

Homicide of Lesbians, Gays, Bisexuals, Travestis, Transexuals, and Transgender people (LGBT) in Brazil: a Spatial Analysis

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Abstract *Violence against LGBT people has always been present in our society. Brazil is the country with the highest number of lethal crimes against LGBT people in the world. The aim of this study was to describe the characteristics of homicides of LGBT people in Brazil using spatial analysis. The LGBT homicide rate was used to facilitate the visualization of the geographical distribution of homicides. Public thoroughfares and the victim's home were the most common places of occurrence. The most commonly used methods for killing male homosexuals and transgender people were cold weapons and firearms, respectively; however, homicides frequently involved beatings, suffocation, and other cruelties. The large majority of victims were aged between 20 and 49 years and typically white or brown. The North, Northeast and Central-West regions, precisely the regions with the lowest HDI, presented LGBT homicide rates above the national rate. LGBT homicides are typically hate crimes and constitute a serious public health problem because they affect young people, particularly transgender people. This problem needs to be addressed by the government, starting with the criminalization of homophobia and the subsequent formulation of public policies to reduce hate crimes and promote respect for diversity.*

Key words *Homicides, LGBT people, Spatial analysis*

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Introduction

Deaths resulting from intentional violence and aggression have increased among external causes of death in Brazil and the country now has the highest absolute number of homicides in the world^{1,2}, making this problem a serious public health concern^{3,4}. This type of violence can be understood as a complex phenomenon that has a major impact on life expectancy, since it generally affects young people, blacks, and low-income people from developing countries⁵⁻⁷.

According to the report “World Health Statistics 2019”, published by the World Health Organization, there were an estimated 477,000 deaths globally due to homicides in 2016⁸. Brazil accounted for around 12.8%⁹ of this total, representing the seventh largest homicide rate in the Americas⁸.

Brazil’s Atlas of Violence 2019 reported that there were 65,602 homicides in 2017, which is equivalent to a homicide rate of 31.6 per 100,000 population. Over half of the victims (54.5%) were young people aged between 15 and 29 years, 91.8% were men, 77% were killed using guns, and 75.5% were black and typically lived in the North and Northeast regions⁹.

According to Transgender Europe (TGEU), there were 2,609 murders of transgender people across 71 different countries between 2008 and 2017, with Brazil accounting for the largest number of deaths¹⁰.

The Atlas of Violence 2019 features a section dedicated to violence against the LGBT population between 2011 and 2017, based on data from *Disque 100* (Dial 100 human rights hotline) and the national notifiable diseases information system (SINAN). *Disque 100* recorded 1,720 complaints of human rights violations against LGBT people in 2017, 193 of which were of murders, 23 attempted murders, and 423 bodily injuries. The number of reported cases of violence against homosexuals/bisexuals recorded in the SINAN in 2016 was 6,800. Physical violence accounted for over half of these complaints; however, violations also included psychological violence and torture⁹.

According to the NGO the *Grupo Gay da Bahia* (GGB), Brazil is the country with the highest number of lethal crimes against LGBT people in the world, followed by Mexico and the United States¹¹⁻¹³. In 2018, the GGB recorded 420 violent deaths among LGBT people in Brazil, which is equivalent to one murder every 20 hours¹².

The aim of the present study is to show the characteristics of LGBT homicides committed in

Brazil between 2002 and 2016 using spatial analysis. It is important to note that the discussion of the social and political aspects of homophobia is beyond the scope of this study. The study is restricted to the analysis of homicides recorded by the GGB that were not necessarily related to homophobia, given that it is difficult to prove the motive due to the lack of information on the circumstances surrounding these crimes.

Materials and methods

Since the number of LGBT homicides in the official data published in the Atlas of Violence 2019 is underreported, it was necessary to think of a viable alternative approach⁹. The most workable approach was to use the data produced by the GGB, which has been recording LGBT homicides and suicides, including those motivated by homophobia, since 1980¹²⁻¹⁴. It is important to stress that international institutions like the TGEU, International Lesbian, Gay, Bisexual, Trans and Intersex Association (ILGA), and the United Nations, as well as the Brazilian press, frequently use data from GGB reports and their website^{10,15,16}.

The Ministry of Human Rights produced a report at the end of 2018 ratifying GGB data and estimating that 8,027 LGBT people were murdered in the country between 1963 and 2018 because of their sexual orientation or gender identity¹⁷. The GGB documented more than 5,000 murders of LGBT people up to 2018, using data based on news stories, internet research, and information provided by LGBT activists¹².

To minimize underreporting, the homicides recorded during the study period were checked through exhaustive internet searches with the help of a researcher from the GGB, resulting in corrections, alterations, and the addition of complementary information. A conservative estimate suggests that for each recorded LGBT homicide two homicides go unrecorded¹⁸ “archive_location”: “743043412; 201026602”, “abstract”: “This article analyzes one of the gravest consequences of discrimination against homosexuals: hate crimes (or homophobic murders; however, it is believed that this number may be even higher in Brazil)¹⁹.”

Since the use of rates is common in spatial analysis, the main variable of interest was “LGBT homicide rate”. We calculated the LGBT homicide rate in towns and cities with more than 100,000 inhabitants as from 2002. Standardized rates were not calculated due to lack of available information.

Since information on LGBT homicide rates do not exist in Brazil, we chose an appropriate parameter to enable comparisons of rates across municipalities and states. Quartile statistics were chosen for the states and the Human Development Index (HDI) – the most widely used social indicator in the world – for capitals and other municipalities²⁰.

Underreporting bias was minimized by grouping cases into five-year periods. The homicide rate per 100,000 population was therefore calculated by dividing the 15-year study period into three five-year periods (2002 to 2006, 2007 to 2011, and 2012 to 2016) in order to make the results more robust, comparable, and representative and to facilitate spatial visualization. Thus, the LGBT homicide rate was calculated based on the sum of homicides in each five-year period (the numerator) divided by 10% of the Brazilian population (the denominator) in the central years of the five-year periods (2004, 2009, and 2014). It is worth highlighting that studies confirming the proportion of LGBT in Brazil do not exist and that 10% is a conservative estimate²¹⁻²³.

Studies from other countries have shown that, on average, 10% of the population are LGBT. A study conducted by the University of California in 2006 in the US' 13 largest cities concluded that 8.1% of the population declared themselves as LGBT²⁴. Another study conducted by *Rutgers Nisso Groep* in the Netherlands in 2009 showed that 10% of men and 11% of women reported feeling sexually attracted to someone of the same sex²⁵. A survey undertaken by the global public opinion and data company *YouGov* estimated that 11% of the population of England were LGBT²⁶, while a study carried out in Italy by *Istituto Nazionale di Statistica* reported that 6.7% of the population declared that they had had sex with a person of the same sex²⁷.

Homicide rates were visualized using a spatial analysis technique developed by Cliff²⁸. Since there is no pre-established classification for homicide rates²⁹, maps were created using quartiles. The calculation of the rates and mapping were performed using R 3.5.3 and QGIS 3.4.5, respectively.

Spatial dependence was measured using Moran's I ³⁰ to determine the presence of spatial autocorrelation of LGBT homicide rates in the three periods, using a significance level of 0.05³¹. Some studies^{32,33} have highlighted the need to perform hypothesis testing, where the null hypothesis (H_0) states that there is no spatial dependence. The index ranges from -1 to +1, where values

close to zero indicate that there is no spatial autocorrelation and positive and negative values indicate the presence of spatial dependence between locations. After testing different matrices, we used a distance between the centroids of the states of greater than 2,500 kilometers for the spatial proximity matrix adopted because this was the configuration that was shown to be most significant ($p\text{-value} \leq 0.05$) for hypothesis testing.

Kernel maps were created to identify spatial patterns of homicide rates across regions. The maps were plotted using interpolation methods, showing the point intensity of the phenomenon across the study area at a scale of 1:2,000, thus providing a general overview of the intensity of LGBT homicide rates across Brazil³⁴.

Finally, this ecological study analyzed data for the period 2002 to 2016 – the most recent available data – in order to achieve more reliable results, thus bringing our estimations as close to reality as possible.

Results

The findings show that there were 3,100 LGBT homicides in Brazil between 2002 and 2016, as shown in Table 1. To aid understanding of the results, gender identity and sexual orientation were separated into three groups: homosexual (including bisexuals), transgender (including intersexuals, transexuals, cross-dressers, and “travestis”), and other (including lesbians, heterosexuals wrongly taken to be homosexuals, and “T-lovers”, who are lovers/admirers of transgender people and travestis). Over half the sample (59.3%) were homosexual, 35.6% were transgender, and 5.1% were other.

Over half of homosexual homicides were committed in small towns and cities (51.5% compared to 48.5% in state capitals). Almost half of the homicides were committed in the victim's home (47.5%), 36% used cold weapons, and 49.2% involved 2 to 5 blows or shots. Over half the victims were white (51.7%), 26.2% were aged between 30 and 39 years, and 44.4% were professionals with higher education, teachers, or business people. Almost half of the perpetrators were aged between 20 and 29 years (47.2%) and 48.6% were sex professionals.

Over half of transgender homicides occurred in small towns and cities (52.8% compared to 47.2% in state capitals), 76.8% were committed in public thoroughfares, 49.8% used firearms, and 57.1% involved 2 to 5 blows or shots. Almost

Table 1. Characteristics of crimes and the victims and identified perpetrators of LGBT homicides in Brazil between 2002 and 2016.

Variables		Homicide							
		Gender identity/Sexual Orientation						Total	
		Homosexual		Transgender		Other*		N	%
		N	%	N	%	N	%	N	%
Region	State capital	891	48.5	522	47.2	73	46.5	1486	47.9
	Smaller town/city	947	51.5	583	52.8	84	53.5	1614	52.1
	Total	1838	100.0	1105	100.0	157	100.0	3100	100.0
Place of occurrence	Home	791	47.5	170	17.3	49	33.6	1010	36.1
	Public thoroughfare	740	44.4	756	76.8	77	52.7	1573	56.2
	Private establishment	128	7.7	58	5.9	20	13.7	206	7.4
	Public establishment	8	0.5	-	-	-	-	8	0.3
	Total	1667	100.0	984	100.0	146	100.0	2797	100.0
Type of weapon or method	Cold weapon	626	36.0	241	23.6	58	38.2	925	31.7
	Firearm	431	24.8	509	49.8	63	41.4	1003	34.4
	Beating	327	18.8	147	14.4	20	13.2	494	16.9
	Suffocation	243	14.0	66	6.5	6	3.9	315	10.8
	Other**	114	6.5	59	5.8	5	3.3	178	6.1
Total	1741	100.0	1022	100.0	152	100.0	2915	100.0	
Number of blows or shots	1	22	7.4	21	10.2	6	15.8	49	9.1
	2 to 5	146	49.2	117	57.1	23	60.5	286	53.0
	6 to 10	52	17.5	32	15.6	6	15.8	90	16.7
	> 10	77	25.9	35	17.1	3	7.9	115	21.3
	Total	297	100.0	205	100.0	38	100.0	540	100.0
Victim's age group (years)	< 15	12	0.8	8	1.1	2	1.4	22	0.9
	15 to 19	105	6.6	97	13.0	22	15.7	224	9.1
	20 to 29	382	24.2	369	49.5	58	41.4	809	32.8
	30 to 39	414	26.2	200	26.8	34	24.3	648	26.3
	40 to 49	372	23.6	66	8.8	14	10.0	452	18.3
	50 to 59	184	11.7	4	0.5	8	5.7	196	8.0
	> 59	110	7.0	2	0.3	2	1.4	114	4.6
Total	1579	100.0	746	100.0	140	100.0	2465	100.0	
Victim's race or skin color	Branca	297	51.7	202	54.6	29	50.9	528	52.7
	Parada	235	40.9	138	37.3	23	40.4	396	39.6
	Preta	42	7.3	30	8.1	5	8.8	77	7.7
	Total	574	100.0	370	100.0	57	100.0	1001	100.0
Victim's profession	Professional with higher education, teacher or business person	477	44.4	16	3.6	14	31.8	507	32.4
	General services/self-employed	336	31.3	62	14.0	16	36.4	414	26.5
	Sex professional	22	2.0	353	79.5	-	-	375	24.0
	Student, retired, or unemployed	111	10.3	5	1.1	11	25.0	127	8.1
	Priest/religious affiliation	65	6.0	3	0.7	-	-	68	4.4
	Professional with 2° education	46	4.3	3	0.7	-	-	49	3.1
	Military member	15	1.4	-	-	3	6.8	18	1.2
	LGBT military member	3	0.3	2	0.5	-	-	5	0.3
	Total	1075	100.0	444	100.0	44	100.0	1563	100.0

it continues

Table 1. Characteristics of crimes and the victims and identified perpetrators of LGBT homicides in Brazil between 2002 and 2016.

Variables	Homicide								
	Gender identity/Sexual Orientation								
	Homosexual		Transgender		Other*		Total		
	N	%	N	%	N	%	N	%	
Perpetrator's age group (years)	< 15	4	1.2	-	-	2	1.4	6	1.1
	15 to 19	118	35.2	18	21.2	22	15.7	158	28.2
	20 to 29	158	47.2	43	50.6	58	41.4	259	46.3
	30 to 39	38	11.3	8	9.4	34	24.3	80	14.3
	40 to 49	14	4.2	11	12.9	14	10.0	39	7.0
	50 to 59	1	0.3	4	4.7	8	5.7	13	2.3
	> 59	2	0.6	1	1.2	2	1.4	5	0.9
	Total	335	100.0	85	100.0	140	100.0	560	100.0
Perpetrator's profession	Sex professional	36	48.6	6	26.1	3	50.0	45	43.7
	Military member	13	17.6	16	69.6	2	33.3	31	30.1
	Student, retired, or unemployed	12	16.2	-	-	1	16.7	13	12.6
	Professional (higher education)	7	9.5	-	-	-	-	7	6.8
	General services/self-employed	6	8.1	1	4.3	-	-	7	6.8
		Total	74	100.0	23	100.0	6	100.0	103

Notes: *Includes lesbians, heterosexuals wrongly taken to be homosexuals, and "T-lovers" (lovers/admirers of transgender people and travestis). ** Other includes clubbing, stoning, decapitation, running over, impalement, drowning, poisoning, and torture.

half of the victims (49.5%) were aged between 20 and 29 years, 54.6% were white, and 79.5% were sex professionals. Half of the identified perpetrators were aged between 20 and 29 years (50.6%) and around two-thirds (69.6%) were military members.

Overall, over half the crimes (52.1%) were committed in small towns and cities, 56.2% in public thoroughfares, 34.4% used firearms, and 53% involved 2 to 5 blows or shots. Over half (52.7%) of the victims were white, 32.8% were aged between 20 to 29 years, and 32.4% were professionals with higher education, teachers, or business people. Almost half of the identified perpetrators were aged between 20 to 29 years (46.3%) and sex professionals (43.7%).

It is important to note that there was limited information on perpetrators, primarily due to the underreporting of these crimes. This happens due to the inefficiency of the Brazil's criminal justice system, leading to a lack of effective measures to address homophobia^{12,13}.

States

Figure 1 shows that seven states showed homicide rates above the 3^o quartile in the period 2002 to 2006 (4.36: Amazonas, Mato Grosso do Sul, Goiás, Rio Grande do Norte, Paraíba, and Pernambuco), six during the period 2007 to 2011 (8.60: Rondônia, Mato Grosso do Sul, Paraíba, Pernambuco, Alagoas, and Sergipe), and six in the period 2012 to 2016 (14.26: Amazonas, Rondônia, Mato Grosso do Sul, Paraíba, Alagoas, and Sergipe).

The states of Paraíba and Mato Grosso do Sul showed homicide rates above the 3^o quartile in all three periods, Amazonas, Rondônia, Pernambuco, Alagoas, and Sergipe in two periods, and Rio Grande do Norte and Goiás in one period.

Towns and cities

The rise in LGBT homicides in Brazil becomes all the more evident when we observe the

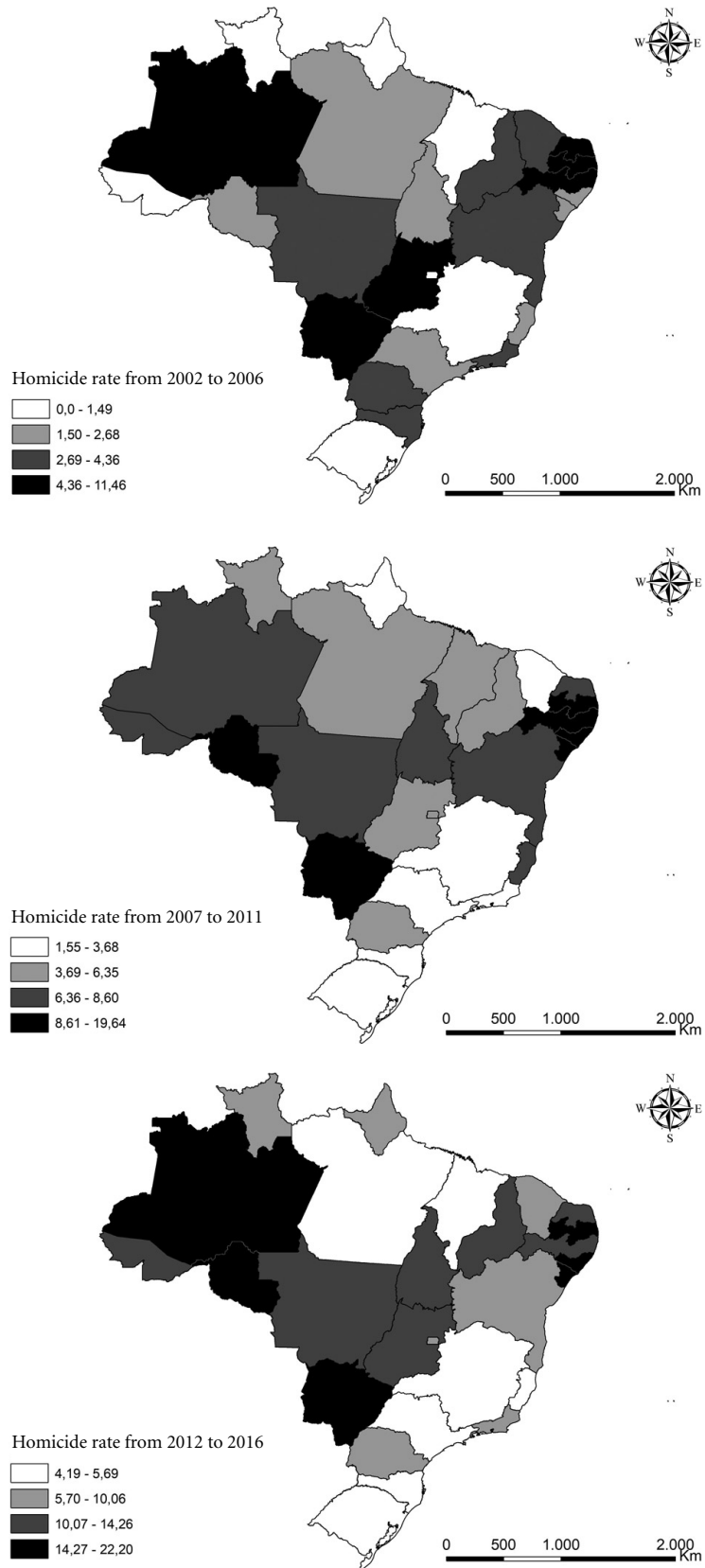


Figure 1. Spatial evolution of homicide rates by state between 2002 and 2016.

spatial evolution of homicide rates across municipalities in the period 2002 to 2016. The number of towns and cities that recorded LGBT homicides increased from 158 in the period 2002 and 2006 (2.84% of all towns and cities), to 310 in the period 2006 to 2011 (5.57% of all towns and cities), and 558 in the period 2011 to 2016 (10.02% of all towns and cities).

State capitals

Florianópolis was used for comparison purposes because it is the state capital with the highest HDI³⁵. For the period 2002 to 2016, fifteen capitals showed homicide rates above that of Florianópolis (12.09 homicides per 100,000 population): João Pessoa (44.25), Palmas (31.51), Recife (27.03), Manaus (24.39), Porto Velho (24.07), Cuiabá (23.76), Maceió (23.33), Natal (23.28), Teresina (22.04), Goiânia (20.22), Aracaju (17.26), Vitória (16.39), Campo Grande (16.21), Salvador (15.65), and Curitiba (12.70), as shown in Figure 2.

The capitals with the greatest positive variation between the periods 2002 to 2006 and 2007 to 2011 were Maceió (797.25%), Aracaju (442.50%), and Brasília (337.70). Those with the greatest negative variation were Florianópolis (-59.37%), Goiânia (-52.43%), and Manaus (-45.04%). The capitals with the greatest positive variation between the periods 2007 to 2011 and 2012 to 2016 were Porto Alegre (241.36%), Manaus (223.74%), and São Paulo (156.26%). Those with the greatest negative variation were Vitória (-59.59%), Maceió (-38.73%), and São Luís (-35.13%).

Municipalities (non-capital towns and cities)

Pouso Alegre in the State of Minas Gerais was used for comparison purposes because it had the highest HDI among the 26 towns and cities that showed the most significant numbers of cases³⁵. Eighteen of these municipalities showed an average homicide rate above that of Pouso Alegre for the period 2002 to 2016 (12.51 homicides per 100,000 population): Caruaru, Pernambuco (23.3); Uberaba, Minas Gerais (21.0); Itabuna, Bahia (20.5); Simões Filho, Bahia (20.3); Rondonópolis, Mato Grosso (19.3); Cabo de Santo Agostinho, Pernambuco (17.6); Várzea Grande, Mato Grosso (16.8); Paulo Afonso, Bahia (15.6); Olinda, Pernambuco (15.4); Vitória de Santo

Antão, Pernambuco (15.2); Lauro de Freitas, Bahia (14.1); Teixeira de Freitas, Bahia (13.9); Camaragibe, Pernambuco (13.7); Araguaína, Tocantins (13.5); Arapiraca, Alagoas (13.5); Camaçari, Bahia (13.2); Feira de Santana, Bahia (13.1), and Porto Seguro, Bahia (12.8).

The municipalities with the greatest positive variation between the periods 2002 to 2006 and 2007 to 2011 were Simões Filho (440.62%), Uberaba (364.10%), and Camaragibe (201.09%). Those with the greatest negative variation were Jaboatão dos Guararapes, Pernambuco (-8.39%); Dourados, Mato Grosso do Sul (-5.24%), and Paulo Afonso (-4.81%). The municipalities with the greatest positive variation between the periods 2007 to 2011 and 2012 to 2016 were Dourados (351.35%); Várzea Grande (306.42%); and Nova Iguaçu, Rio de Janeiro (145.27). Those with the greatest negative variation were Simões Filho (-100.00%); Olinda, Pernambuco (-65.94%), and Paulo Afonso (-54.91%).

Spatial dependence

Initially we applied Moran's I using municipalities as the unit of analysis. However, since approximately 90% of municipalities showed homicide rates equal to zero, it was necessary to group areas by state in order to satisfy the assumptions of the coefficient. Thus, although it is unusual to group areas by state, we applied Moran's I to three five-year periods (2002 to 2006, 2007 to 2011, and 2012 to 2016). It is important to note that three states were discarded for the period 2002 to 2006 because they showed homicide rates equal to zero.

Moran's I was significant for the three periods, thus providing enough evidence at the 5% level of significance to reject the null hypothesis (H_0) of absence of spatial autocorrelation and confirm that there was positive spatial autocorrelation for homicide rates across states in the three periods, concluding that there is no way of confirming that LGBT homicides occurred independently across states. Thus, these findings should not be interpreted in isolation as if these homicides were a social phenomenon specific to each particular state.

To provide an overview of the growth in homicide rates across Brazil, we created kernel maps for each period using quartiles, where the darker the area the higher the rate. The maps show that higher homicide rates tend to be concentrated in and around metropolitan areas (Figure 3).

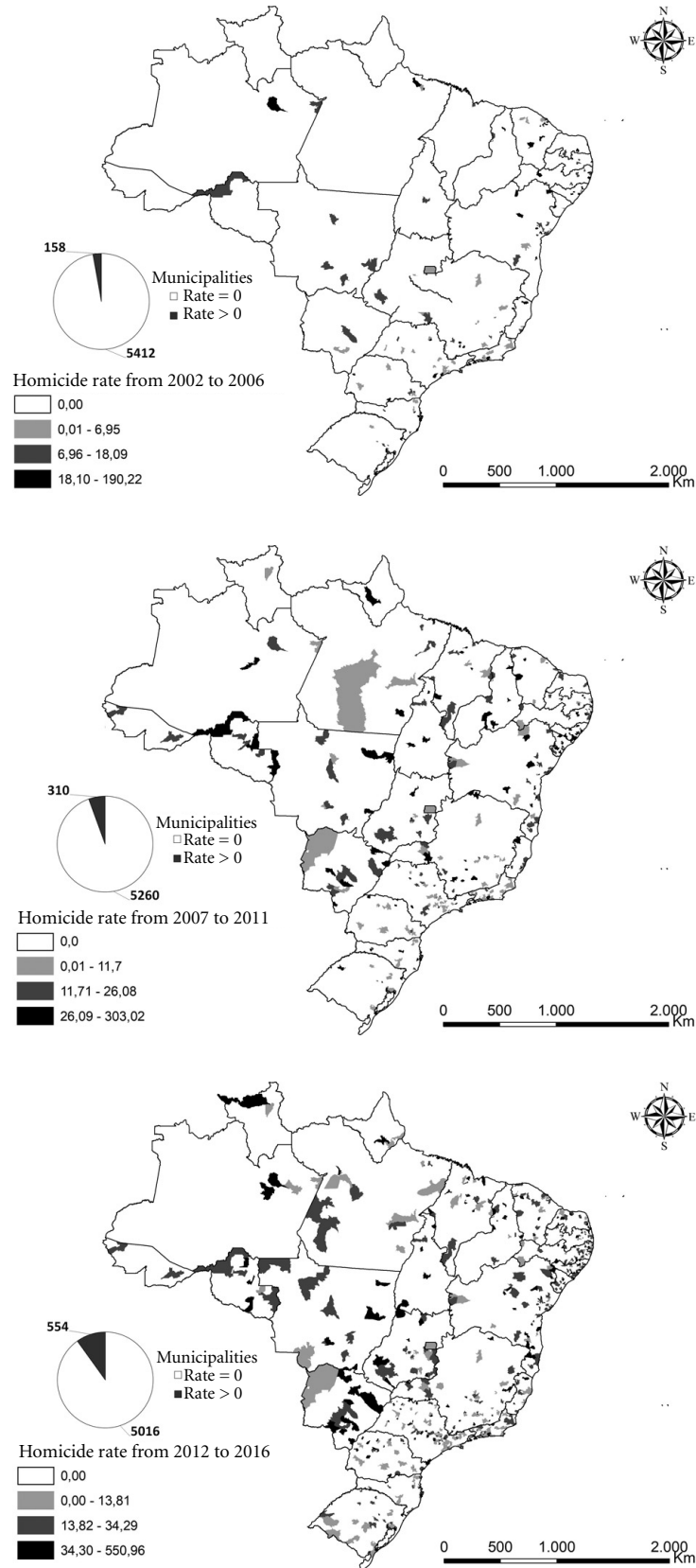


Figura 2. Evolução espacial das taxas de homicídios por municípios brasileiros de 2002 a 2016.

Discussion

This study is pioneering in so far as it presents more robust information about LGBT homicides in Brazil. The number of homicides in the country has increased steadily over the study period due to a lack of policies to combat violence against LGBT people^{12,14}. Although the criminalization of homophobia alone will not resolve this problem, a recent law specifically addressing such discrimination is a first step forward in reducing violence against this group^{11,13,18}. Our findings therefore shed much needed light on a little known reality often ignored by the government and policymakers.

One of the key findings of the study is that homicide rates were similar between capitals and smaller towns and cities, which has not been described by other studies. Furthermore, homicides occur predominantly in public thoroughfares^{14,18,36-42} and in the victims' home^{14,18,36-44} and the most common methods of killing were firearms, cold weapons, beating, and suffocation^{14,18,36-41,43,45-47}. The crimes also tended to involve more than one blow or shot, suggesting that they are hate crimes^{14,41,43,44,47}.

With regard to victims, male homosexuals and transgender people were the most affected^{38,43} and the most vulnerable age group was 20 to 49 years^{12,36,38-40,46}, showing that transgender victims are typically younger^{45,48}. Victims were typically white^{12,37,41,43-45,48} or brown^{43,45,48} and the majority were professionals with higher education, teachers, or business people^{12,36,38,40}. The large majority of identified perpetrators were aged under 30 years^{37,40-44,47} and sex professionals^{36,38}, military members, or students³⁶⁻⁴⁰.

The spatial analysis shows that the states with homicide rates above the third quartile were located in the North, Northeast, and Center-West regions^{1,49,50}. A comparison with homicide rates among the general population during the period 2006 to 2016 shows the same pattern, with the exception of the State of Pernambuco, where rates decreased (-10.2%), and Rio Grande do Sul, where rate increased (58.0%)¹.

Eight of the fifteen capitals that had homicide rates above that of Florianópolis are on the list of the 50 most violent cities in the world: João Pessoa, Recife, Manaus, Maceió, Natal, Teresina, Aracaju, and Salvador⁵¹. The capitals Fortaleza, Belém, and Macapá are also on this list, but do not feature among the 15 most violent capitals for LGBT people.

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Of the 18 municipalities that showed an average homicide rate for the period 2002 to 2016 above that of Pouso Alegre, only Feira de Santana appears on the list of the 50 most violent cities in the world⁵¹.

The findings of the Moran's I tests confirmed the presence of positive spatial autocorrelation for each of the three periods, which means that the findings should not be interpreted in isolation, since LGBT violence is a social and political phenomenon and serious public health problem. The kernel maps show that higher homicide rates tend to be concentrated in and around metropolitan areas, following the pattern of homicide rates in the general population reported by the Atlas of Violence 2019^{9,52}.

The number of LGBT homicides in Brazil has increased steadily over the study period, from 158 between 2002 and 2006 to 558 in the period 2012 to 2016, representing an increase of 253%, whereas the number of homicides among the general population rose from 245,835 to 292,103 in the same period, representing an increase of 18.82%. This means that the number of LGBT homicides has increased 13 times more than the number of homicides among the general population⁵³. It is important to highlight that LGBT homicide rates do not show a seasonal pattern, varying by month, year, region, and city and failing to show a dominant pattern over the years^{12,14}.

Young people are most affected by this type of crime because of their vulnerability^{9,50,54}. For decades Brazilian LGBT movement have been pushing for the criminalization of homophobia or "LGBTphobia"¹¹. However, it was only recently that the Supreme Court voted to put homophobia on an equal footing with racism⁵⁵. Given the complexity of this issue, this action alone is not enough to solve this public health problem, but constitutes an important step forward in drawing increased public attention to homophobia.

We believe that, despite resorting to non-official data sources, this study achieved its objective, bringing to light valuable new information. To our knowledge, this research is the first comprehensive study of this problem in the world, providing greater visibility to such a common crime in this country. It is important to highlight that the data provided by the GGB was revised and corrected where necessary.

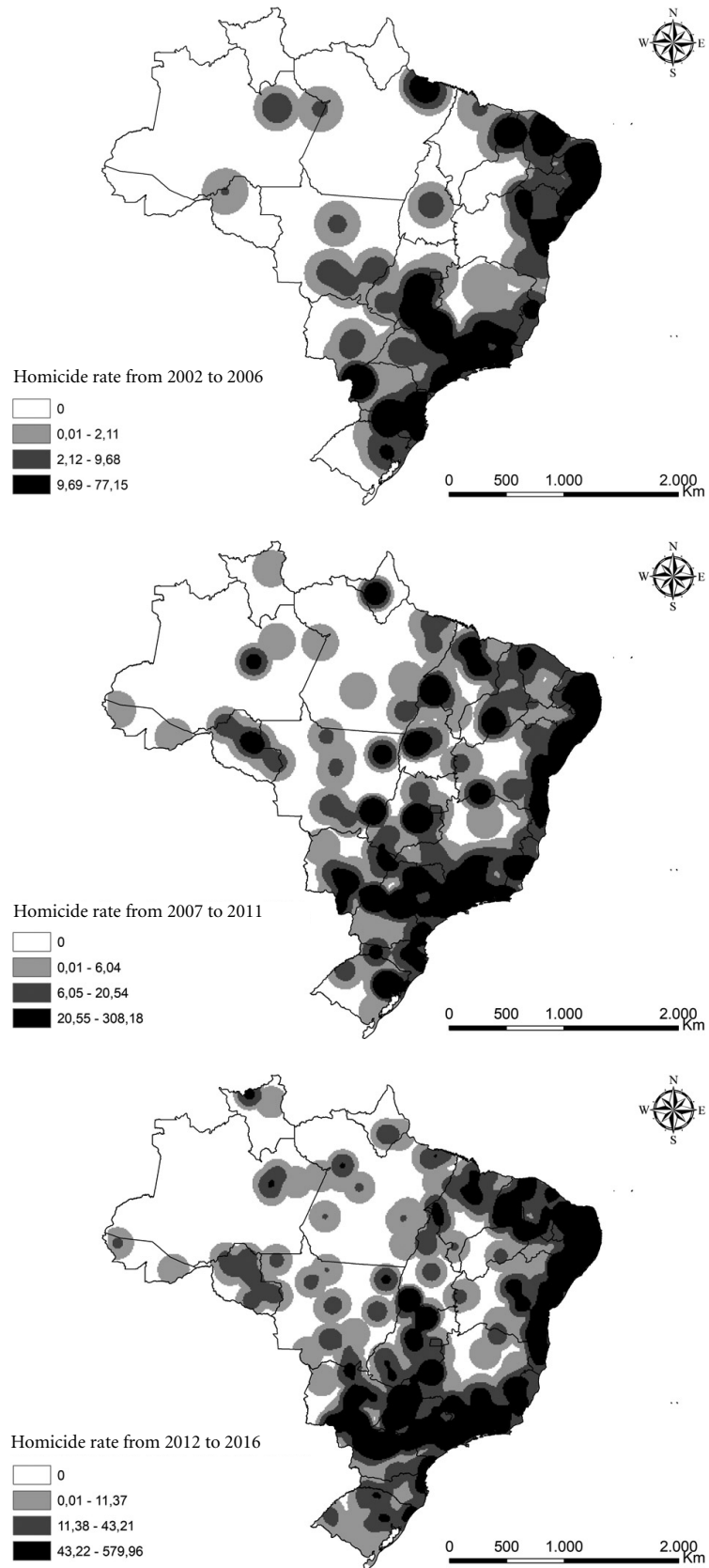


Figure 3. Kernel maps of homicide rates across Brazil between 2002 and 2016.

It is important to stress that LGBT homicide, regardless of whether or not it is motivated by homophobia, is a public health problem and gross and systematic violation of human rights. The aim of this study was to draw greater public attention to the number and characteristics of these crimes and their victims and perpetrators. Further research is needed into non-lethal crimes against LGBT people and suicide among

this group, including specific studies focusing on marginalized groups overlooked by the government and society such as transgender people. In a country witnessing rising violence and hate crime against this population, the expansion of research into this problem is much needed and has much to contribute to tackling homophobia by bringing different points of view and new information.

Collaborations

WG Mendes: Data collection, tabulation, descriptive and spatial analysis. Writing the text and standardizing the rules according to the magazine. CMFP Silva: Text revision and suggestion of significant parts.

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References

1. Cerqueira D, Lima RS, Bueno S, Neme C, Ferreira H, Coelho D, Alves PP, Pinheiro M, Astolfi R, Marques D, Reis M, Merian F. *Atlas da Violência 2018* [Internet]. Brasília: Instituto de Pesquisa Econômica Aplicada (IPEA); 2018 Sep [cited 2018 Sep 11]. Available from: http://www.ipea.gov.br/portal/images/stories/PDFs/relatorio_institucional/180604_atlas_da_violencia_2018.pdf
2. Wanzinack C, Signorelli MC, Reis C. Homicides and socio-environmental determinants of health in Brazil: a systematic literature review. *Cad Saude Publica* [Internet]. 2018 Nov 29 [cited 2019 Mar 30]; 34(12). Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0102-311X2018001202001&lng=en&tlng=en
3. Reichenheim ME, Souza ER, Moraes CL, Jorge MHPM, Silva CMFP, Minayo MCS. Violence and injuries in Brazil: the effect, progress made, and challenges ahead. *Lancet* 2011; 377(9781):1962-1975.
4. Rivara FP, Studdert DM, Wintemute GJ. Firearm-Related Mortality: A Global Public Health Problem. *JAMA* 2018; 320(8):764.
5. Luckenbill DF. Criminal Homicide as a Situated Transaction. *Soc Probl* 1977; 25(2):176-186.
6. Murray J, Cerqueira DRC, Kahn T. Crime and violence in Brazil: Systematic review of time trends, prevalence rates and risk factors. *Aggress Violent Behav* 2013; 18(5):471-483.
7. Sharkey P, Friedson M. The Impact of the Homicide Decline on Life Expectancy of African American Males. *Demography* [Internet]. 2019 Mar 5 [cited 2019 Mar 30]; Available from: <http://link.springer.com/10.1007/s13524-019-00768-4>
8. World Health Organization (WHO). *World Health Statistics 2018: Monitoring health for the SDGs* [Internet]. S.L.: WHO; 2018 [cited 2018 Nov 9]. Available from: https://www.who.int/gho/publications/world_health_statistics/2018/en/
9. Cerqueira D, Lima RS, Bueno S, Neme C, Ferreira H, Coelho D, Alves PP, Pinheiro M, Astolfi R, Marques D, Reis M, Merian F. *Atlas da Violência 2019* [Internet]. Brasília: Instituto de Pesquisa Econômica Aplicada (IPEA); 2019 Jul [cited 2019 Jul 27]. Available from: http://www.ipea.gov.br/portal/images/stories/PDFs/relatorio_institucional/180604_atlas_da_violencia_2018.pdf
10. Transgender Europe (TGEU). *TMM Update Trans Day of Remembrance 2018* [Internet]. Berlin, Germany: Transgender Europe (TGEU); 2018 Nov [cited 2019 Mar 30]. Available from: <https://transrespect.org/en/tmm-update-trans-day-of-remembrance-2018/>
11. Mott L. Homo-afetividade e direitos humanos. *Rev Estud Fem* 2006; 14(2):509-521.
12. Mott L, Michels E. *Relatório 2018: Assassinatos de LGBT no Brasil* [Internet]. Brasil: Grupo Gay da Bahia - GGB; 2019 [cited 2017 May 1]. Available from: <https://homofobiamata.files.wordpress.com/2017/01/relatc3b3rio-2016-ps.pdf>
13. Mott L, Cerqueira M. *Causa Mortis: Homofobia*. Salvador: Grupo Gay da Bahia; 2001.
14. Mott L, Cerqueira M, Almeida C. *O Crime Anti-homossexual no Brasil*. Salvador: Grupo Gay da Bahia; 2002.

15. International Lesbian, Gay, Bisexual, Trans and Intersex Association (ILGA). *LGBulletin #74 - The week in LGBTI news* [Internet]. 2019 [cited 2019 Mar 30]. Available from: <https://ilga.org/lgbti-news-74-ilga-jan-2017>
16. Organização das Nações Unidas do Brasil (ONU Brasil). *PNUD e parceiros lançam campanha para combater homofobia e violência de gênero* [Internet]. ONU Brasil. 2019 [cited 2019 Mar 30]. Available from: <https://nacoesunidas.org/pnud-e-parceiros-lancam-campanha-para-combater-homofobia-e-violencia-de-genero/>
17. Brasil. Ministério dos Direitos Humanos (MDH). *Brasil registra uma morte por homofobia a cada 16 horas, aponta relatório* [Internet]. 2019 [cited 2019 May 10]. Available from: <https://noticias.uol.com.br/cotidiano/ultimas-noticias/2019/02/20/brasil-matou-8-mil-lgbt-desde-1963-governo-dificulta-divulgacao-de-dados.htm>
18. Mercado Mondragon J. Intolerance toward Sexuality Diversity and Homophobic Crimes. *A Sociological Analysis. Sociologia* 2009; 24(69):123-156.
19. Ministério da Mulher, da Família e dos Direitos Humanos (MMFDH). *Disque 100, Disque Direitos Humanos - Relatório 2019* [Internet]. Brasília: MMFDH; 2019. [cited 2019 May 10]. Available from: <https://www.mdh.gov.br/informacao-ao-cidadao/ouvidoria/balanco-disque-100>
20. Sagar AD, Najam A. The human development index: a critical review. *Ecol Econ* 1998; 25(3):249-264.
21. Brasil de Fato. *10% dos brasileiros são LGBTI, mas estão sub-representados na política* [Internet]. 2017 [cited 2018 Feb 7]. Available from: <https://www.brasildefato.com.br/2017/06/19/cerca-de-10-da-populacao-brasileira-pessoas-lgbti-sao-sub-representadas-na-politica/index.html>
22. Mundo Mais. *Censo gay* [Internet]. 2011 [cited 2018 Feb 7]. Available from: <http://web.archive.org/web/20110706153632/http://www.mundomais.com.br/exibemateria2.php?idmateria=334>
23. Scrivano R, Neto JS. *Potencial de compras LGBT é estimado em R\$ 419 bilhões no Brasil*. O Globo [Internet]. 2018 Oct 31; [cited 2018 Oct 31]. Available from: <https://oglobo.globo.com/economia/potencial-de-compras-lgbt-estimado-em-419-bilhoes-no-brasil-15785227>
24. Gates GJ. *Same-sex Couples and the Gay, Lesbian, Bisexual Population: New Estimates from the American Community Survey* [Internet]. Los Angeles, USA: Universidade da Califórnia; 2019 [cited 2019 Aug 12]. Available from: <http://www.lgbtdata.com/uploads/1/0/8/8/10884149/samesexcouplesandglbpops.pdf>
25. Bakke F, Graaf H de, Haas S de, Kedde H, Kruijer H, Wijzen C. *Rapport Seksuele gezondheid in Nederland 2009* [Internet]. Utrecht: Rutgers Nisso Groep; 2019 [cited 2019 Aug 12]. Available from: https://fiom.nl/sites/default/files/files/RNG_rapport-seksuele-gezondheid-in-nederland-2009.pdf
26. Dahlgreen W, Shakespeare A-E. <https://yougov.co.uk/topics/lifestyle/articles-reports/2015/08/16/half-young-not-heterosexual> [Internet]. London: YouGov; 2015 [cited 2019 Aug 12]. Available from: <https://yougov.co.uk/topics/lifestyle/articles-reports/2015/08/16/half-young-not-heterosexual>
27. ISTAT. *Discriminazioni in base al genere, all'orientamento sessuale e all'appartenenza etnica* [Internet]. Roma: Istituto Nazionale di Statistica; 2011 [cited 2019 Aug 12]. Available from: <http://www.istat.it/it/archivio/30726>
28. Cliff AD, Ord JK, Cliff AD. *Spatial processes: models & applications*. London: Pion; 1981.
29. Altman DG, Bland JM. Statistics Notes: Quartiles, quintiles, centiles, and other quantiles. *BMJ* 1994; 309(6960): 996-996.
30. Moran PP. Notes on continuous stochastic phenomena. *Biometrika* 1950; 37(1-2):17-23.
31. Chou YH. Map Resolution and Spatial Autocorrelation. *Geogr Anal* 2010; 23(3):228-246.
32. Bivand R. *spdep: Spatial dependence: weighting schemes, statistics and models (R) package version 0.5-37* [Internet]. 2011. [cited 2019 Aug 12]. Available from: <http://CRAN.R-project.org/package=spdep>
33. Tiefelsdorf M, Griffith DA, Boots B. A Variance-Stabilizing Coding Scheme for Spatial Link Matrices. *Environ Plan A* 1999; 31(1):165-180.
34. Bailey TC, Gatrell AC. *Interactive spatial data analysis*. Harlow Essex, New York: Longman Scientific & Technical, J. Wiley; 1995.
35. Programa das Nações Unidas para o Desenvolvimento (PNUD), Instituto de Pesquisa Econômica Aplicada (IPEA). *O Índice de Desenvolvimento Humano Municipal Brasileiro: série atlas do desenvolvimento humano no Brasil 2013* [Internet]. Brasília: PNUD, IPEA; 2019 [cited 2019 Apr 1]. Available from: http://ipea.gov.br/portal/images/stories/PDFs/130729_AtlasPNUD_2013.pdf
36. Tomsen S. Victims, Perpetrators and Fatal Scenarios: A Research Note on Anti-Homosexual Male Homicides. *Int Rev Vict* 2002; 9(3):253-271.
37. Mouzos J, Thompson S. *Gay-Hate Related Homicides: An Overview of Major Findings in New South Wales* [Internet]. 2000. [cited 2019 Apr 1]. Available from: <http://search.proquest.com/docview/9862650?accountid=26662>
38. Boivin RR. Características y factores de la violencia homicida contra las minorías sexuales en la Ciudad de México, 1995-2013. *Sex Salud Soc* 2016; (23):22-57.
39. Oliveira JMD. *Desejo, preconceito e morte: assassinatos de LGBT em Sergipe - 1980 a 2010*. Natal: Universidade Federal do Rio Grande do Norte; 2012.
40. Bartlett P. Killing gay men, 1976-2001. *Br J Criminol* 2007; 47(4):573-595.
41. Stacey M. Distinctive Characteristics of Sexual Orientation Bias Crimes. *J Interpers Violence* 2011; 26(15): 3013-3032.
42. Prunas A, Clerici CA, Gentile G, Muccino E, Veneroni L, Zoja R. Transphobic Murders in Italy: An Overview of Homicides in Milan (Italy) in the Past Two Decades (1993-2012). *J Interpers Violence* 2015; 30(16):2872-2885.
43. Gruenewald J, Kelley K. Exploring Anti-LGBT Homicide by Mode of Victim Selection. *Crim Justice Behav* 2014; 41(9):1130-1152.

44. Kelley KK. *A Mixed-Method Examination of Homicides Targeting LGBT Individuals in the United States*. 2013 [cited 2017 Jan 23]. Available from: http://scholarworks.uark.edu/etd/771/?utm_source=scholarworks.uark.edu%2Fetd%2F771&utm_medium=PDF&utm_campaign=PDFCoverPages
45. Carrara S, Vianna ARB. "Tá lá o corpo estendido no chão...": a violência letal contra travestis no município do Rio de Janeiro. *Physis Rio J* 2006;16(2):233-249.
46. Granados JA, Delgado G. Mortality by homicide in homosexuals: characterization of the cases registered in Mexico between 1995 and 2000. *Am J Forensic Med Pathol* 2008; 29(1):43-48.
47. Gruenewald J. Are Anti-LGBT Homicides in the United States Unique. *J Interpers Violence* 2012; 27(18): 3601-3623.
48. Waters E, Jindasurat C, Wolfe C. *A report from the National Coalition of Anti-Violence Programs: Lesbian, gay, bisexual, transgender, queer, and hiv-affected hate violence in 2015 - 2016 release edition* [Internet]. New York: Arcus Foundation; 2016 [cited 2016 Sep 11]. Available from: http://www.avp.org/storage/documents/ncavp_hvreport_2015_final.pdf
49. Andrade LT, Diniz AMA. A reorganização espacial dos homicídios no Brasil e a tese da interiorização. *Rev Bras Estud Popul* 2013; 30(Supl.):S171-191.
50. Frota MTE. *Determinantes dos Homicídios no Brasil*. Fortaleza: Universidade Federal do Ceará; 2014.
51. Consejo Ciudadano para la Seguridad Pública y la Justicia Penal A.C. *Las 50 ciudades más violentas del mundo 2018* [Internet]. Ciudad de México, México: Consejo Ciudadano para la Seguridad Pública y la Justicia Penal A.C.; 2019 [cited 2019 May 1] p. 17. Available from: <http://seguridadjusticiapaz.org.mx/files/estudio.pdf>
52. Souza SR. *Respostas brasileiras à violência urbana no campo da segurança pública: os movimentos sociais e as organizações não-governamentais* [tese]. Rio de Janeiro: Fiocruz; 2008.
53. Brasil. Ministério da Saúde (MS). *TabNet Win32 3.0: Óbitos por Causas Externas - Brasil* [Internet]. 2019 [cited 2019 May 27]. Available from: <http://tabnet.datasus.gov.br/cgi/defthtm.exe?sim/cnv/ext10br.def>
54. Pereira FNA, Queiroz BL. Diferenciais de mortalidade jovem no Brasil: a importância dos fatores socioeconômicos dos domicílios e das condições de vida nos municípios e estados brasileiros. *Cad Saude Publica* [Internet]. 2016 [cited 2019 Apr 28];32(9). Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0102-311X2016000905012&lng=pt&tlng=pt
55. El País. Maioria do STF decide que homofobia é crime [Internet]. 2019 [cited 2019 May 27]. Available from: https://brasil.elpais.com/brasil/2019/05/23/politica/1558635166_112275.html

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