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Violence and social determinants of health in Brazil: association between homicides, urbanization, population, inequality, and development

Violência e determinantes sociais da saúde no Brasil: associação entre homicídios, urbanização, população, desigualdade e desenvolvimento

Violencia y determinantes sociales de la salud en Brasil: una asociación entre homicidios, urbanización, población, desigualdad y desarrollo

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Abstract

The aim was to analyze the relations between homicidal violence, human development, inequality, population size, and urbanization rates in Brazilian municipalities. This is a retrospective ecological study of 5,570 Brazilian municipalities which analyzes the relations between the average rate of homicides registered in the Brazilian Mortality Information System (from 2005 to 2015) and selected indicators: municipal human development indices (HDI-M), Gini index, urbanization rates, and quantitative population. Analysis of the relative effect (%) of the variables on the risk for homicidal violence showed a greater association with more populous municipalities (log 10) (80.8%, 95%CI: 73.0; 88.8), more urbanized ones (8%, 95%CI: 6.7; 9.2), with higher Gini index (6%, 95%CI: 2.6; 9.5); whereas the relation with HDI-M is inverse (-17.1%, 95%CI: -21.4; -12.6). National policies which aim to limit population growth and the urbanization of the most populous Brazilian cities could reduce homicide rates across the country. Reducing inequalities and investing in municipal social education, health, and income policies could also reduce the number of homicides. We estimated that improving the HDI-M of the municipalities by 0.1 would cause a national reduction between 7,560 and 12,834 annual homicides, whereas decreasing income inequality (Gini index) by 0.1 would mean saving between 1,569 to 5,448 lives per year.

Homicide; Human Development; Socieconomic Factors; Violence

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Introduction

Violence has been recognized for several decades as a problem for criminal justice and defense departments and sectors. It has been a topic of debate in the most diverse United Nations (UN) resolutions since 1986. The international health agenda at the World Health Assembly in 1996 [1] included it, declaring violence a major public health issue worldwide. The UN urged its member states to immediately address the problem of violence, asking the World Health Organization (WHO) to develop a scientific approach to understanding and preventing violence [2].

Of the different types of violence in our society, this study will focus on homicide. Homicide is the most visible result of the violent behavior recorded in official statistics. Estimates show that, in 2017, 464,000 people were murdered on the planet – which is equivalent to a total rate of 6.1 per 100,000 inhabitants in the world [2,3]. The Americas continue to be the region with the highest reported number of homicides and Brazil is the country with the highest absolute number on the planet: one out of every seven homicides reported in the world occurs in Brazil [2,4,5]. However, Brazil had the 12th highest homicide rate of all countries in 2017 (around 30 homicides per 100,000 inhabitants), according to data from the UN Office on Drugs and Crime [4]. The WHO [6] also estimated a rate of 61.5 homicides per 100,000 for men and 6.0/100,000 for women. Overall, Brazil had around 65,602 homicides in 2017, a rate around five times higher than the world average [7].

Both the different typologies of violence (on a broader spectrum) and homicidal violence more specifically cause different consequences for the people and places in which they occur [8,9]. Its impacts range from the individual trauma to its victims and their families to impacts on the economy – since a great number of financial resources are allocated to actions to combat violence. Estimates suggest that, in Brazil, the cost of violence reaches 5.9% of its Gross Domestic Product (GDP), which corresponds to BRL 372 billion every year [10].

Several studies shed light on the impacts of homicides in Brazil [11,12,13,14]. Recent studies [12,15,16] show the relation between homicides and social determinants of health (SDH) in Brazil, of which young, black, poor, and low-educated men are its main victims [5,17]. However, research needs more studies to understand this complex scenario, particularly considering wider periods of analysis and differences between Brazilian municipalities. The WHO Commission on the Social Determinants of Health has defined SDH as *"the conditions in which people are born, grow, live, work and age" and "the fundamental drivers of these conditions"* [18] (p. 1). "Social determinants" include the health-related factors of cities and communities (e.g., decent urban conditions and sanitation) but also socioeconomic (e.g., income and education) and structural ones (e.g., gender, race/ethnicity, and age). All these factors are considered fundamental causes of a wide range of health outcomes [18,19,20].

More recently, the WHO [21] reinforced the need to strengthen the monitoring systems which provide disaggregated data to assess inequities in health, their relation to SDH, and the national, regional, and global impacts of policies on the SDH in support of the 2030 Agenda for Sustainable Development [21]. Based on these assumptions and facing the complexity of Brazil as having amongst the highest homicide rates in the world, the question which guided our study was: is there an association between selected SDH and homicides in Brazil if we analyze all Brazilian municipalities during a longer period (2005 to 2015)?

Studies show that homicides are unevenly distributed across the Brazilian territory [16,22,23]. Nevertheless, national ecological studies analyzing the associations between homicide and SDH at the municipal level and during longer periods of analysis are scarce. Therefore, considering these gaps, this study aimed to analyze the relations between homicidal violence, recorded between 2005 and 2015, and SDH selected from all 5,570 Brazilian municipalities. This study focused on analyzing the following SDH: human development, income inequality, municipal population size, and urbanization rate.

Methods

A retrospective exploratory ecological time-series study was conducted [24]. Average homicide rates from 2005 to 2015 was calculated and compared with socioeconomic indicators for all 5,570 Brazilian municipalities. A longer analysis period (2005-2015) helps us to understand the evolution of homicides in Brazilian municipalities with greater data precision. More recent years are still unavailable in the consulted database.

Only secondary data obtained from open and free access databases were analyzed. Consequently, approval from the Research Ethics Committee could be waivered.

Data source: dependent variable

(a) Homicides: data were obtained from the Brazilian Health Informatics Department (DATASUS) of the Brazilian Unified National Health System (SUS) website of the Brazilian Ministry of Health. Deaths due to aggression were selected (codes X85 to Y09 and Y35 and 36 of the International Classification of Diseases 10th revision (ICD-10), here referred to as homicides) from the Brazilian Mortality Information System (SIM). Data were collected according to the municipality in which the homicides occurred between 2005 and 2015.

Data source: independent variables (SDH)

(a) Population: data from the 5,570 Brazilian municipalities were considered. This information was collected by the Brazilian Institute of Geography and Statistics (IBGE) in the last Brazilian census, conducted in 2010. Population data were obtained directly from the IBGE Automatic Recovery System (SIDRA) [25].
(b) Municipal Human Development Index (HDI-M): this is the municipal version of the HDI, which is a measure composed of indicators from three dimensions of human development: longevity (life expectancy), education (average completed years of study), and income. They differ since the HDI-M uses the average income of residents in the municipalities instead of GDP per capita (used when calculating HDI). HDI-M ranges from 0 to 1 and the closer to 1, the greater the human development. The 2010 HDI-M of all Brazilian municipalities were collected from the *Atlas of Human Development in Brazil* [26].
(c) Gini index: a measurement of income distribution which refers to social inequalities. It ranges from 0 to 1, in which 0 represents a situation of complete income equality (in which each individual has the same income), whereas the value 1 indicates extreme inequality. Data were collected by municipality, for 2010, from the *Atlas of Human Development in Brazil* [26].
(d) Urbanization rate: the percentage of urban population against total population. It was extracted from the IBGE Census for each Brazilian municipality in 2010.

Statistical procedures

Being the number of homicides in city i and year t, $O_{i,t}$ was considered as our outcome. The expected number of deaths obtained from indirect standardization $e_{i,t}$, was considered to contemplate demographic differences between municipalities. Standardization was carried out considering gender, age, and race/color variables since municipalities with more men, youths, and black people would be imbalanced since these characteristics are more associated with homicides.

HDI-M, Gini index, urbanization rates, and population were examined to explain the variations which the demographic structure failed to elucidate. This extra variation $r_{i,t}$ is labeled as the risk for homicide in municipality i and year t. A value of risk ($r_{i,t}$ greater than 1) indicates that i municipality observed more homicides in year t than expected by its demography.

To be more specific, a Poisson distribution was assumed for $O_{o,t}$. The product between the expected value of deaths and standardized mortality risk is the parameter of this distribution. Thus:

$$O_{i,t} \sim Poisson(e_{i,t} r_{i,t}) \quad (1)$$

HDI-M, Gini index, resident population, and urbanization rates were evaluated for their effect on relative risk. To accommodate extra variation which these factors fail to explain, a spatiotemporal effect representing a risk relative to municipality i and year t,.$s_{i,t}$, was considered.

The model for the relative risk is expressed by the following logarithm:

$$log_E(r_{i,t}) = \alpha + \beta_1 \text{HDI-M} + \beta_2 Gini + \beta_3 Urbanization + \beta_4 log10(Population) + s_{i,t} \quad (2)$$

in which is a necessary intercept parameter for best estimation; parameters $\beta_j j = 1,2,3,4 \beta_j$ represent the effect of the respective factor and the spatiotemporal effect. The interpretability of parameters β_j refers to the risk related to changing one unit of the associated factor.

Spatiotemporal effect $s_{i,t}$ modeling was expressed by combining two approaches in the literature. A spatiotemporal autoregressive model [27] was considered but with a parameterization for the spatial model [28].

Consequently:

$$x_{i,t} = \sqrt{1-\rho} s_{i,t} set = 1 \quad (3)$$

$$x_{i,t} = \rho x_{i,t-1} + s_{i,t} set > 1 \quad (4)$$

in which ρ is a temporal persistence parameter and $s_{i,t}$ is the term with a spatial correlation structure. If ρ is close to 0, the standardized mortality ratio (SMR) between consecutive years has no correlation and the temporal correlation between consecutive years increases to ρ as ρ approaches 1.

The term $s_{i,t}$ is considered to have a structured part in space and an unstructured parameterized part [28]. In this case:

$$s_{i_t} = \sigma_s \left[\sqrt{1-\phi} v_{i,t} + \sqrt{\phi} u_{i,t} \right] \quad (5)$$

in which ν is an unstructured effect in space with variance 1, i.e., $\nu_{i,t} \sim N(0,1)$; and $u_{i,t}$, the spatially structured effect with a marginal variance equal to 1. Thus, parameter ϕ measures the proportion of the spatial effect structured in space and is associated with the degree of spatial correlation of homicide rates.

The inference procedure was considered under the Bayesian paradigm. The a priori distribution of parameters σ_s, ϕ, and ρ considers the shape complexity penalty [29]. The corresponding a priori complexity penalty for parameter ρ was also considered. To calculate marginal posterior distributions, the Integrated and Nested Laplace Approximation Algorithm, better known as INLA (https://www.r-inla.org/), was used. Based on the described methodology, these procedures guaranteed the hypothesis test, which aimed to investigate the relations between SDH and homicides in all 5,570 Brazilian municipalities over time. The independent variables included in the final model were the Gini index, HDI-M, urbanization rates and population size, whereas the outcome variable was "homicides", in a multilevel analysis approach.

Analyses were conducted in R version 4.2.0 (http://www.r-project.org), utilizing the following packages: Matrix (https://cran.r-project.org/web/packages/Matrix/index.html), rgdal (https://cran.r-project.org/web/packages/rgdal/), and INLA (https://www.r-inla.org/). Missing data, unavailable in the consulted databases, such as references to the occurrence of homicides (victim's gender, race, age, or place of occurrence), were standardized according to the resulting N, guaranteeing the proportionality of the sample.

Spatial analysis

The final generated model had its response variable (SMR) predicted for all Brazilian municipalities and its results were rasterized and expressed in maps per year of evaluation.

Results

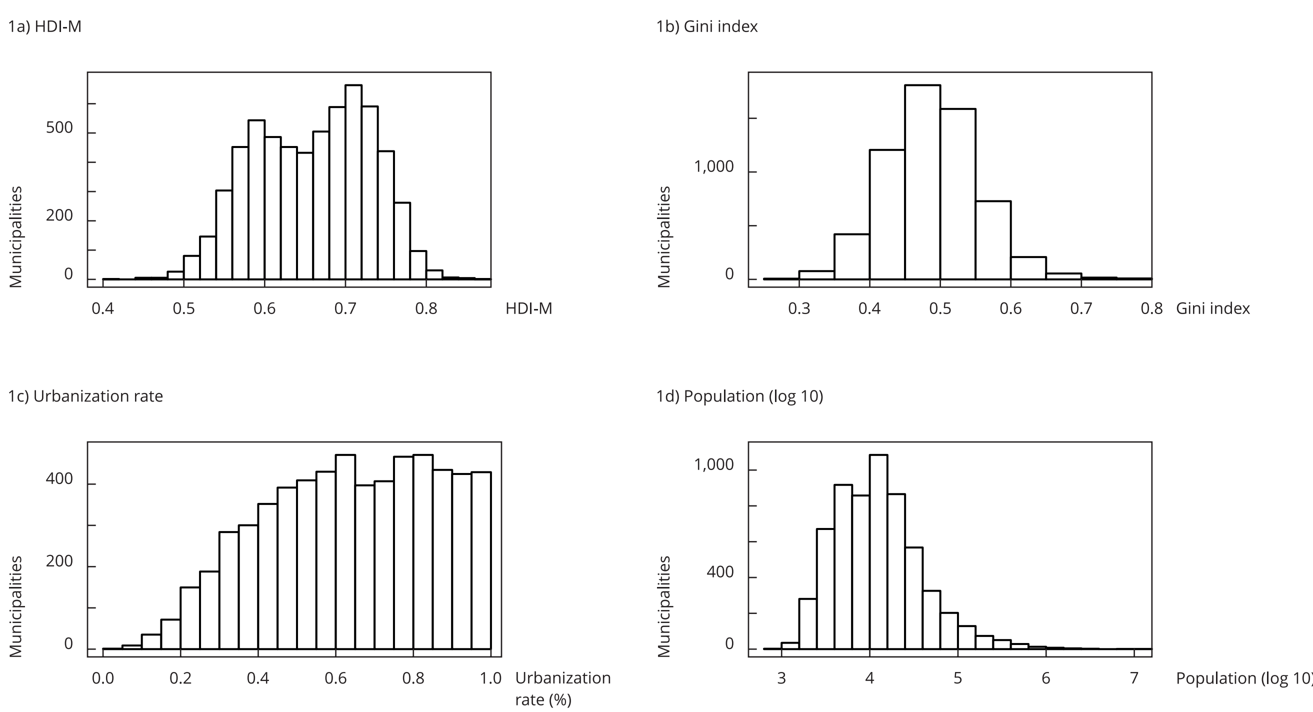
We developed a model for the standardized mortality rate in each Brazilian municipality from 2005 to 2015. We considered HDI-M, Gini index, base-10 logarithm of the resident population, and urbanization rates as fixed effects in a model to explain the evolution of homicide during the period. We calculated four covariates related to SDH for each municipality in 2010, based on demographic census data (Figure 1).

According to Figure 1, Brazil has few municipalities with a very high HDI-M (≥ 0.8), whereas its vast majority had an HDI-M between 0.5 and 0.799 in 2010, showing great variability in terms of human development. Regarding the Gini index, most municipalities have an income inequality index between 0.35 and 0.65. In 2010, no municipality had low inequality, highlighting its persistence among Brazilian cities.

Urbanization rates showed great variability. We found a reasonable number of municipalities with less than 40% of residents in urban areas. Most cities are distributed in similar frequencies along a range between 40% and 100% of urbanization.

Figure 1

Frequency distribution of Brazilian municipalities in relation to social determinants of health (Municipal Human Development Index – HDI-M, Gini index, urbanization rate, and population). Brazil, 2010.



Source: prepared by the authors.

As for the resident population in 2010, we considered a base-10 log scale due to its large variation range. Few municipalities had less than 1,000 inhabitants and some, more than one million inhabitants. We found almost 2,000 cities with a population of around 3,000 to 10,000 inhabitants ($10^{3.5}$ up to 10^4) and a little more than 2,000 municipalities with a population between 10,000 to 30,000 inhabitants (10^4 and $10^{4.5}$). Therefore, most Brazilian cities have less than 30,000 inhabitants.

On the other hand, Table 1 estimates the effect of population size, urbanization rates, the Gini index, and HDI-M on the risk of homicidal violence in Brazilian municipalities. The effect of population size represents the variable most associated with the risk of homicidal violence. Data in Table 1 show that the occurrence of homicides is more associated with populous municipalities (log 10), with an 80.8% (95% credibility interval – 95%CI: 73.0; 88.8) average risk; more urbanized cities, with an 8% (95%CI: 6.7; 9.2) average risk; municipalities with higher Gini index, with 6% (95%CI: 2.6; 9.5) average risk; whereas the relation with HDI-M is inverse. In other words, the risk is greater for municipalities with lower HDI-M, with -17.1% (95%CI: -21.4; -12.6) average risk.

Table 1 also shows the relative effect of each covariable considered in relative risk. The effect of urbanization rates, Gini index, and HDI-M were multiplied by 10 to facilitate the interpretation of the results, thus the estimated effect of an increase of 0.1 (10%) in the urbanization rate, 0.1 in the Gini index, and 0.1 in the HDI-M.

We may consider the relative risk coefficients in Table 1 to assess the effect of these factors. When comparing two municipalities, these coefficients show whether their relative homicide risk rose or fell due to an increase in one unit of the considered factor. Therefore, municipalities with larger populations, higher urbanization rates, or higher Gini index tend to show a higher risk of homicide. On the other direction, municipalities with higher HDI-M tended to show a lower risk of homicide.

Thus, for a municipality with a population 10 times greater than another, its risk of homicide rose around 80%, with a 95%CI of this increase lying between 73% and 88.8%. We can consider this result to show how greater is the risk of homicide in large cities. In addition to having more homicides due to their larger population, the fact that this risk is greater in large cities more pronouncedly concentrates homicides.

As for urbanization rates, we observed that a 10% increase in the proportion of people residing in urban areas is associated with an average increase of 8% in the risk of homicide, with a 95%CI varying from 6.7% to 9.2% in the risk of homicide.

A 0.1 increase in the Gini index is associated with a 6% average increase in the risk of homicide, with a 95% credibility interval ranging from 2.6% to 9.5%. This means that the more socioeconomic inequality increases in a territory, the more the risk of homicide tends to rise. Considering the current Brazilian scenario of 60,000 homicides per year, reducing Gini by 0.1 would represent saving between 1,569 and 5,448 lives annually.

An increase of 0.1 in HDI-M represents an average reduction of 17.1% in the risk of homicide, with a 95%CI ranging from -12.6% to -21.4%. If, on average, the municipal HDI were to raise by

Table 1

Effect of relative homicide risk (%) in Brazilian municipalities according to our covariables (population, urbanization rate, Gini index, and Municipal Human Development Index – HDI-M), considering the annual standardized average of homicides from 2005-2015.

Variables	Estimate	SE	Average	95%CI	p-value
Intercept	-0.380	0.0167	--	-	< 0.0001
Population (log 10) in 2010	0.225	0.0028	80.8	73.0; 88.8	< 0.0001
Urbanization rate (10x) in 2010	0.026	0.0001	8.0	6.7; 9.2	< 0.0001
Gini index (10x) in 2010	0.010	0.0002	6.0	2.6; 9.5	< 0.0001
HDI-M (10x) in 2010	-0.050	0.0003	-17.1	-21.4; -12.6	< 0.0001

95%CI: 95% credibility interval; SE: standard error.
Source: prepared by the authors.

0.1, we would have a considerable reduction in the number of homicides. Considering the annual reported homicides of around 60,000, this decrease would represent saving between 7,560 and 12,834 Brazilian lives. Thus, our analysis suggests that the risk of homicide is greater in more populous cities, with higher urbanization rates, greater income inequality, and lower human development.

Figure 2 displays our SMR maps with the annual spatial distribution of homicides in Brazilian municipalities (2005-2015). It shows a pattern which seems to repeat year after year. The distribution of homicides is quite heterogeneous. Some regions register much more homicides than expected, with an SMR greater than 1. In this group are a range of municipalities in the Eastern portion of Brazil, bordering the Atlantic Ocean from its Northeast to its South. This range encompasses densely populated coastal regions and several state capitals, including the states of Pernambuco, Alagoas, Bahia, Espírito Santo, Rio de Janeiro, and Paraná, among others. In Paraná, this strip seems to move inland toward the West, linking with another long range running through the Brazilian Central-West and North. In this range, homicide rates are much higher than expected close to international borders, particularly with Paraguay (in the states of Paraná and Mato Grosso do Sul), Bolivia (in the states of Mato Grosso and Rondônia), and Venezuela (in the State of Roraima). Another highlight is the so-called "agricultural frontier", which comprises vast portions of the states of Mato Grosso, Rondônia, and the south of Pará, all areas with recognized land disputes.

On the other hand, Figure 2 also shows that many regions had an SMR < 1, registering fewer homicides than expected. In general, this occurred in the states of Acre, Amazonas, Northwestern Pará, Piauí, and in most of the states of Minas Gerais, São Paulo, Maranhão, and Tocantins. Analysis also showed how the distribution of homicides is heterogeneous even within the states. Bahia is one of these examples, with regions with lower (< 1) SMR (in its Western portion, close to its border with Tocantins); whereas other regions had higher (> 1) SMR, such as its East and South coastal sides.

Discussion

Our study shows that homicides are unevenly distributed within the Brazilian territory and attested the association of SDH with homicides, particularly in more populous cities, urbanized areas, and places with greater socioeconomic inequalities. On the other hand, human development is a factor which seems to protect the population, reducing their exposure to this type of violence in cities with greater HDI-M. Understanding and describing these events and their territorial variations is a permanent challenge and an efficient way to contribute to the improvement of public policies and urban planning [16].

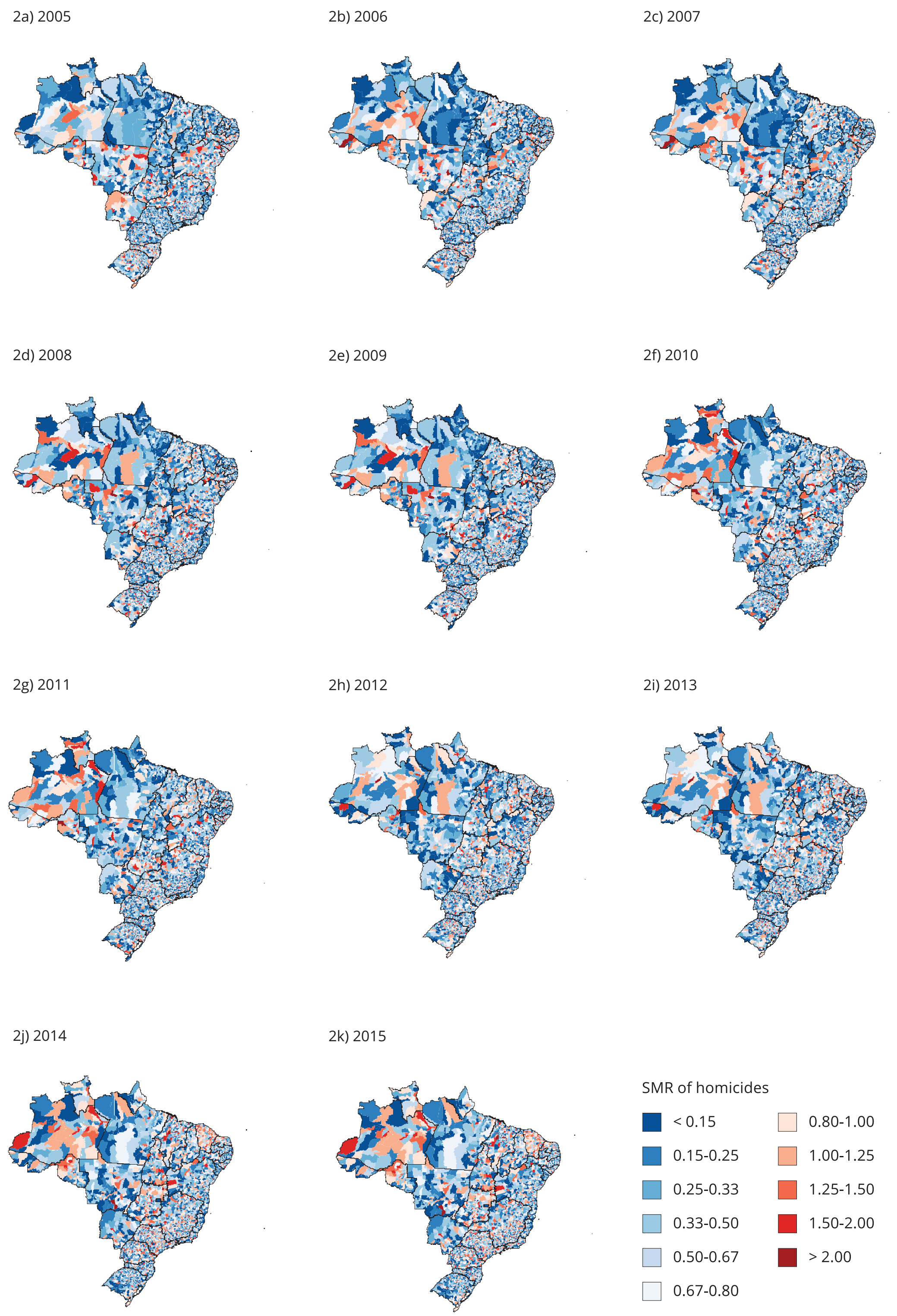
International studies have shown the relations between homicides and SDH in countries like the United States, Mexico, Canada, and Australia [30,31,32,33]. Previously, only a few nationwide studies [34,35,36,37,38] analyzed this issue for all 5,570 Brazilian municipalities over several years but numerous studies focused on specific Brazilian states [39,40,41,42,43,44] or cities [44,45,46,47]. One of these nationwide studies [34] specifically analyzed the homicides of men aged 20 to 39 years between 1999-2002 and 2007-2010, showing that homicide rates were significantly higher in larger cities, associated with higher fertility rates, lower literacy levels, higher social inequality, and more urbanized municipalities [34]. On the other hand, studies draw attention to the fact that small and medium municipalities have been showing rapid growth in homicide rates, despite having lower values for this indicator [34,48].

Our analysis showed that the larger the population of a municipality, the greater the risk of homicide, reaffirming previous studies conducted in other countries [49]. This data is consistent with a spatial analysis which found that few municipalities account for most Brazilian homicides [36]. In total, 150 Brazilian cities, which correspond to only 2.7% of the municipalities in the country, account for more than 60% of its homicides [50]. Most have a population of over 290,000 inhabitants. Nonetheless, research must analyze these data with caution, considering that they fail to necessarily mean that smaller cities are free from this form of violence – though this study intended to highlight its predominant pattern.

Another covariable we analyzed was urbanization rates: the risk of homicide proportionally increased with it. This result is consistent with studies conducted in other countries [51]. Comparing covariables, urbanization rates show a smaller impact than population size on homicides but the

Figure 2

Standardized mortality ratio (SMR) maps with the annual spatial distribution of homicides in Brazilian municipalities, 2005-2015.



Source: prepared by the authors.

literature knows that, in practice, both factors are usually associated [42]. Urbanization, associated with population increase, may become a decisive factor regarding urban violence, in which lack of resources such as income (including its poor distribution) and disordered growth can add to other challenges of large cities, such as lack of access to health, safety, and public education [15,52]. Urban poverty and unhealthy living are directly linked to lack of power among the most vulnerable communities to demand and impose better living conditions [53]. Authors have been postulating that it is necessary to remove sources of freedom deprivation, including violence, neglect of public services, poverty, and absence of economic opportunities for societies to achieve a satisfactory human development [54].

The most recent nationwide data on homicides in Brazil, made available by the Brazilian Forum on Public Security (FBSP) in 2021 [55], reaffirms that the victim profile consists mostly of men (91.3%), black individuals (76.2%), and young people (54.3%), with 78% of cases involving firearms. The same report [55] also showed a 4% increase in homicides compared to the previous year. The literature describes this predominant victim profile [15,35,44] well and studies have added that worse socioeconomic conditions are also linked to exposure to homicides [22,36,42,56].

Our model showed that social inequality (Gini index) is associated with homicides, whereas income (a component of the HDI-M) has an inverse relation, meaning that less income increases risks of exposure to homicide. Both national and international studies reinforce these two SDH as risk factors for homicides [22,30,51,57]. Prominent Brazilian researchers argue that social inequalities and unequal opportunities contribute to explaining the epidemic of violence more than absolute poverty, combined with issues of urbanization and exaggerated population growth [45,58]. A study [39] analyzing homicides in municipalities in Paraná found a statistically significant correlation between homicide mortality in men aged 15 to 29 years and the Gini index of municipalities, whereas another study suggests that income below the poverty line showed a significant association with homicide rates [31]. Given the above, eradicating poverty and socioeconomic inequalities must be an integral part of any program to fight against violence [53].

Socioeconomic inequalities are among the most common assumptions related to violent crimes [57]. Along with low income, the poorest suffer from multiple deprivations, which can also be risk factors for violence and homicide [16,54]. Under certain conditions, individuals or groups would be vulnerable to violence due to the few or non-existent resources available for their protection [15]. Brazil still shows some aggravating factors which make it more susceptible to murderous violence, with emphasis on organized crime, recognized by criminal organizations as the First Command of the Capital (PCC) from São Paulo and the Red Command from Rio de Janeiro [4]. Discrimination and the structural racism permeating the Brazilian society and exposing black youth to crime due to lack of opportunities and decent conditions is another factor which must be acknowledged [7]. The number of black Brazilian homicide victims is disproportionately higher than other groups [3].

Living in unstable and/or stigmatized communities with precarious or no access to public services and under the effect of social inequalities can influence such greater vulnerability to early and violent causes of death [42]. This problem is not limited to the outskirts of large cities. Our spatial analysis show that homicides are spreading into rural areas, including the Pantanal and Amazonia, two fragile ecosystems marked by substantial agricultural advances, land disputes, and dispossession of indigenous lands, and both are part of routes for international drug trafficking [55,59].

Research must reflect on homicide patterns to develop preventive and intervention measures, identify vulnerabilities, and promote strategic actions [60,61]. Based on the analyzed indicators, investment in SDH related to education, health, and income (components of the HDI-M calculation), as well as measures to combat inequality (to improve the Gini index), can reduce homicides. Macrostructural measures, such as conditional cash transfer programs (*Bolsa Família*), have been shown as key strategies to prevent homicides and hospitalization from violence in Brazil by reducing poverty and/or socioeconomic inequalities [62]. Other strategies aimed at reducing rural exodus and guaranteeing decent conditions so the population remains in the countryside can prevent population growth in large cities and excessive urbanization, thus mitigating the two analyzed factors which most contribute to the risk of homicide.

This study has limitations, including research with secondary data; its failure to explore in-depth regional specificities; and its limited time-series cut. Also, our interpretation of the coefficients of fixed effect terms of the model, such as changes in the risk log for a unit of variation of the index, e.g., Gini, would mean moving from the extreme of equality to the extreme of inequality. However, we emphasize that this study and interpretation are the result of a model, and like any statistical model, it starts by simplifying a given phenomenon. We must be aware that, under real conditions, countless other aspects can influence a given phenomenon.

Another limitation is that we obtained most of our independent variables from the Census conducted in 2010 (the last census conducted in Brazil), whereas we considered homicides in later periods. It was a methodological option to use census data instead of estimates. However, these limitations fail to significantly affect the validity of our results as the studied independent variables show relative stability over time. Despite the limitations of this study, we should mention its potentialities. As a source of power, we emphasize that this study subsidizes criteria to guide public policies, including financial investments to regions with a higher risk of homicide, groups that are more vulnerable, or to improve the analyzed SDH (population, urbanization, human development, and socioeconomic inequality). Reducing violence is a complex task but it is essential for countries to achieve the Sustainable Development Goals.

Contributors

The authors declare that they collaboratively conceived the proposal, participated in the draft of this article, equally reviewed the text, suggesting improvements, and approved the final version of this article. C. Wanzinack collected the data and tabulated the results. C. Wanzinack, M. C. Signorelli and C. Reis performed the analysis. C. Wanzinack and M. C. Signorelli systematized the draft version of the text.

Additional informations

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Resumo

O objetivo foi analisar as relações entre violência homicida, desenvolvimento humano, desigualdade, tamanho populacional e taxas de urbanização nos municípios brasileiros. Trata-se de um estudo ecológico retrospectivo de 5.570 municípios brasileiros que analisa as relações entre a taxa média de homicídios registrados no Sistema de Informações sobre Mortalidade (de 2005 a 2015) e indicadores selecionados: índices municipais de desenvolvimento humano (IDH-M), coeficientes de Gini, taxas de urbanização e população quantitativa. A análise do efeito relativo (%) das variáveis sobre o risco de violência homicida mostrou maior associação com municípios mais populosos (log 10) (80,8%, IC95%: 73,0; 88,8), mais urbanizados (8%, IC95%: 6,7; 9,2), com maiores coeficientes de Gini (6%, IC95%: 2,6; 9,5); enquanto a relação com IDH-M é inversa (-17,1%, IC95%: -21,4; -12,6). Políticas nacionais que visam limitar o crescimento populacional e a urbanização das cidades brasileiras mais populosas poderiam reduzir as taxas de homicídios em todo o país. Reduzir as desigualdades e investir em políticas municipais de educação social, saúde e renda também poderiam reduzir o número de homicídios. Estima-se que uma melhoria de 0,1 no IDH-M dos municípios causaria uma redução nacional entre 7.560 a 12.834 homicídios anuais, enquanto uma diminuição de 0,1 em desigualdade de renda (coeficiente de Gini) significaria salvar entre 1.569 e 5.448 vidas por ano.

Homicídio; Desenvolvimento Humano; Fatores Socioeconômicos; Violência

Resumen

El objetivo de este estudio fue analizar las relaciones entre la violencia homicida, el desarrollo humano, la desigualdad, el tamaño poblacional y las tasas de urbanización en municipios brasileños. Se trata de un estudio ecológico, retrospectivo realizado con 5.570 municipios brasileños, con el fin de analizar la relación entre el promedio de homicidios, registrado en el Sistema de Información de Mortalidad (2005-2015), y los indicadores seleccionados: índices de desarrollo humano del municipio (IDH-M), coeficientes de Gini, tasas de urbanización y población cuantitativa. El análisis del efecto relativo (%) de las variables sobre el riesgo de violencia homicida mostró una asociación mayor con los municipios más poblados (log 10) (80,8%, IC95%: 73,0; 88,8), más urbanizados (8%, IC95%: 6,7; 9,2), con coeficientes de Gini más altos (6%, IC95%: 2,6; 9,5); mientras que la relación con el IDH-M es inversa (-17,1%, IC95%: -21,4; -12,6). Las políticas nacionales destinadas a limitar el crecimiento de la población y la urbanización en las ciudades más pobladas de Brasil podrían reducir las tasas de homicidio en todo el país. La reducción de las desigualdades y las inversiones en políticas municipales de educación social, salud y renta también podrían contribuir con la disminución de la tasa de homicidios. Si el IDH-M de los municipios tuviese una mejora del 0,1, habría una reducción nacional de 7.560 a 12.834 homicidios al año, mientras que una disminución de 0,1 en la desigualdad de renta (coeficiente de Gini) salvaría entre 1.569 y 5.448 vidas al año.

Homicidio; Desarrollo Humano; Factores Socioeconómicos; Violencia

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