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TEMPORAL EVOLUTION OF POTENTIAL YEARS OF LIFE LOST DUE TO ASSAULT

EVOLUÇÃO TEMPORAL DOS ANOS POTENCIAIS DE VIDA PERDIDOS EM ÓBITOS POR AGRESSÃO

EVOLUCIÓN TEMPORAL DE LOS AÑOS POTENCIALES DE VIDA PERDIDOS DE MUERTES POR AGRESIÓN

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ABSTRACT

Objectives: analyzing the temporal evolution of deaths caused by assault and their impact on the life potential lost in the state of Minas Gerais. **Method**: this is a time series, an observational and ecological study carried out with mortality rates, potential life years lost, crude percentage variation and temporal tendency. Deaths by Assault (ICD-10: X85-Y09) from 1996 to 2014, that were registered and available in an information system, were included. **Results**: mean mortality (30,7; IC95% 25.4 - 35.9) rates by fire arms were higher among men, the mean death average was 30.5 years of age, and the variation of potential life lost per 100,000 people increased 288.7%. The linear regression was significant ($p<0.001$) with a determination coefficient > 70%. There was a growing temporal evolution regarding the deaths. **Conclusion**: deaths by assault had expressive impacts on the potential life years lost. Knowing vulnerabilities and the context of deaths is important to design inter-sectoral interventions and to contribute for an epidemiological vigilance of violence.
Descriptors: Assault; Mortality; Epidemiological Studies.

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RESUMO

Objetivo: analisar a evolução temporal dos óbitos por agressão e seu impacto no potencial de vida perdido no estado de Minas Gerais. **Método**: Trata-se de estudo observacional, ecológico e série temporal por coeficiente de mortalidade, anos potenciais de vida perdidos, variação percentual bruta e tendência temporal. Foram incluídos os registros de óbitos por Agressão (CID-10: X85-Y09) entre 1996 a 2014, disponíveis em sistema de informação. **Resultados**: A média de mortalidade (30,7; IC95% 25,4 - 35,9) por arma de fogo foi maior entre homens, com idade do óbito de 30,5 anos, potencial de vida perdido para 100.000 habitantes com variação percentual positiva 288,7%. Regressão linear foi significativa (p<0,001), com coeficiente de determinação >70% havendo evolução temporal crescente dos óbitos. **Conclusão**: Foi identificado expressivo impacto da mortalidade por agressão no potencial de vida perdido, sendo oportuno reconhecer vulnerabilidades e contexto dos óbitos no delineamento de intervenções intersetoriais, como também contribuir para vigilância epidemiológica da violência.
Descritores: Agressão; Mortalidade; Estudos Epidemiológicos.

RESUMEN

Objetivo: analizar la evolución temporal de las muertes por agresión y su impacto en el potencial de vida perdido en el estado de Minas Gerais. **Método**: Se trata de estudio observacional, ecológico y serie temporal por coeficiente de mortalidad, años potenciales de vida perdidos, variación porcentual bruta y tendencia temporal. Se incluyeron los registros de muertes por agresión (CID-10: X85-Y09) entre 1996 a 2014, disponibles en sistema de información. **Resultados**: La media de mortalidad (30,7, IC95% 25,4 - 35,9) por arma de fuego fue mayor entre hombres, con edad del óbito de 30,5 años, potencial de vida perdido para 100.000 habitantes con variación porcentual positivo 288,7%. La regresión lineal fue significativa (p <0,001), con coeficiente de determinación> 70% habiendo una evolución temporal creciente de las muertes. **Conclusión**: Se identificó expresivo impacto de la mortalidad por agresión en el potencial de vida perdido, siendo oportuno reconocer vulnerabilidades y contexto de las muertes en el delineamiento de intervenciones intersectoriales, así como contribuir a la vigilancia epidemiológica de la violencia.
Descriptores: Agresión; Mortalidad; Estudios Epidemiológicos.

INTRODUCTION

Deaths by violence are denominated external cause deaths, according to the International Classification of Diseases.[1] The number of violent cause deaths has been growing worldwide, and an inter-sectoral debate about this epidemic is increasingly necessary, as it would contribute to the fight against its different expressions.[2-4]

It is necessary to highlight the 16th of the millennium goals to change the world until 2030, which includes among its strategies a significant reduction of all forms of violence and their related mortality rates everyplace.[5] Therefore,

researches on this theme are relevant for the context of the world.

However, understanding the phenomenon of deaths with violent causes is a contemporary challenge. That is especially true in the most severe case, deaths by assault - which are considered to be criminal. Although this theme might be within the scope of criminalist studies, violence has been impacting the health sector due to: physical and psychological sequelae in the particular scope of each subject. It requires different abilities from the health professionals, so they can deal with this demand.[2-3,6].

Therefore, identifying the temporal evolution of deaths by assault and its impacts on the health of the population contributes to increase knowledge regarding the phenomenon, using these analyses to create a more promising future regarding the decrease in these types of death.

Many different theories discuss the factors that involve violence.[4,7-8] They see violence as an effect of the fast industrialization and urbanization, resulting in the creation of classes whose wishes are dissociated from their realizations. Thus, marginalized social classes become the centers of violence production. However, seeing violence as a result of urban transition is considered to be limiting, since it attributes the potential of criminality to working classes who are in a situation of poverty.[4,7-8]

Another view that is currently very common regarding violence, is that its proliferation in society is based on the lack of authority of the State, that is, in the low repressive power of the police and juridical apparatuses. In spite of the expressive shortcomings in the operationalization of public safety, these aspect cannot be pointed as the only determining factor of violence. Be it because the main principles involving public safety are dynamic and perfected according to the social perception of human rights, be it because of the other social determinants that lead to violence[4,8] Also, in this setting, two new factors that contribute to the maintenance and expansion of violence have surfaced: organized crime, related to drug traffic, and the illegal commercialization of fire arms[8] To conceive the phenomenon of violence, it is necessary to understand that it is a complex phenomenon.

As health indexes, the impact of Potential Life Years Lost (PLYL) are epidemiological indexes for the prediction of premature deaths. The measure of PLYL emphasizes the specific death causes which affect different age groups, resulting in a different ordering of causes of death. It can be used as a summary measure, carrying out an initial triage in the analysis of data in areas with high mortality rates.[9] The

following questions are thus raised: What is the potential life years lost in deaths by assault, and how did the data evolve over time in the state of Minas Gerais?

Minas Gerais has an estimated population of 20.9 million people, being the fourth largest and second most populated state in Brazil. It is the fifth state in the country in deaths by Assault, the third one in the Southwest region. Although it is not the Brazilian territory where the impact of this type of death is the highest, it is important to understand this cause of death due to the territorial expansion, economical relevance and extreme social inequality in the region.[10] This leads to an understanding of the potential life years lost to this cause of death, considering the implications it generates in this setting.

Usually, in the scope of collective health, the understanding of deaths by assault is achieved using epidemiological tools.[11] However, a recent bibliometrical revision on the theme found that the Brazilian scientific production on the use of epidemiological indexes in the analysis of mortality can still be encouraged.[9] To contribute to the unveiling of violent deaths, regarding deaths by assault, this study aims to analyze the temporal evolution of deaths by assault and their impact on the potential life years lost in the state of Minas Gerais.

METHOD

This is a time series, an observational and ecological study carried out through the analysis of the epidemiological indexes: Mortality Rates (MR) and Potential Life Years Lost (PLYL), and their crude percentage (Δ%) and temporal tendency. The study used in formation from the records of deaths in the public domain website of the Unified Health System Informatics Department, DATASUS, more specifically, the Death Information System (SIM).

The information refers to the International Disease Classification in its tenth revision (ICD-10).[1] All deaths that fit in the Group ICD-10X85-Y09 - *Assault* and took place from 1996 to 2014 victimizing residents of Minas Gerais/Brazil were included. The types in this group are: X85-Assault by drugs, medicaments and biological substances; X86-Assault by corrosive substance; X87-Assault by pesticides; X88-Assault by gases and vapours; X89-Assault by other specified chemicals and noxious substances; X90-Assault by unspecified chemical or noxious substance; X91-Assault by hanging, strangulation and suffocation; X92-Assault by drowning and submersion; X93-Assault by handgun discharge; X94-Assault by rifle, shotgun and larger firearm discharge; X95-Assault

by other and unspecified firearm discharge; X96-Assault by explosive material; X97-Assault by smoke, fire and flames; X98-Assault by steam, hot vapours and hot objects; X99-Assault by sharp object; Y00-Assault by blunt object; Y01-Assault by pushing from high place; Y02-Assault by pushing or placing victim before moving object; Y03-Assault by crashing of motor vehicle; Y04-Assault by bodily force; Y05-Sexual assault by bodily force; Y06-Neglect and abandonment; Y07-Other maltreatment; Y08-Assault by other specified means; Y09-Assault by unspecified means.

Census data from the Brazilian Institute of Geography and Statistics (IBGE) and the inter-census projections made available by DATASUS were also used. The standard population considered for calculating the indexes was the 2010 population, corresponding to 364.915 people.

The period of the study was selected as it is within the scope of the data made available in this website. Records with blank or empty spaces were not included. Data extraction took place in December, 2016. It was independently conducted by a pair of researchers, and later verified to adjust any inadequacies. The study variables were: demographic aspect of the deaths (age group, sex, race/skin color) and the death causes were defined according to the ICD-10 category.

Data was analyzed by MR using the expression: Total of deaths in a certain area, in the year being considered/Standard population in the area x 100,000, in a 19-year period (1996 to 2014). Later, data was analyzed according to specific mortality rates: sex (male and female), age group (less than one yar old; 1 to 4 years; 5 to 9 years; 10 to 14 years; 15 to 19 years; 20 to 29 years; 30 to 39 years; 40 to 49 years; 50 to 59 years; 60 to 69 years; 70 to 79 years; and 80 years old or older) and race/skin color (white or not white). The specific MR results were compared during the period considering their crude values.

Later, rates were standardized according to the standard population of this study. The year of 2010 was considered, and the MR was standardized by age considering the standard population via a direct method, as to adjust for the age structure effect and make a distortion free comparison viable. The results were presented according to yearly values, considering means and a confidence interval of 95% (CI95%) for the MR (total and specific).

PLYL were calculated according to the Romeder and McWhinnie technique[12], considering all deaths involving people of up to 75 years of age. Were calculated: the total PLYL values for the entire period

analyzed, the mean PLYL (PLYLm) and the standardized PLYL (PLYLx10^5), using the formula *(Crude PLYL x n. of deaths/Standardized Population) x 100,000 inhabitants*. The results were also presented according to yearly values considering means and CI95%.

The basic formula used for the PLYL was: $PLYL = \sum aixdi$[12], in which: "ai" is the difference between the limit-age and the mean point of each age group, assuming that the deaths in each group are uniformly distributed; and "di" is the number of deaths due to a specific cause within the same age group.

The crude percentage variation [Δ%; where Δ% = (Tf-Ti/Ti)x100] of the PLYL in the beginning and in the end of the period studied was also used, Tf being the PLYL of the four-year mean value and Ti the PLYL of the initial yearly mean.[13] The result of the calculation of MR and PLYL indicators were presented according to three-year means (1996/1998, 1999/2001, 2002/2004, 2005/2007, 2008/2010) and one four-year mean (2011/2014).

To analyze the tendencies of the PLYL by assault, a first order polinomial linear regression model was used, considering PLYL x 10^5 as the dependent variable (Y) and the years studied as the independent variable (X), so that the evolution of the impact of this cause of death in the population of the study could be understood. The X variable, centralized (year minus the mean point of the historical series), with the year 2005 as the medial point.[14] The precision measure of the tendency was the determination coefficient (r^2) as well as Pearson's r. The first order simple linear regression model was chosen ($Y= \beta 0+ \beta 1X$) due to its being easy to interpret. The model was considered significant when $p \leq 0,05$. In addition, the tendency of increasing or decreasing was identified in each series by the positive or negative β1 sign and by the direction of the line.

Data was extracted from the SIM/DATASUS site in the form of a Microsoft Excel® spreadsheet. To perform the statistical analyses, the databank was transcribed into the Statistical Package for the Social Sciences (SPSS) software, version 21.0. This study was not submitted for approval by an Research Ethics Committee, since the source of the data, the DATASUS, is a public domain website.

RESULTS

Deaths by Assault in Minas Gerais were a total of 63354 from 1996 to 2014. Males (30.7; IC95%25.4 - 35.9) from 20 to 29 years old (36.9; IC95% 30.6 - 43.3) had the higher MR means in the studied period (Table 1).

Table 1. Distribution of Mortality Rates (100,000 people) by Assault (ICD-10: X85-Y09) according to demographic aspects, from 1996 to 2014, Minas Gerais, Brazil. Uberaba, Minas Gerais, 2017.

Demographic Aspects	Period (1996 - 2014)						Mean	CI 95%
	1996-1998	1999-2001	2002-2004	2005-2007	2008-2010	2011-2014		
General	6.92	10.19	18.70	21.01	18.91	22.98	16.5	(11.5;21.4)
Sex								
Female	1.9	2.4	3.4	3.9	3.9	4.3	3.4	(2.9;3.8)
Male	12.1	18.3	34.5	38.7	34.4	42.2	30.7	(25.4;35.9)
Age Group (years)								
< 1	2.4	3.0	2.3	3.3	2.4	2.6	2.7	(2.3;3.1)
1 |-| 4	0.5	0.8	0.8	0.8	0.6	0.6	0.7	(0.6;0.8)
5 |-| 9	0.2	0.3	0.6	0.5	0.5	0.4	0.4	(0.2;0.6)
10 |-| 14	1.1	1.3	2.6	3.2	3.2	3.5	2.5	(2.1;3.0)
15 |-| 19	8.9	16.6	34.0	42.5	35.9	46.3	31.5	(25.0;38.0)
20 |-| 29	13.8	22.4	44.5	47.7	41.5	48.0	36.9	(30.6;43.3)
30 |-| 39	11.5	15.2	24.8	28.2	26.8	33.8	23.9	(20.3;27.6)
40 |-| 49	6.3	8.6	14.9	16.8	15.3	18.9	13.8	(11.6;15.9)
50 |-| 59	4.1	5.0	8.7	9.9	9.9	12.1	8.5	(7.1;9.9)
60 |-| 69	3.2	4.5	7.4	7.5	6.5	8.6	6.4	(5.5;7.4)
70 |-| 79	2.5	3.7	5.0	6.8	6.1	7.8	5.4	(4.6;6.3)
≥ 80	2.1	3.9	3.3	4.0	6.5	5.1	4.2	(3.4;5.0)
Race/Skin color								
White	1.2	2.9	5.4	5.9	5.1	6.2	4.5	(3.7;5.4)
Black	0.3	0.9	1.9	2.3	2.2	3.1	1.9	(1.4;2.3)
Yellow	0.0	0.1	0.0	0.0	0.0	0.0	0.0	(0.0;0.1)
Brown	2.0	5.0	10.5	11.8	10.6	13.1	9.1	(7.2;11.0)
Indian (native)	0.01	0.0	0.01	0.02	0.02	0.03	0.02	(0.01;0.02)

The potential life years lost due to the category X86-Assault by corrosive substance presented the lowest average of age at time of death, 21.2 years. As opposite, the categories involving assault with firearms, X95-Assault by other and unspecified firearm discharge and X93-Assault by handgun discharge, were responsible for the greatest amount of potential life years lost in the population (9427.7 and 856.4 years per 100,000 people, respectively) (Table 2).

Table 2. Distribution of deaths by Assault (ICD-10: X85-Y09) according to ICD-10 categories, potential life years lost (crude and standardized at 10^5) and mean age at the time of death, 1996 to 2014, Minas Gerais, Brazil. Uberaba, Minas Gerais, 2017.

ICD Category	Crude PLYL[a]	Age at time of death[b]	PLYL 10^5	Total of Deaths N (%)
X86	54.6	21.2	0.5	2 (0.00)
X85	48.9	26.8	4.9	20 (0.03)
X89	47.9	27.7	3.1	17 (0.03)
X95	46.8	28.9	9427.7	40266 (63.6)
Y06	46.4	29.3	4.9	27 (0.04)
X96	46.1	29.6	4.2	18 (0.03)
Y05	46.1	29.6	9.9	43 (0.1)
X93	45.8	29.9	856.4	3734 (5.9)
X90	43.2	32.5	6.5	31 (0.05)
X92	43.2	32.5	22.4	107 (0.2)
Y07	43.2	32.5	42.1	207 (0.3)
X94	42.7	33	22.8	106 (0.2)
X91	42.1	33.6	195.9	975 (1.5)
X97	41.9	33.8	55.1	275 (0.4)
X99	41.2	34.5	1967	9679 (15.3)
X87	40.4	35.3	1.6	8 (0.01)
Y09	39.3	36.4	642.5	3415 (5.4)
Y00	38.8	36.9	592.4	3137 (5)
X98	38.7	37	1.9	10 (0.0)
Y01	38.4	37.3	6.9	37 (0.1)
Y04	37.3	38.4	128.8	719 (1.1)
Y08	36.9	38.8	67.8	374 (0.6)
Y03	34.4	41.3	19.2	122 (0.2)
X88	33.2	42.5	0.7	4 (0.01)
Y02	32.8	42.8	3.3	21 (0.03)
Total	45.2	30.5	13330.7	63354 (100)

[a] Decreasing classification of deaths according to Crude PLYL.

[b] Age of death through direct calculation (crude PLYL — Life expectancy)

It stands out that, for 1996, in 99.8% of cases the skin color field was ignored. On average, from 1997 to 2014, this percentage was 5.6%, with a standard deviation of ±2,4. Therefore, to analyze the variation rates, the year 1997 was proposed as the Ti.

In general, the percentage variation (Δ%) for all variables in the study had an expressive increase when the potential life years lost were analyzed in the territorial conglomerate (PLYL x 10^5). This means that the number of deaths in the population has increased. Also, a diminution in the occurrence of deaths by assault can be noted, except for females. The elevated percentage variation for the Black and Brown skin colors can also be related to the fact that this information is better

notified, meaning that new investigations are necessary (Table 3).

Table 3. Distribution of impact indexes (PLYL and age average) of deaths by Assault (ICD-10: X85-Y09) and their corresponding variation rate from 1996 to 2014, Minas Gerais, Brazil. Uberaba, Minas Gerais, 2017.

Indexes	Period (1996 - 2014)						Δ%
	1996-1998	1999-2001	2002-2004	2005-2007	2008-2010	2011-2014	
General							
Crude PLYL	43.3	43.3	45.2	45.4	45.0	44.8	3.5
Age Average on Death	32.4	31.3	30.6	30.3	30.7	31.0	-4.3
PLYL x 10^5	288.9	444.4	834.0	941.1	835.9	1013.1	250.7
Female							
Crude PLYL	44.2	45.0	44.4	43.7	44.3	43.1	-2.5
Age Average on Death	31.5	30.7	31.3	32.0	31.4	32.6	3.5
PLYL x 10^5	39.4	52.2	76.1	84.1	85.5	92.3	134.3
Male							
Crude PLYL	43.3	44.4	45.3	45.6	45.1	45.0	3.9
Age Average on Death	32.4	31.3	30.4	30.1	30.6	30.7	-5.2
PLYL x 10^5	249.4	392.0	757.9	856.8	750.4	920.7	269.2
White Skin color							
Crude PLYL	42.9	41.7	42.9	43.3	42.5	42.3	-1.4
Age Average on Death	32.9	34.0	32.8	32.4	33.2	33.4	1.5
PLYL x 10^5	47.6	119.8	226.2	250.7	211.5	256.4	438.7
Black and Brown skin color							
Crude PLYL	30.0	46.1	46.3	46.3	46.0	45.7	52.3
Age Average on Death	20.5	29.6	29.4	29.4	29.7	30.0	46.3
PLYL x 10^5	100.3	269.2	568.8	649.2	583.6	732.4	630.2

Regarding the evolution over time, the first order polinomial linear regression showed a determination coefficient ≥ 70% for all variables. The tendency of this cause of death is growing ($r \geq 0.8$), reflecting the high impact of deaths due to this cause in the population of the study through time (Table 4).

Table 4. Regression model of the PLYL x 10^5 tendency analysis of Assault deaths from 1996 to 2014, Minas Gerais, Brazil. Uberaba, Minas Gerais, 2017.

PLYL x10^5	Model [c]	*p*	R^2	Tendency	r
General	y = 44.33x + 741.34	<0.001	0.8	Increasing	0.9
Female	y = 3.298x + 72.693	<0.001	0.8	Increasing	0.9
Male	y = 41.03x + 668.53	<0.001	0.8	Increasing	0.9
White Skin color	y = 12.08x + 189.12	<0.001	0.7	Increasing	0.8

Black and Brown skin color	y = 38.16x + 497	<0.001	0.8	Increasing 0.9

DISCUSSION

The growth of deaths by assault is a national preoccupation. The global growth of this phenomenon in Brazil was 11.2% in the first decade of the XXI century (2000-2010), specially regarding deaths by firearms.[15] The results of this research are in agreement to those from different Brazilian regions. In a study about the evolution of death by homicide in Bahia/Brazil, it was found that the victims are mostly from 15 to 39 years of age (92.4%) and male (78%), and the homicide rates grew for all variables as years passed.[13] In a city in the same state, deaths by assault are the most common external cause deaths, with 45.3 PLYL per death, firearms being the most common instrument used (83% of deaths), with growing temporal tendency.[16] In Maceió, capital of Alagoas/Brazil, a study found that, considering firearm deaths, most victims were male (93.6% of cases), with a mean age at death of 27.4 years.[17]

The results of this research diverge from that of others in the analysis of the race/skin color of the victim. That is partly due to the fact that the studies were conducted in territories whose population is mostly comprised of brown- and black-skinned people.[13, 15-17] However, the quality of this type of information is not good in the state of Minas Gerais, which means that new investigations would be necessary to understand why the victims in the area self-reported that their race/skin color is white.

Studies in different international places also indicate that the most common victims of deaths by assault are male.[18-19] Understanding this gap between the numbers from the different genders would require the development of researches that analyze additional sociocultural dimensions. However, other studies point out that, through time, there has been an increase in female deaths due to this cause, albeit not an expressive one.[15,19] To analyze this subject, discussions on the types of assault that target each gender often emerge. The violence that targets women is often not lethal but of a different nature — it is a constant, silent type of violence, such as sexual and domestic violence.[3,19]

Other systems generate information nationwide to support violence control, such as the Notifiable Grievances System (SINAN). This system follows notifications of exposure to violent situations, such as domestic or sexual violence. However, the SIM is a better system for the evaluation and quantification of deaths.

In the United States, a study indicated factors that contributed to the death by assault, showing that the number of homicides decreased in the last 30 years. The percentage of unemployment, the actions of the state in prison executions and the prison indexes of drug dealers were significant predictors in the reduction of this cause of death.[18] Studies in Brazil that statistically analyze the factors that predict death by assault have not been found.

In general, from the perspective of social determinism, violence can be classified as structural, cultural, delinquent or resistance.[7] Structural violence would be a result of social inequality regarding the access to job markets and essential consumer goods. Cultural violence would involve sexism, racism, imposition of adults on other age groups and any domination through cultural factors that can interfere in human freedom. Delinquent violence, on the other hand, would be a result of the disintegration of human values and their related aspects. Finally, resistance violence is characterized by the political, economical and cultural oppression upon vulnerable population groups.[7]

Nonetheless, contemporary society is undergoing many changes. Rapid urbanization, the growth of consumerism and the technological advances have been influencing human relations and leading to unbalance in social-environmental aspects. These asymmetrical relations are expressed by a reality full of inequality, increasingly generating vulnerabilities that lead to situations of violence.[3-4,8]

Considering these definitions, it is easy to understand that violence is not only the result of specific actions. On the other hand, deaths by assault in different regions, especially those by firearms, are important health indexes, and homicide is the universal index for the levels of violence.[15]

For Collective Health, studies that use secondary data are undeniably important for the identification of mortality epidemiological patterns. When submitted to analysis, they allow for a better understanding of health problems and of the reality of assistance.[2,6,9] They are fast sources that allow one to characterize the victims and the magnitude of the deaths, showing how the violence is distributed through time and how it affects the population.

The limitations of this research involve the fact that the aggregate data was used, and it does not allow for individual risk analyses. As MR and PLYL calculations were conducted, it was necessary to make corrections regarding the precision of causes of death that were not well-defined in the databanks. This leads to some uncertainty regarding the tendencies, and additional studies that

consider determining this aspect are recommended. Also, despite the national scope of the data sources for the consolidation of death declarations, it is necessary to consider cases of records that are incomplete or incorrectly completed.

Still, the population and size of Minas Gerais are bigger than those of some developing countries, and as a consequence, the results found here can aid in the identification of this reality in similar places and be used for comparisons.

CONCLUSION

The results of this study aid in the identification of the expressive impact of deaths by violent causes and assault in the potential years of life lost of the population. The profile of the victims is in agreement with those found in other national and international settings. The mortality among males was expressive (mean MR=30.7; CI95%25.4 - 35.9) and mean age at death of 30.5. The most impactful cause of death in the population of the research was assault by firearms. The temporal evolution showed a growing linear distribution for PLYL x 10^5 in all analyzed variables (general index, sex and race/skin color).

These results indicate an opportunity for future interventions in the context of these deaths, especially considering vulnerabilities regarding issues of gender and race/skin color. That corroborates the 2030 Agenda, which is related to the reduction of death by violent causes throughout the world.

For Collective Health, it is necessary not only to care for the consequences of violent actions, but to give support for an epidemiological control of violence, observing patterns, risk factors, implementing and evaluating interventions that discuss the subject. Therefore, epidemiological studies on death by violent causes contribute to the inter-sectoral confrontation of this problem, since they make it possible to advance in the comprehension of this situation that directly affects the health of the populations, thus having an effect on the design of more effective strategies for the reduction of avoidable deaths caused by this social problem.

REFERENCES

1. Organização Mundial da Saúde. Classificação estatística internacional de doenças e problemas relacionados à saúde. 8ed. São Paulo: EdUSP; 2002.
2. Oliveira LP, Camargo FC, Iwamoto HH. Violência relacionada ao trabalho das equipes de saúde da família. Rev Enferm Atenção Saúde [Internet]. 2013 [citado em 02 jul 2018]; 2(2):46-56. Disponível em: http://seer.uftm.edu.br/revistaeletronica/index.php/enfer/article/view/388/417
3. Carrara S, Mora C, Aguião S. Perspectives on Violence and care: contributions and challenges. Sex, Salud

Soc. [Internet]. 2016 [citado em 02 jul 2017]; (23):3-7. Disponível em: http://www.scielo.br/pdf/sess/n23/pt_1984-6487-sess-23-00003.pdf. doi: http://dx.doi.org/10.1590/1984-6487.sess.2016.23.01.e

4. Moreira LS, Branco AMCUA. Processo de socialização e promoção da cultura de paz na perspectiva de policiais militares. Estud Psicol. (Campinas, Internet). 2016 [citado em 02 jul 2017]; 33(3):553-63. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0103-166X2016000300553&lng=pt&tlng=pt. doi: http://dx.doi.org/10.1590/1982-02752016000300018

5. Organização das Nações Unidas no Brasil. Agenda 2030 [Internet]. [Brasília, DF]: ONUBR; 2015 [citado em 02 jul 2017]. Disponível em: https://nacoesunidas.org/wp-content/uploads/2015/10/agenda2030-pt-br.pdf

6. Machado CB, Daher DV. Violence in the area and its repercussions upon health care actions: descriptive-exploratory study. Online Braz J Nurs. [Internet]. 2013 [citado em 25 jun 2017]; 12(Suppl):674-76. Disponível em: http://www.objnursing.uff.br/index.php/nursing/article/view/4540

7. Minayo MCS. Violência social sob a perspectiva da saúde pública. Cad Saúde Pública [Internet]. 1994 [citado em 25 jun 2017]; 10(Suppl 1):S7-S18. Disponível em: http://www.scielo.br/pdf/csp/v10s1/v10supl1a02.pdf. doi: http://dx.doi.org/10.1590/S0102-311X1994000500002

8. Miagusko E. Esperando a UPP: circulação, violência e mercado político na baixada fluminense. Rev Bras Ciênc Soc. [Internet]. 2016 [citado em 25 jun 2017]; 31(91):e319101. Disponível em: http://www.scielo.br/pdf/rbcsoc/v31n91/0102-6909-rbcsoc-3191012016.pdf. doi: http://dx.doi.org/10.17666/319101/2016

9. Garcia LAAG, Camargo FFC, Gomes THM, Rezende MP, Pereira GA, Iwamoto HH, et al. Production of knowledge of nursing about potential life years lost: bibliometric study. REFACS [Internet]. 2017 [citado em 02 jul 2017]; 5(1):34-46. Disponível em: http://seer.uftm.edu.br/revistaeletronica/index.php/refacs/article/view/1911/1918. doi: http://dx.doi.org/10.18554/refacs.v5i1.1911

10. Lim F. Why Florence Nightingale still matters. Nursing. 2010; 40(11):46-7.

11. Barbosa TAGS, Coelho KR, Andrade GN, Bittencourt SDA, Leal MC; Gazzinelli A. Determinants of infant mortality in cities of the Jequitinhonha Valley, Minas Gerais, Brazil. REME Rev Min Enferm. [Internet]. 2014 [citado em 01 jul 2017]; 18(4):915-22. Disponível em: http://www.reme.org.br/artigo/detalhes/972. doi: http://www.dx.doi.org/10.5935/1415-2762.20140067.

12. Romeder JM, McWhinnie JR. Le développement des années potentielles de vie perdues comme indicateur de mortalité prématurée. Rev Epidémiol Santé Publique. 1978; 26(1):97-115.

13. Souza TO, Souza ER, Pinto LW. Evolução da mortalidade por homicídio no Estado da Bahia, Brasil, no período de 1996 a 2010. Ciênc Saúde Colet. [Internet]. 2014 [citado em 01 jul 2017]; 19(6):1889-1900. Disponível em: http://www.scielo.br/pdf/csc/v19n6/1413-8123-csc-19-06-01889.pdf. doi: http://dx.doi.org/10.1590/1413-81232014196.04772013

14. Latorre MRDO, Cardoso MGA. Análise de séries temporais em epidemiologia: uma introdução sobre os aspectos metodológicos. Rev Bras Epidemiol. [Internet]. 2001 [citado em 01 jul 2017]; 4(3):145-52. Disponível em: http://www.scielo.br/pdf/rbepid/v4n3/02.pdf. doi: http://dx.doi.org/10.1590/S1415-790X2001000300002

15. Waiselfisz JJ. Mapa da Violência 2013: mortes matadas por armas de fogo. [Internet]. São Paulo: Centro Brasileiro de

Estudos Latino-Americanos; 2013 [citado em 01 Jul 2017]. 55p. Disponível em: http://www.mapadaviolencia.org.br/pdf2013/MapaViolencia2013_armas.pdf
16. Costa FAMM, Trindade RFC, Santos CB. Deaths from homicides: a historical series. Rev Latinoam Enferm. [Internet]. 2014 [citado em 01 jul 2017]; 22(6):1017-25. Disponível em: http://www.scielo.br/pdf/rlae/v22n6/pt_0104-1169-rlae-22-06-01017.pdf. doi: http://dx.doi.org/10.1590/0104-1169.3603.2511
17. Trindade RFC, Costa FAMM, Silva PPAC, Caminiti GB, Santos CB. Map of homicides by firearms: profile of the victims and the assaults. Rev Esc Enferm USP. [Internet]. 2015 [citado em 01 jul 2017]; 49(5):746-52. Disponível em: http://www.scielo.br/pdf/reeusp/v49n5/pt_0080-6234-reeusp-49-05-0748.pdf. doi: http://dx.doi.org/10.1590/S0080-623420150000500006
18. McCall PL, Parker KF, MacDonald JM. The dynamic relationship between homicide rates and social, economic, and political factors from 1970 to 2000. Soc Sci Res. [Internet]. 2008 [citado em 01 jul 2017]; 37(3):721-35. Disponível em: https://www.sciencedirect.com/science/article/pii/S0049089X07000762?via%3Dihub. doi: http://dx.doi.org/10.1016/j.ssresearch.2007.09.007
19. Eckhardt K, Pridemore WA. Differences in female and male involvement in lethal violence in Russia. J Crim Justice [Internet]. 2009 [citado em 01 jul 2017]; 37(1):55-64. Disponível em: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2712302/pdf/nihms98088.pdf. doi: 10.1016/j.jcrimjus.2008.12.009

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