

Murder and actual bodily harm in Itaboraí, Brazil: analysis at different scales

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Abstract *An ecological study aimed at analyzing homicide rates and actual bodily harm was conducted in Itaboraí, in the years 2010 to 2011. The entire municipality was used in the study covering critical and non-critical areas. The data came from the Information System for the Public Security Institute in Rio de Janeiro state. The territories were identified and defined by referring to studies on illegal occupations of areas. The snowballing method was used for the social recognition of poor conditions. The morphological differentiation of urban and housing standards marked the locations. The areas were georeferenced, and the problems were located geographically and organized according to their corresponding critical area. We calculated the municipal rates using population estimates from IBGE. For the critical areas, we obtained estimates of the number of households multiplied by a factor equal to the average household density in the corresponding census tract. There was a decrease in homicide rates and a rise in actual bodily harm in Itaboraí. We also found that there was an increased risk of bodily injury in critical areas with the worst living conditions, suggesting the existence of social inequalities that make certain social spaces more vulnerable to incidents involving violent injuries.*

Key words *Homicide, Injury, Assault, Violence, Spatial analysis*

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Introduction

The implementation of a major commercial enterprise such as the Rio Petrochemical Complex, Complexo Petroquímico do Rio de Janeiro/COMPERJ in the eastern region of Rio de Janeiro has brought about major socioenvironmental transformations¹. In order to check the heterogeneity of the areas and its relations with the health situation, epidemiological monitoring of the commercial enterprise is taking place. In the ambit of this monitoring, we analyzed the incidents of actual bodily harm and murders in the municipality of Itaboraí and in specific areas in this municipality that presented poor sanitary, living and economic conditions which we called critical areas^{2,3}.

The search for inter-relations between living conditions and health is not a recent search; pioneers in this area produced studies on the above in the 19th century. Subsequently with the advent of the “bacteriological era”, such studies increased in intensity and there was a marked increase in the 1950s “emphasizing the relations between health levels and socioeconomic factors, principally in relation to the theme of health and development”⁴.

The studies are theoretically based on the presence of inequality in health for certain population groups, which is a reflection of the different living conditions demonstrated in the classic research findings produced by Villermé and Engels. According to Paim⁴, these studies provide an explanation for the health conditions.

based on the relations between the development of productive forces connected to industrialization and the social processes such as: urbanization, the agrarian question, migrations and the formation of the so-called reserve army of labor, meaning the population surplus exposed to poverty and serious health problems.

Based on this assumption, this idea is very well summarized by Castellanos⁷ (apud Paim⁴), that:

each individual, family, community and population group in every moment of their existence, have necessities and risks that are characteristic to them, based on their age, sex and on other individual attributes such as geographical and ecological locality, culture, level of education or economic-social standing which translates itself into health problems/peculiar diseases and which can either be favorable to them or, to a greater or lesser extent, make their being an fulfilled individual difficult including realizing social projects.

As a methodological alternative to access the different living conditions of the populations, ecological studies on specific areas were used as units of analysis and they were compared with each other to identify socio-spatial inequalities and health conditions^{4,7}.

Barcellos et al.⁶ working in a similar theoretical vein concerning the methodological resource of space stated:

if the disease is a manifestation of the individual, the health situation is a manifestation of the place. The places inside of a city or region, are the result of an accumulation of historical, environmental and social situations that promote particular conditions for the production of diseases.

They highlighted the importance of the “development of indicators that can detect and reflect conditions that present health risks based on the environmental and socially adverse conditions”⁶, for the diagnosis of the differences in health situations.

In general, the studies described as “ecological”, use indicators that come from censuses or health reports that, due to how they have been obtained, end up limiting the construction of the territorial units to be analyzed^{8,9}.

In the ambit of the Plan for Epidemiological Monitoring of the Process for the Implementation of COMPERJ², there were two with complementary ones that employed methodological tools to investigate the influence of the population’s living conditions in the municipalities covered by the research in relation to worsening people’s health for those that were being monitored.

The first consists of the socioeconomic stratification of the boroughs and census sectors in the municipalities of Itaboraí, Guapimirim and Cachoeiras de Macacu grouped in Local Surveillance Units (UVL). This was done in accordance with the indices composed of urban installations and social structures in order to cross reference the information on the notification of assaults and deaths. The UVLs are territorial units for analysis created based on an agglomeration of census sectors. The Demographic Census from IBGE¹⁰ is the primary database that has demographic and socioeconomic information in the country that is in accordance with the criteria of contiguity and similarity in relation to indicators comprising living conditions and urban infrastructure created for the Epidemiological Monitoring of the Process of Implementation for COMPERJ. Lastly the UVLs were mapped onto the boroughs of the municipalities through the analysis of images.

The second idea that this paper is based on, consists in the identification of the critical areas that are localities that have the worse living conditions in the ambit of the municipalities that were covered and monitored and in the checking of the distribution of assaults in these areas.

The search for another perspective for the recognition of living conditions comes from our concordance with criticism in the use of social indicators obtained through the aggregation of data on the population. These indicators have as an assumption, the internal homogeneity of the territorial units, but according to Barcellos⁷,

these assumptions are false, being the result of a simplification of structure and dynamics in the geographic space. Various studies have shown that there is not always a linear and direct correlation between poverty and poor health conditions. In some cases, to the contrary, areas with higher numbers may increase the risks of health of their residents.

The acceptance of this hypothesis easily takes us to the conclusion that these areas would not be homogenous as assumed by the aggregated analysis methodology (ecological speaking), but extremely differentiated internally.

Thus, in relation to the panorama provided by the secondary data referring to living conditions and health at territorial scales in the municipality in Itaboraí, the intention was to bring together another perspective given through the search for information with technicians from the city councils in the municipalities and field work, for the recognition of living conditions in the local ambit. This means the intention was to analyze the relations between living conditions and health conditions based on two complementary scales: municipal and the other based on small local units of analysis called critical areas.

In this way, the present study presents itself as an attempt, in the face of the challenge, to bring to light some of the silenced internal differences in the midst of homogenization owing to the construction of social indicators for municipal territorial units, to refine the analysis of possible correlations between living conditions and health conditions in the local units in the municipality of Itaboraí.

Methodology

The purpose of this ecological study was to analyze the rates of murders (fatal aggression) and actual bodily harm (none fatal aggression) in

Itaboraí between 2010 and 2011. These acts were chosen as they are characterized by: violence against someone, their gravity and because they are indicators for social violence^{11,12}. In addition to this, the offence of actual bodily harm has been registered the most amount of times by the police.

The information relative to actual bodily harm and murders came from the Information System for the Public Security Institute in state of Rio de Janeiro. It was taken from the police reports made at the police stations which had been placed on the system.

Two spatial scale analysis were used: the municipality and its parts and three analysis units. These included the municipality, critical areas and the localities without critical areas in the same municipality.

The critical territories were initially identified through the review of studies on urban conditions in the municipality (including the Director's Plan for the Municipality of Itaboraí and the Strategic Municipal Plan for Informal Urban Settlements - PEMAS) principally those referring to the existence and location of illegal occupations and through the social recognition of the worse conditions using the *snowballing*¹³ method. Thus, the areas were identified by the researchers through field work in the identified localities based on dialogs with: technicians from the city council, residents in illegal occupations indicated by the technicians and residents of other areas in the municipality indicated by the residents of these occupations.

Later on, in the study, we went to these localities to conduct physical recognitions and to outline the geographical limits through the process of morphological differentiation of urban standards of living in the localities to which the researchers were taken by the participants. These areas were georeferenced.

Geographical localization was done for the investigated incidents based on the variable public places placed on the databases used. The data was organized by the names of roads and subsequently classified in accordance with its corresponding critical area.

To calculate the municipal rates, population estimates from IBGE¹⁰ were used and for population estimates in the critical areas, the number of habitations was calculated with a multiplication by a factor equal to the average household density in the corresponding sector census.

The murder and actual bodily harm rates were calculated for the municipality as a whole. This

covered the critical areas and the rest of the localities in the municipality without critical areas.

In relation to the comparison of rates between years and areas, the incidents under analysis may be considered as being subject to random variations and in this way, requires the calculation of confidence intervals¹⁴. Where the numerator rate was less than 100 incidents, we used the Poisson distribution for calculating the confidence intervals of 95%. For the rest of the cases, the normal distribution of probability was used. In the comparison of rates whose numerator was less than 100, a superposition of the intervals of confidence, indicated that the observed difference was not statistically significant. For cases in which the numerator of the rates was greater than 100, we calculated a test statistic of z and this was considered not to be significant when $|z| < 1.96$ ¹⁴.

A brief description of the municipality of Itaboraí

This municipality is located in the state of Rio de Janeiro on the north-east part of the Guanabara bay. It is a part of the Metropolitan Region of Rio de Janeiro encompassing the hydro-graphic basin of the Caceribu River. It has an area that is approximately 428.6 km². To the north, it borders the municipalities of Guapimirim and Cachoeiras de Macacu. To the south, it borders Maricá. To the west, it borders São Gonçalo and Baía de Guanabara and to the east it borders Tanguá (the old district of Itaboraí that became independent in 1995). Its territory is divided into eight districts: Itaboraí, Porto das Caixas, Itambi, Sambaetiba, Visconde de Itaboraí, Cabuçu, Manilha and Pachecos.

According to the Census data for 2010¹⁰, its total population was 218,008 inhabitants of whom, 98.8% resided in the urban areas. Women were the predominant sex making up 51.3% of the total population. Also, according to the aforementioned Census¹⁰, 57.7% of the population was aged between 20 to 59 years old and only 10.3% were over 60. The population was overwhelming made up of young people.

In the first decades of the 19th century with the expansion of the coffee plantation, Itaboraí acquired a level of importance and relevance for having a route for the soldiers that brought coffee from Cantagalo, Cordeiro and Nova Friburgo going towards the Macacu river and taking it to Porto das Caixas and then on to Rio de Janeiro. However, from 1950s the production of coffee was hit by a crisis and the municipality of Itab-

oraí went back to cultivating oranges¹⁵, in part, as a response to the expansion of the market and thanks to the development of the cities of Niterói and Rio de Janeiro.

The construction and paving of the highways was also an important factor that had a dynamic economic impact on the population of this region. Amongst them were the highways: RJ-104, BR-493 and BR-116. It is worth mentioning that in 1970 there was the occurrence of a major event that drastically changed the whole social and economic dynamism in the region accelerating the process of urbanization and principally impacting on the municipality of Itaboraí. This was the construction of the Rio-Niterói bridge that was opened in 1974¹⁶.

The pottery industry also played an important role in the economy of this municipality. It was boosted by the arrival of the royal family to Brazil. However, this economic activity started to decline in the 1970s resulting in the down turn of industrial production¹⁷.

During the 90s there was a serious citriculture crisis which was the municipality's main activity, due to pests. This factor produced major losses in the rural economy of Itaboraí with the transformation of the district of Tanguá in the municipality (taking with it the greater part of the rural output of Itaboraí) and it caused a significant fall in agricultural activity in the municipality.

The recent analysis of the characterization of the economic activity in the municipality showed that the municipality is strongly based on the tertiary sector and services which makes up 62.0% of the GDP. This sector has grown and attracted new companies such as electrical domestic and furnisher stores and a chain of snack bars. The secondary sector in the economy can also be highlighted with particular reference to civil construction and the transformation of industries, each of which has been contributing up to 9% of the municipal's GDP. It should also be highlighted that to corroborate the findings of the fall in agricultural activity, a notable fact in the primary sector is that it has not reached 1.0% of the GDP¹⁷.

In terms of territorial occupation, the critical areas correspond to 4.1% of the total territory occupied in the municipality of Itaboraí and in this area 7.4% of the inhabitants live there.

Results

In 2010, the rate of murders in the critical areas (48.7/100.000 inhabitants, 8 incidents) was 13%

greater than what was observed in the municipality as a whole (43.1/100.000 inhabitants, 94 incidents), and 14.3% greater than the rate in the localities without critical areas (42.6/100.000 inhabitants, 86 incidents). In 2011, the rate for these incidents in critical areas (48/100.000 inhabitants, 8 incidents) was 53.8% greater than the rate in the municipality (31.2 per 100.000 inhabitants, 69 incidents) and when compared to the rate in the territory without critical areas (29.8/100.000, 61 incidents) the difference was even greater (61.1%) as shown in Graphic 1. The differences observed however, were not statistically significant.

It is important to highlight the absolute numbers, as the rate of murders fell between 2010 to 2011 in the units of analysis and in the localities without critical areas, but they remained practically the same in the critical areas. In the municipality, the rate fell by 27.6% and in the localities without critical areas the fall was 30%. However, we did not see any significant statistical difference between the rates.

In Graphic 2 in 2010 the rate of actual bodily harm in the critical areas (577.9/100.000 inhabitants, 95 incidents) was 20% greater than what was observed in the municipality as a whole (481.5/100.000 inhabitants, 1050 incidents), and 22% greater than the rate in the localities without critical areas (473.6/100.00 inhabitants, 955 incidents). In the following year, the difference was even more accentuated: the critical areas presented a rate of (701.3/100.000 inhabitants, 117 cases) 26.1% greater than that in the municipality (556.1/100.000 inhabitants, 1231 cases) and

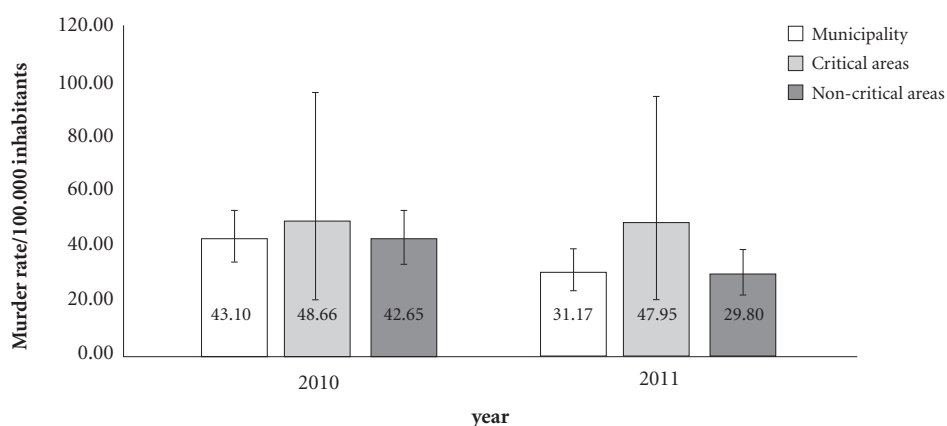
41.6% greater than a rate in the localities without critical areas (495.4/100.000 inhabitants, 1014 cases). The comparison of the rates between the areas for the year 2010 showed that there was no significant difference. For the following year however, the differences observed were statistically significant.

In the period, we observed increases in the rates in three units of analysis, with there being greater intensity in the critical areas (21.3%) compared to whole of the municipality (15.5%) and the non-critical areas (4.6%). We noted a statistically significant difference only for the municipal rates.

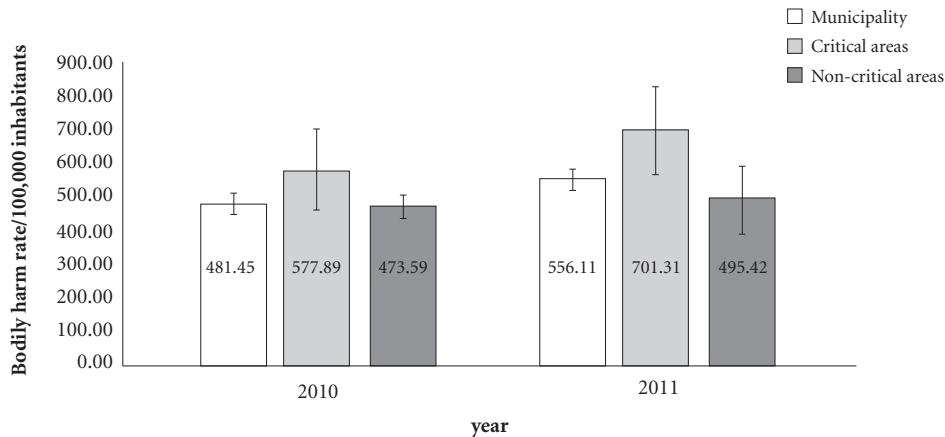
Discussion

The present study sought to obtain new indicators for the analysis of violence that can identify intra-territorial heterogeneity and thus demonstrate the existence of distinct vulnerabilities determined by the different socioeconomic life conditions. The findings suggest the existence of social inequalities resulting from precarious living conditions that make certain social spaces more vulnerable to violent incidents^{4-7,18}.

In the analysis presented here, we observed the reduction in the rate of murders and the increase in the rate of actual bodily harm in the municipality of Itaboraí; showing a possible change in the pattern of aggressive acts that were occurring which may indicate that they became less serious. This is something that requires a deeper study. One way of checking this hypothe-



Graphic 1. Annual rate of murders (per 100,000 inhabitants) in critical areas, non-critical areas and the municipality of Itaboraí with the respective rate of CI95%, 2010 and 2011.



Graphic 2. Annual rate of actual bodily harm (per 100,000 inhabitants) in critical areas, non-critical areas and the municipality of Itaboraí with the respective rate of CI95%, 2010 and 2011.

sis would be to analyze the dynamic generators of the murders and actual bodily harm incidents as, for example, the involvement of incidents with narcotrafficking having a common criminality element or with crimes of passion such as aggression against women, amongst others.

The national journals have been showing falls in the mortality rates for murders in the large Brazilian metropolises^{19,20} and increases in cities around the capitals metropolitan regions – such as is the case for Itaboraí just like the cities in the outskirts of the states and in the border regions²¹⁻²⁵. It would be important to monitor whether the occurrence of a decline in the rates observed in the municipality studied was consistent. And, this being the case, to identify if and how this fall is related to the arrival of COMPERJ in the municipality and to the control of certain violent events as also with the increase of other types of aggression which was the case for actual bodily harm. In this study, we checked that the falls observed in the rates of murders were not statistically significant.

The violence shown here through lethal aggression and non-lethal aggression, appeared to show not just differences amongst the areas that were analyzed but we also noted a greater intensity of the violence for those with poor living conditions. In this way in 2011, what can be noted was the existence of a greater risk of non-fatal aggression in the critical territories characterized by a lack of urban infrastructure. However, in agreement with some authors^{26,27}, it is important to explain that we do not want to incriminate

poverty stricken populations for having high levels of violence. On the contrary, these populations have principally been the victims of these forms of violence that occur in the territories where they live. These areas are marked by precarious socioeconomic living conditions and social instruments, but the principal lost is that of the protection for the residents and the guarantee of their citizenship rights.

In the years that were analyzed, even when there was a fall in the rate of murders in the municipality and in the non-critical areas, we observed an increase in this rate in critical areas. When there was an increase in the rate of actual bodily harm in the three areas, it was intense in the critical territories. This, once again, showed that these last areas are more vulnerable to these violent incidents.

Barcellos¹⁸ highlighted that the degree of detail from the information depends on the scale of geographical analysis chosen and this choice is not arbitrary. His definition advocates the best way of reaching the objectives of the study and to respond to the question in the research. This has implications in just a part of the information that was analyzed since it is impossible to consider all of the existing elements on any given geographical scale as well as the recognition of the geographical elements that ought to be included or excluded in the study. For this reason, it is necessary to take care when studying associations amongst the risks of one particular and complex health problem that has many causes as is the case for violence and isolated variables²⁸.

Final Considerations

The methods and indicators used to analyze the acts of violence are not always sufficiently specific and precise to detect inter and intra-regional differences, that many times are necessary to understand these aggressive acts.

This study has shown that it is possible to obtain more detailed knowledge on creating a methodology and working with smaller scale analysis. However, it should be highlighted that this was the initial contribution and that any enhancements to the method here, needs to be done with a view to refining it.

There is a possibility that sub-registers exist in the number of violent incidents that were analyzed, bearing in mind that not all of the murders and principally not all of the actual bodily harm acts that were registered by the police, can be taken as an under-estimation of the rates. In the same way, there may be inaccuracies in the population estimates, principally those related to the critical areas that were based on counting the number of households multiplied by the average density of households from the census data where the critical areas were situated. This number may have increased as the population went down in these areas, causing either a reduction in the risk or its increase.

Another important step ought to be looked at which is to analyze a larger historical series which may demonstrate a consistency or not in the results that were found.

In any case is necessary to conduct a deeper analysis of this area as according to Gracie et al.²⁸, spatial studies affect the results that are obtained because each space on the scale used, has its own attributes. A geographical scale on using a certain unit of aggregated data, can show clear associations that are not visible on other geographical scales. Thus, the same indicator can be positively or negatively correlated with an incidence of a violent act, for example, depending on the geographical scale used. Therefore, as recommended by the authors, it is important to combine, visualize and analyze the data on different scales and decide which geographical scale should be used. Do not forget that it should be compatible with the studied phenomenon. However, this choice is never an easy one.

The municipality of Itaboraí and its critical areas are suffering from the influences of socio-economic and demographic transformations resulting from the installation of the Petrochemical Pole COMPERJ. According to Rosa and Or-

doñez¹, in 2010, this municipality attracted 50 thousand new residents totaling approximately 300 thousand inhabitants. The prediction was that in ten years-time the population would reach one million. Also, according to these authors, a study by the Federação das Indústrias in the state of Rio de Janeiro (Firjan) made the prediction that COMPERJ would attract between 320 and 700 industries to the municipality in the next five years. COMPERJ generated six thousand jobs in 2010 and in 2011 it was hoped that it would generate approximately 10 thousand jobs. In the area of commerce, 160 new jobs were created in 2009. The city is experiencing a property explosion with an increase of 20% in the value of property which has not stopped increasing. This is a reflection of the migratory flow. However, only a third of the population has access to a sewage system and basic sanitation.

It falls to the public authorities to act proactively with the objective of improving the socio-sanitary conditions in its most poverty stricken territories with a view to reducing the effects of unplanned economic growth. This situation of a lack of state intervention has already occurred in other areas in Rio de Janeiro that went through similar experiences and its adverse effects are well known.

Collaborations

ER Souza, HLF Praça and ES Luz came up with the idea as well as analyzed and wrote the paper. PC Sabroza came up with the methodology used in the article. LW Pinto analyzed the data and wrote the text.

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References

- Rosa B, Ordoñez R. Com obras do Comperj, Itaboraí sofre 'boom' imobiliário e enfrenta os males da migração. *O Globo* 2011; 09 Jan.
- Toledo LM. *Monitoramento da evolução das causas relevantes de adoecimento, morte e de segurança pública nos municípios de Itaboraí, Guapimirim, Cachoeiras de Macacu e no Distrito de Monjolos: Relatório técnico-executivo XXIII. síntese anual 2012*. Rio de Janeiro: Fiocruz; 2013.
- Toledo LM. *Plano de Monitoramento Epidemiológico da Área de Influência do COMPERJ. Relatório técnico-executivo XXVIII: Monitoramento Epidemiológico das Causas Relevantes de Adoecimento, Morte e de Segurança Pública nos Municípios de Itaboraí, Cachoeiras de Macacu, Guapimirim e no Distrito de Monjolos (Município de São Gonçalo): síntese anual 2013*. Rio de Janeiro: Fiocruz; 2014.
- Paim JS. Abordagens Teórico-Conceituais em Estudos de Condições de Vida e Saúde. Saúde. In: Barradas RB, organizadora. *Condições de Vida e Situação de Saúde*. Rio de Janeiro: Editora Abrasco; 1997. p. 276.
- Castellanos PL. Epidemiologia, Saúde Pública, Situação de Saúde e Condições de Vida. Considerações Conceituais In: Barata RR, organizadora. *Condições de Vida e Situação de Saúde*. Rio de Janeiro: Ed. Abrasco; 1997. p. 31-75.
- Barcellos CC, Sabroza PC, Peiter P, Rojas LI. Organização Espacial, Saúde e Qualidade de Vida: Análise Espacial e Uso de Indicadores na Avaliação de Situações de Saúde. *Inf. Epidemiol SUS* 2002; 11(3):129-138.
- Barcellos C. Os indicadores da pobreza e a pobreza dos indicadores: uma abordagem geográfica das desigualdades sociais em saúde. In: Barcellos C, organizador. *A Geografia e o Contexto dos Problemas de Saúde*. Rio de Janeiro: Ed. Abrasco; 2008. p. 107-139.
- Borrel C. Métodos utilizados no estudo das desigualdades sociais em saúde. In: Barata RB, organizadora. *Condições de Vida e Situação de Saúde*. Rio de Janeiro: Abrasco; 1997. p. 167-191.
- Macintyre S, Ellaway A, Cummins S. Place effects on health: how can we conceptualise, operationalise and measure them? *Soc Sci Med* 2002; 55(1):125-139.
- Instituto Brasileiro de Geografia e Estatística (IBGE). *Censo Demográfico 2010: Resultados do universo*. [Internet]. [acessado 2015 Mar 16]. Disponível em: <http://www.ibge.gov.br>.
- Brasil. Departamento de Análise de Situação de Saúde. *Política nacional de redução da morbimortalidade por acidentes e violências: Portaria MS/GM n.º 737 de 16/5/01, publicada no DOU n.º 96 seção 1E de 18/5/01*. [Internet]. Ministério da Saúde, Secretaria de Vigilância em Saúde, Departamento de Análise de Situação de Saúde. 2ª ed. Brasília, DF: Editora do Ministério da Saúde; 2005. [acessado 2015 Mar 16]. Disponível em: http://bvsms.saude.gov.br/bvs/publicacoes/politica_reducao_morbimortalidade_acidentes_2ed
- Waiselfisz JJ. *Homicídios e juventude no Brasil: Mapa da Violência 2013*. Brasília: Secretaria Geral da Presidência da República; 2013. [acessado 2015 Fev 16]. Disponível em: www.juventude.gov.br
- Explorable Psychology Experiments. *Snowball Sampling*. 24 Apr. 2009. [Internet]. [acessado 2015 Mar 16]. Disponível em: <https://explorable.com/snowball-sampling>.
- Matthews TJ, MacDorman MF, Thoma ME. Infant Mortality Statistics From the 2013 Period Linked Birth/ Infant Death Data Set. *Natl Vital Stat Rep* 2015; 64:1-30.
- Neves DP. Os trabalhadores tangidos pelo gado. *Tempo* 1999; 4(7):47-69.
- Magalhães LRL. O papel do transporte no desenvolvimento regional visto do outro lado da Ponte Rio-Niterói. *Rev Rio Jan* 2006; 18-19:1-256.
- Itaboraí (RJ). *Plano Estratégico Municipal para Assentamento Subnormais: Programa Habitar Brasil BID – Itaboraí*. Itaboraí 2003.
- Barcellos C. Unidades y escalas en los análisis espaciales em salud. *Rev Cuba Salud Pública* 2003; 29(4):307-313.
- Peres MFT, Vicentin D, Nery M, Lima RS, Souza ER, Cerda M, Cardia N, Adorno S. Queda dos homicídios em São Paulo, Brasil: uma análise descritiva. *Rev Panam. Salud Pública* 2011; 29(1):17-26.
- Souza ER, Lima MLC, Bezerra, EAD. Homicides in Brazil: Evolution and impacts. In: Lovisi GM, Mari JJ, Valencia ES, editors. *The Psychological Impact of Living under Violence*. New York: Nova Science Publishers, Inc; 2010. p. 1-14.
- Souza TO, Souza ER, Pinto LW. Evolução da mortalidade por homicídio no Estado da Bahia, Brasil, no período de 1996 a 2010. *Cien Saude Colet* 2014; 19(6):1889-1900.
- Sousa CAM, Silva CMFP, Souza ER. Determinantes dos homicídios no Estado da Bahia, Brasil em 2009. *Rev. bras. epidemiol.* 2014; 17(1):135-146.
- Nery MB, Peres MFT, Cardia N, Vicentin D, Adorno S. Regimes espaciais: dinâmica dos homicídios dolosos na cidade de São Paulo entre 2000 e 2008. *Rev Panam Salud Publica* 2012; 32(6):405-412.
- Salla F, Alvarez MC, Oi AH. *Homicídios na Faixa de Fronteira do Brasil, 2000-2007: Relatório de Pesquisa do Projeto Violência e Fronteiras FAPESP/CNPq*. São Paulo: Núcleo de Estudos da Violência da USP (NEV/USP); 2011. [Internet]. [acessado 2015 Mar 17]. Disponível em: <http://www.nevusp.org/downloads/down251.pdf>
- Silva JG, Valadares FC, Souza ER. O desafio de compreender a consequência fatal da violência em dois municípios brasileiros. *Interface (Botucatu)* 2013; 17(46):535-547.
- Zaluar A, Noronha JC, Albuquerque C. Violência: Pobreza ou Fraqueza Institucional? *Cad Saude Publica* 1994; 10(Supl. 1):213-217.
- Briceño-León R. La Comprensión de los Homicidios en América Latina: ¿Pobreza o Institucionalidad? *Cien Saude Colet* 2012; 17(12):3159-3170.
- Gracie R, Barcellos C, Magalhães M, Souza-Santos R, Barrocas PRG. Geographical Scale Effects on the Analysis of Leptospirosis Determinants. *Int J Environ Res Public Health* 2014; 11(10):10366-10383.

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