479,418.00	468
Q2	31,940.25	93,016.16	14,074.75	166.00	2319.50	5614.50	16,128.00	1,114,319.00	468
Q3	10,643.04	21,234.14	6983.00	221.00	1800.50	3912.50	8800.00	213,872.00	468
Q4	7965.89	19,972.57	4118.50	175.00	900.25	1953.50	5015.00	207,114.00	468

Table 3 shows that the TVM is lower in districts with larger demographic sizes than in smaller districts. It is also observed that districts Q1 (IQR = 1.92), Q2 (IQR = 1.29) and Q3 (IQR = 1.80) have low variability; however, in Q4 (IQR = 7.79), the variability is high. Something similar happens with the standard deviation (SD). So, it can be deduced that the TVM is quite variable in districts where there is a high rate of TVM. Districts Q1 and Q2 are the ones with the largest number of inhabitants and the most urbanized, compared to districts Q3 and Q4, which are the most rural and with the lowest average number of inhabitants (Tables 2 and 3).

Table 3. Violence against Women Rate TVM. Source: authors◎elaboration based on INEI and CEM data.

	Mean	SD	IQR	0%	25%	50%	75%	100%	*n*
Q1	4.27	1.10	1.92	1.43	3.35	4.43	5.26	5.98	468
Q2	7.21	0.83	1.29	5.98	6.40	7.14	7.70	9.04	468
Q3	11.35	1.25	1.80	9.05	10.45	11.28	12.25	14.05	468
Q4	23.27	16.26	7.79	14.07	16.65	18.36	24.45	121.31	468

Regarding the relationship between population density by districts and TVM, it is observed that the average population density by districts is higher in quartiles Q1 and Q2 (mean: 737) compared to Q3 and Q4 (mean: 159.11), which means that there is a higher TVM in the districts with lower density. Table 4 shows that in Q2 (mean = 1163.96), the mean is quite high compared to Q1, Q3 and Q4.

Table 4. Population density (inhabitants/km²). Sources: authors elaboration based on data from the National Institute of Statistics and Informatics INEI and Women's Emergency Centers CEMs.

	Mean	SD	IQR	0%	25%	50%	75%	100%	*n*
Q1	310.04	2031.62	39.00	0.00	7.00	20.00	46.00	22,686.00	468
Q2	1163.96	4017.27	70.75	0.00	9.00	23.00	79.00	28,223.00	468
Q3	103.12	335.11	42.75	0.00	10.00	22.00	52.00	3313.00	468
Q4	215.10	1410.55	20.00	0.00	4.00	9.00	24.00	20,660.00	468

Table 5 shows that there is a direct relationship between violence against women and rural districts. It is found that in the districts where there is a higher TVM (Q4), the rural population ratio is also higher (mean = 83.44, SD = 6.68, IQR = 10.74), while in districts where there is a lower TVM (Q1), the rural ratio is also lower (mean = 5.67, SD = 5.08, IQR = 8.72).

Table 5. Rural ratio. Percentage of population residing in settlements with a population with fewer than 2000 inhabitants with respect to the total population of the district. Sources prepared by the authors based on data from the INEI and CEMs.

	Mean	SD	IQR	0%	25%	50%	75%	100%	*n*
Q1	5.67	5.08	8.72	0.00	0.77	4.75	9.49	16.54	468
Q2	32.92	9.46	16.79	16.56	24.71	32.96	41.50	48.14	468
Q3	60.98	6.99	12.12	48.23	55.08	61.10	67.20	72.49	468
Q4	83.44	6.68	10.74	72.54	77.80	83.28	88.54	97.57	468

The TVM increases with age and demographic aging. Table 6 shows that in the districts where there is a higher TVM (Q4), the mean age is also higher (mean = 39.20, SD = 3.11, IQR = 4), while in districts where there is a lower TVM (Q1), the mean age is also lower (mean = 28.04, SD = 2.05, IQR = 3). In addition, Table 7 shows that in the districts where there is a higher TVM (Q4), the population over 60 years of age is also more numerous (mean = 23.67, SD = 4.85, IQR = 6.76), while in districts where there is a lower TVM (Q1), the mean population over 60 years of age is also lower (mean = 8.04, SD = 1.88, IQR = 2.89). A progressive proportional increase in age was observed between interquartiles Q1 and Q4.

Table 6. Average age.

	Mean	SD	IQR	0%	25%	50%	75%	100%	*n*
Q1	28.04	2.05	3	19	27	29	30	30	468
Q2	31.49	0.50	1	31	31	31	32	32	468
Q3	33.89	0.79	2	33	33	34	35	35	468
Q4	39.20	3.11	4	36	37	38	41	51	468

Table 7. Ratio of the population aged 60 and over to the total.

	Mean	SD	IQR	0%	25%	50%	75%	100%	*n*
Q1	8.04	1.88	2.49	1.95	7.00	8.41	9.50	10.54	468
Q2	12.26	0.96	1.62	10.55	11.47	12.24	13.09	13.88	468
Q3	15.93	1.25	2.15	13.89	14.89	15.83	17.04	18.24	468
Q4	23.67	4.86	6.76	18.25	19.89	22.03	26.65	43.69	468

With respect to illiteracy by districts, the TVM is presented as directly proportional; that is, the greater the illiteracy, the higher the TVM. Table 8 shows that in the districts where there is a higher TVM (Q4), the illiterate population is also higher (mean = 16.30,

SD = 2.96, IQR = 3.92), while in the districts where there is the TVM is lower (Q1), the illiterate population is also lower (mean = 2.54, SD = 1.04, IQR = 1.73).

Table 8. Proportion of the population who are illiterate.

	Mean	SD	IQR	0%	25%	50%	75%	100%	*n*
Q1	2.54	1.04	1.73	0.22	1.71	2.56	3.44	4.28	468
Q2	5.99	1.02	1.71	4.28	5.11	5.99	6.82	7.80	468
Q3	9.92	1.36	2.41	7.81	8.70	9.87	11.11	12.46	468
Q4	16.30	2.96	3.92	12.46	14.04	15.62	17.96	31.00	468

Regarding the feminization in the demographic structure of the districts of Peru, the TVM increases with a greater proportion of women of childbearing age and women and adolescent mothers in the population of the different districts. Table 9 shows the relationship between the highest values of TVM (Q4) and the districts where the highest percentage of women of childbearing age between 15 and 49 years of age is higher (mean = 53.62, SD = 2.69, IQR = 3.69), while in districts where there is a lower TVM (Q1), the percentage of women of childbearing age between 15 and 49 years of age is also lower (mean = 39.21, SD = 3.00, IQR = 3.88).

Table 9. Proportion of the female population of childbearing age (15–49 years).

	Mean	SD	IQR	0%	25%	50%	75%	100%	*n*
Q1	39.21	3.00	3.88	25.09	37.68	40.00	41.56	42.57	468
Q2	44.77	1.21	2.13	42.57	46.72	44.80	45.85	46.78	468
Q3	48.51	1.04	1.80	46.79	47.60	48.48	49.40	50.40	468
Q4	53.62	2.69	3.69	50.41	51.54	53.03	55.23	69.51	468

Table 10 shows that in the districts with the highest MVP (Q4), the percentage of adolescent females between 12 and 19 years of age is also higher (mean = 16.96, SD = 1.22, IQR = 1.61), while in districts where there is a lower TVM (Q1), the percentage of adolescent females between 12 and 19 years of age is also lower (mean = 10.14, SD = 1.82, IQR = 2.31). In Table 11, it is observed, similarly, that in the districts with the highest TVM (Q4), the percentage of adolescent mothers between 12 and 19 years of age compared to adolescent women is also higher (mean = 13.03, SD = 3.14, IQR = 4.04), while in districts where there is a lower TVM (Q1), the percentage of adolescent mothers between 12 and 19 years of age compared to adolescent women is also lower (mean = 3.09, SD = 1.50, IQR = 1.99).

Table 10. Proportion of the female population aged 12 to 19 years.

	Mean	SD	IQR	0%	25%	50%	75%	100%	*n*
Q1	10.14	1.82	2.31	0.88	9.22	10.71	11.53	12.11	468
Q2	12.95	0.45	0.74	12.11	12.58	12.94	13.32	13.72	468
Q3	14.60	0.50	0.86	13.73	14.17	14.62	15.03	15.45	468
Q4	16.96	1.22	1.61	15.46	16.01	16.62	17.62	23.62	468

Table 11. Proportion of adolescent mothers between 12 and 19 years of age to adolescent women.

	Mean	SD	IQR	0%	25%	50%	75%	100%	*n*
Q1	3.09	1.50	1.99	0.00	2.30	3.53	4.29	4.88	468
Q2	5.87	0.57	0.95	4.88	5.37	5.88	6.32	6.89	468
Q3	8.18	0.80	1.27	6.90	7.53	8.11	8.80	9.70	468
Q4	13.03	3.14	4.04	9.71	10.56	12.34	14.60	29.06	468

Finally, the direct relationship between the TVM and the population in poverty is observed, understood as those who do not cover their basic vital needs. Table 12 shows that in the districts where there is a higher TVM (Q4), monetary poverty is also higher (mean = 44.78, SD = 8.71, IQR = 11), while in the districts where there is a lower TVM (Q1), monetary poverty is considerably lower (mean = 7.34, SD = 4.02, IQR = 7).

In summary, the spatial analysis of the TVM data arranged in interquartile intervals shows that violence against women is higher in municipal districts with rural characteristics than in those with urban characteristics and that this is related to greater aging of the residents, lower demographic density, feminization in the demographic structure with a greater presence of women of reproductive age and adolescent mothers, as well as in relation to greater illiteracy and a greater population in poverty.

Table 12. Monetary Poverty Ratio. Populations with a level of expenditure below the cost of the basic consumption basket composed of food and non-food. Sources: Authors◎elaboration based on data from INEI and CEMs.

	Mean	SD	IQR	0%	25%	50%	75%	100%	*n*
Q1	7.34	4.02	7	0	4	8	11	13	468
Q2	18.56	3.00	5	14	16	18	21	23	468
Q3	28.63	3.08	5	24	26	28	31	32	468
Q4	44.78	8.71	11	35	38	42	49	75	468

4. Discussion

The spatial analysis of data on the Violence against Women Rate in the municipal districts of Peru shows a direct relationship between the TVM with low population density, rural settlements with fewer than 2000 inhabitants, the aging of the population, illiteracy, poverty and the higher ratios of women of reproductive age and adolescent women and mothers. Our analysis enables decision-making regarding planning the supply and geographic location of health and social services, directing them towards those areas of greater risk for women who suffer or may suffer violence in the country. The interquartile classification allows for identifying priority locations of intervention at the spatial level, differentiating those municipal districts with the highest and lowest prevalence. However, we must emphasize that further research is needed to obtain sufficient data to develop regression models of TVMs associated with social and environmental variables.

In rural districts with low population densities, women who suffer violence have limited access to public or private care services due to isolation, stigmatization or physical barriers (Lorente and Castro 2009; Ferrás et al. 2023). These low-density rural districts correspond to quartile Q4 of the TVM map of Peru. Women who suffer violence in rural areas are determined by isolation, stigma, and social and family environment (Camarero and Sampedro 2008). In such sociocultural environments, women in poverty, older women and/or women with some type of disability are three times more likely to experience violence of any kind and have long-term mental health problems with self-destructive behaviors (Muster 2021). For this reason, in Peru and Latin America (Carmona-Torres et al. 2018), new specialized research on violence against women with the highest degree of vulnerability is needed. The research carried out has focused on violence against women in general, but it is necessary to study the location and geographical distribution of women in situations of high vulnerability, such as women over 65 years of age or women with some type of disability, for correct and efficient territorial planning of eradication and prevention programs. In fact, the results of our

research in Peru show that it is necessary to add women and adolescent mothers between the ages of 12 and 19 among the most vulnerable groups.

In the case of Spain, it highlights that government studies on violence against women in rural areas indicate that it is necessary to spatially analyze data on such violence in order to direct resources to the areas where they are most needed (Ministry of the Presidency, Relations with the Courts and Equality 2019; Ministry of the Environment and Rural and Marine Affairs 2011; Ministry of Equality 2021; Luoma et al. 2011), and the methodology developed in our research in Peru, which allows mapping areas of greater or lesser prevalence of TVM at the district level, facilitate this task. Therefore, it is necessary to design and implement prevention measures from territorial planning to locate and offer care services in those municipal districts where the Rate of Violence against Women is highest. To make decisions about territorial planning of prevention programs for this type of violence, it is necessary to generate data and know its geographic location, that is, to know where, when and why in that place and not in another.

State policies in Peru aimed at violence against women have been designed for urban areas and populations (Crisóstomo 2021) and from a paternalistic and patriarchal point of view (Del Pino Espejo et al. 2021). In this context and based on the TVM map of Peru prepared, we believe it is necessary to direct and develop specialized care programs tailored to the socio-environmental characteristics of rural districts in Peru, which can reduce indicators such as the percentage of illiterate population living in poverty or accessibility to public health and social services, coinciding with the recommendations of Bourey et al. (2015) and Pathak et al. (2019). Professionals working in frontline social services, where women who experience violence are commonly made invisible, must be trained to identify and respond to violence in a way that is appropriate to their social and cultural environment (Celdrán 2013; Meyer et al. 2020) for which the territorial approach and the mapping of violence against women are configured as valuable tools. It is important to keep in mind the importance of spatial data analysis to geographically locate the places where violence against women occurs, to prevent it and efficiently organize social and health services to address it.

In the case of Peru, Crisóstomo (2016) argues that the state does not know the reality of women who suffer violence and that rural women who are going through situations of violence do not report to the authorities or avail themselves of legal services. There is, therefore, an underreporting of cases in Women's Emergency Centers that must be addressed with measures such as the creation of more CEMs where they are not implemented and with the continuous evaluation of their programs and activities. To encourage women to report to the authorities, it is necessary to approximate and facilitate access to CEMs for women who suffer violence. The low visibility of violence against rural women is present in Latin America (Sagot 2005; Bott et al. 2013; Viviano Llave 2020; Crisóstomo 2021) and in Spain (Martínez García and Camarero 2015; Ministry of Equality 2021). More research is needed at the international level on why violence against women is underreported (Crockett et al. 2015), as well as research with qualitative and quantitative data on the social and environmental determinants present in this type of violence (Straka and Montminy 2006; Crockett et al. 2015; Ferrás et al. 2023) in different countries and cultures.

5. Conclusions

The spatial distribution of the higher or lower TVMs is determined by the ratio of the rural population, the greater presence of women of reproductive age and adolescent mothers, aging, poverty and illiteracy as dominant features in the sociodemographic analysis at the level of Peruvian municipal districts. In the research we have carried out, it has been observed that the higher the ratios of these variables, the higher the TVM. The

inverse linear correlation between population density and TVM should also be highlighted. We found that the lower the population density, the higher the TVM. The analysis of spatial data highlights the link between rural areas with low population density and violence against women, poverty, demographic feminization, illiteracy and aging.

In short, violence against women in Peru is more frequent in rural and low-density areas. Intervention and prevention measures against violence against women are necessary in municipal districts with these characteristics. The evidence shows a lack of spatial data in the Peruvian Governments statistics on violence against women, which does not allow for decision-making and the design of prevention programs against violence against women at a geographic level. To carry out adequate planning of the provision of care services, both social and health-related, for the care of women victims of violence, it is necessary to efficiently direct technical and human resources to those municipal districts with the highest rates of this violence. In short, the mapping of violence against women in all its forms is presented as a strategic need, without which planning prevention and intervention actions at a territorial level is not possible. The production, collection and spatial analysis of data are essential for an efficient organization of public and/or private services for the care of the victims.

Author Contributions: Conceptualization C.F. and M.J.I.-C.; methodology C.F. and M.J.I.-C.; software M.J.I.-C.; validation C.F. and M.J.I.-C.; formal analysis C.F., M.J.I.-C., E.M.I.-C. and Y.G.V.; investigation C.F., M.J.I.-C., E.M.I.-C. and Y.G.V.; resources, E.M.I.-C. and Y.G.V.; data curation M.J.I.-C.; writing—original draft preparation ; C.F. and M.J.I.-C. writing—review and editing C.F., M.J.I.-C., E.M.I.-C. and Y.G.V.; visualization E.M.I.-C. and Y.G.V.; supervision. M.J.I.-C. and C.F.; project administration Y.G.V.; funding acquisition Y.G.V. All authors have read and agreed to the published version of the manuscript.

Funding: This article was supported by the Directorate-General for Foreign Relations and with the European Union of the Autonomous Government of Galicia, Spain, (Grant: PR815A-2023-00000006-00).

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Data can be provided upon request.

Conflicts of Interest: The authors declare no conflict of interest.

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