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Homicide mortality trends in Belo Horizonte and Metropolitan Area: 1980- 2005

ABSTRACT

OBJECTIVE: To analyze the evolution of homicide mortality rates in Belo Horizonte and its metropolitan area, Southeastern Brazil, from 1980 to 2005.

METHODS: Deaths by homicide were obtained from the SIM (Mortality Information System). Population estimates by sex, age group and calendar-years were obtained from the Brazilian Institute of Geography and Statistics (IBGE). The specific mortality rates for sex and age groups were calculated annually for each geographic region. The trends analysis was carried out using polynomial regression models for time series data, with a significance level $\alpha \leq 0.05$.

RESULTS: There were high homicide mortality rates in Belo Horizonte and the metropolitan area, principally amongst males. Secular trends showed an accelerated growth of the rate ratios in both sexes and in almost all age groups, most evidently from the beginning of the 1990s in the metropolitan area.

CONCLUSIONS: The results show the need to implement organized public policies for the control of violence. Investing in education and guaranteeing access to employment are recommended for the control of the accelerated increase in homicide mortality, principally among male youth residents of the metropolitan area.

DESCRIPTORS: Homicide. Mortality, trends. External Causes. Metropolitan Zones. Time Series Studies.

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INTRODUCTION

In the last decades, the epidemiological and demographic transition has generated large changes in the health and illness patterns of the Brazilian population. The reduction of infant mortality and of mortality from communicable diseases, together with the increased impact of chronic and degenerative diseases on morbidity and mortality, brought new challenges for health professionals, among which include the simultaneous increase in morbidity and mortality rates from external causes[8,13]

According to Briceño-Leon,[3] the direct costs of violence in Brazil, in 2000, were approximately 3.3% of GNP, which is more than three times the investment in science and technology in the country.

For Mello Jorge et al,[a] until the end of the 1980s, mortality from traffic accidents was the primary external cause of mortality. At the same time, homicide mortality rates increased until surpassing mortality rates from traffic accidents. In the beginning of the 1990s, an increase of more than 60% made homicides the leading external cause in mortality statistics, specifically in the large Brazilian capitals. This phenomenon also occurred in other countries like Mexico, Columbia, Puerto Rico and Venezuela and, to a lesser extent, in the United States, and it constitutes a serious public health problem.

According to Minayo,[18] in the last 20 years, homicides in Brazil increased by more than 200%. The largest increase occurred in the 1980s, even though from the beginning of the 1990s the percentages maintained an increasing trend, although with less intensity.

Souza,[23] in studying homicide mortality in Brazil during the period from 1980 to 1988, observed a proportional increase in all ages, especially among males who were 90% of victims. Although greater magnitude of the rates have been observed in the 15 to 19 years age group, followed by the ten to 14 years group, the percentage increase in mortality from this cause during the period was 93.3% for the ten to 14 years age group and 43.6% for the 15 to 19 years age group. This denotes an important change in the mortality age characteristics for this group of causes among youth.

Mello Jorge et al,[16] compared homicide mortality rates in Latin America from 1996 to 1999, and highlighted Brazil as the country with the highest rates, especially in the Southeast Region where the respective mortality rates for the states of Rio de Janeiro, Espírito Santo, São Paulo and Minas Gerais were 52.6, 51.9, 44.0 and 9.2 per 100,000 inhabitants.

Although the state of Minas Gerais had lower homicide mortality rates than other regions of Brazil, its capital ranks among the top five in mortality from this group of causes.[17] On the other hand, studies of homicide mortality in the municipality of Belo Horizonte found that the occurrence of deaths by homicide differs according to geographical region. Ishitani et al,[10] in 2000, found that in the central-south region of Belo Horizonte, homicide mortality mainly occurred in young people and residents of favelas. In considering the indicator "potential years of life lost" (PYLL), they obtained a percentage of 61.5% in relation to the other groups of causes. According to the authors, homicide mortality in this region was 16 times greater in areas where favelas were concentrated than in the other respective neighborhoods.

The objective of the present study was to analyze the evolution of homicide mortality rates in Belo Horizonte and its metropolitan area, during the period from 1980 to 2005.

METHODS

The study had an ecological (time series) approach[19] and was carried out with data corresponding to the municipality of Belo Horizonte, Minas Gerais state, and its metropolitan area, during the period from 1980 to 2005.

The data on homicide deaths was extracted from the Ministry of Health's Mortality Information System (SIM), according to basic cause, sex, age, geographical region and calendar-year.[b] For deaths occurring from 1980 to 1995, the codes (E960-E969) of the 9th International Classification of Diseases (ICD-9)[20] were used, and for deaths occurring between 1996 and 2004, the codes (X85-Y09) of ICD-10 were used.[21] The final classification of the basic causes of death in the Death Certificates in Belo Horizonte and the Metropolitan Area underwent to revision and reclassification according to established procedures, which minimizes the possibility of classification errors.

The population estimates according to sex, age and geographical region for the period from 1980 to 2005 were obtained from the demographic census of the Brazilian Institute of Geography and Statistics (IBGE).

The specific mortality rates were calculated annually in each geographical region according to sex and six age groups: "15-19"; "20-29"; "30-39"; "40-49"; "50-59"

[a] Mello Jorge MHP, Gotlieb SLD, Laurenti R, editores. A saúde no Brasil: análise do período 1996 a 1999. Brasília: Organização Pan-Americana da Saúde; 2001. Análise por tipo de doença ou agravo; p. 203-20.
[b] Ministério da Saúde. Datasus. Sistema de informação sobre mortalidade (1980-2004). [cited 2008 Aug 15]. Available from: http://www2.datasus.gov.br/DATASUS

and "60-69". The mortality rates were calculated by dividing the number of deaths by the estimated population on July 1st of each calendar-year and then presenting the results for each 100,000 inhabitants. In evaluating the indicators for the metropolitan region, the municipality of Belo Horizonte was excluded.

In the trend analysis, in order to avoid serial correlation between the terms of the regression equation, the variable "year" was centered from the midpoint of the historical series. Accordingly, for the period between 1980 and 2005, the term (X-1992.5) represents the centralized variable. Therefore, the equation for the linear model is:

$$Y_T = \beta_0 + \beta_1 (X - 1992.5),$$

where Y_T=mortality rate; β_0= average rate during the period; β_1= average annual increase; X=centralized calendar year.

There was oscillation of the points representing small numbers of deaths (white noise), especially among older age groups. To smoothen the historical series, it was decided to use a moving average of three and five terms.[19] In this process, for the moving average of three terms, the smoothen rate for year *i* (Y_{ai}) corresponded to the arithmetic average of the rates in the previous year (*i*-1), of the given year (*i*) , and the following year (*i*+1):

$$Y_{ai} = \frac{Y_{i-1} + Y_i + Y_{i+1}}{3},$$

and for the moving average of five terms, the respective rate was obtained by using the formula:

$$Y_{ai} = \frac{Y_{i-2} + Y_{i-1} + Y_i + Y_{i+1} + Y_{i+2}}{5}.$$

Then the scatter plots for the homicide mortality rates were analyzed, in relation to the calendar-year, to identify the function that most closely fit the trajectory according to sex, age group and geographical region. Compliance to the normal distribution was tested.

The trends analysis was conducted using polynomial regression models for time series. The dependent variable was the homicide mortality rate (Y), with a moving average of five terms, and the independent variable was the centralized year (X). The trends analysis was performed using regression models due to greater ease in formulating and interpreting the results taking into account the regression equation that best describes the relationship between the dependent variable (Y) and the independent variable (X).[11] The significance level adopted (α) was 0.05.

The modeling was performed using linear regression, starting by the lower order model ($Y=\beta_0+\beta_1X$), followed by more complex models such as the second order models ($Y=\beta_0+\beta_1X+\beta_2X^2$), and third order models($Y=\beta_0+\beta_1X+\beta_2X^2+\beta_3X^3$). Those three steps were initially performed for each age group and sex, in a total of 72 models.

The selection of the best model was based on the analysis of the scatter plots; p values for the F statistic; values of the determination coefficient (r_a^2), and the residuals analysis that should present a normal distribution and constant variance (homoscedasticity).[11] Based on these assumptions, lower order models were chosen whenever possible.

To standardize the Y-axis scales, the predicted rates were transformed into natural logarithms (nl).

All the analyses was done using the Stata 8.2 software.

RESULTS

Tables 1 and 2 show the observed homicide mortality rates for both sexes and age groups, throughout the historical series, in the municipality of Belo Horizonte and the metropolitan area, respectively. During the studied period, higher rates were observed among male, considering that the first four age groups (15-19, 20-29, 30-39 and 40-49 years) concentrated the highest values for those e rates in both sexes.

Figures 1 and 2 show the regression models for each region studied, according to sex and age group. The adjusted determination coefficient ranged from 0.75 to 0.99, and most models had quadratic or cubic terms, highlighting different patterns of increase, in some periods of the time series. Stationary series were only identified among females in the age group of 40-49 years in the municipality of Belo Horizonte, and 60-69 years in both regions. All the models selected for the trends analysis in the two regions had p values <0.001 for the F statistic, and were only selected after confirming homoscedasticity in the residual analysis.

Considering males, in the municipality of Belo Horizonte the models presented increasing patterns in all age groups, with rapid increase that became more evident from the beginning of the 1990s, or in subsequent years, and no periods of decline were observed. Different patterns were observed for females, in which the rates showed periods of increase (1986-2000) followed by periods of decline in the end of the historical series, principally in two age groups: 30-39 and 50-59 years.

In the metropolitan area, increasing trends for the predicted rates were observed in both sexes. For males a dramatic increase was observed in the beginning of the 1990s, principally in the first three age groups. On the other hand, no period of decline was observed throughout the time series for females.

Table 1. Homicide mortality ratios (x100,000), by sex and age group . Municipality of Belo Horizonte, Southeastern Brazil, 1980-2005.

Age (years)	15-19		20-29		30-39		40-49		50-59		60-69	
Sex	M	F	M	F	M	F	M	F	M	F	M	F
1980	35.74	2.67	58.3	3.51	44.79	3.27	47.36	3.53	42.24	0	15.8	5.68
1981	24.9	5.36	36.4	2	46.18	5.54	45.11	1.15	14.45	1.69	11.37	0
1982	16.06	1.8	36.3	5.96	28.31	6.11	27.64	2.22	32.04	0	18.25	0
1983	18.22	3.64	26.4	3.46	32.35	4.42	15.93	1.08	23.34	4.78	3.52	2.52
1984	19.38	4.6	35.5	5.41	21.68	8.54	27.51	6.29	20.8	4.66	10.19	0
1985	17.48	2.79	30	2.94	25.68	2.75	17.52	2.04	9.2	0	6.57	0
1986	18.66	3.75	34.2	0.97	20.39	5.33	22.84	6.95	21.49	0	12.72	0
1987	26.12	1.89	38.9	5.82	23.48	4.53	20.11	2.9	13.97	4.31	6.17	0
1988	26.32	2.87	36.6	6.28	25.7	2.51	19.69	5.66	13.63	1.4	5.99	0
1989	36.07	3.86	46	2.88	28.51	3.06	26.8	5.53	19.99	0	8.73	2.05
1990	23.52	2.92	40.1	3.35	31.21	3.57	25.23	3.6	14.66	0	17.01	0
1991	28.04	2.96	56.2	4.76	40.25	5.2	27.78	1.76	25.43	2.62	19.27	1.93
1992	25.14	3.85	40	4.31	39.08	5.71	31.9	2.55	24.86	1.28	13.33	1.89
1993	31.71	0.97	45.8	4.67	39.46	4.53	31.26	4.3	20.25	2.57	2.7	3.79
1994	31.36	2.87	45.3	5.08	30.7	3.36	25.93	2.95	7.7	2.54	10.67	1.87
1995	42.39	3.78	65.5	2.74	40.5	3.88	32.55	5.05	25.91	5.03	23.75	5.56
1996	33.44	2.62	62.8	6.91	46.84	5.93	35.03	2.22	22.63	3.52	9.34	1.7
1997	40.52	5.2	64.9	3.92	53.17	7.49	23.44	7.35	32.26	2.33	18.53	0
1998	46.64	5.16	91.1	7.78	65.54	9.03	30.18	2.19	23.68	4.62	27.6	3.34
1999	51.76	15.38	96.7	8.21	59.05	9.49	33.39	5.07	22.13	3.44	13.7	0
2000	106.81	13.24	125	8.52	66	5.71	30.87	6.34	21.8	2.95	22.35	2.99
2001	98.55	3.5	132	7.11	79.3	5.66	42.53	4.4	32.4	4.87	26.17	1.48
2002	137.14	7.78	154	3.96	84.13	5.6	43.53	3.73	30.85	1.93	21.9	1.46
2003	177.5	16.28	217	13.5	108.87	7.06	62.87	4.31	36.44	3.82	37.62	1.45
2004	183.35	18.68	256	9.5	116.87	10.49	67.36	4.27	43.1	2.84	19.54	7.18
2005	185.69	9.15	210	13.1	94.67	7.83	57.48	6.58	36.52	1.85	26.8	7.04

DISCUSSION

The results showed an increased magnitude of homicide mortality rates in Belo Horizonte and the metropolitan area, mainly among males. The secular trends revealed accelerated growth for these rates, in both sexes and in almost all age groups, especially from the beginning of the 1990s, in both regions, especially in the metropolitan area.

Studies in Brazil have identified that beginning in 1990 homicide rates have become the main component of mortality from external causes[15] and that the victims are concentrated among male youth and residents of the Southeast Region.[5,7,23] Gawryszewski et al[8] found that general mortality rates from this group of causes in Brazil, in 2000, corresponded to 26.7 deaths per 100,000 inhabitants, being 35.1 among males and 3.1 among females. According to Barros et al,[2] the predominance of males in homicide mortality is related to their greater exposure to potential risk factors like alcohol consumption, use of licit and illicit drugs and use of fire weapons. According to Caiaffa et al,[4] the homicide mortality rates in the metropolitan area have presented greater increases in relation to the municipality of Belo Horizonte.

Lima et al,[14] analyzing the spatial distribution of homicide mortality in 1998 in Recife and its metropolitan area, found greater rates in neighborhoods where there were more social differences, identifying social inequalities as determinants of violence. Similar results were found by Szawarcwald & Bastos[24] in studying homicide mortality in Rio de Janeiro in 1999.

Duarte et al,[6] studying the association between social demographic factors and homicide rates, in 1999, in the Brazilian population, identified greater rates of homicide mortality in regions with a greater degree of urbanization. According to the authors, the process of occupying urban areas and the social inequalities in Brazilian municipalities are risk factors for violence.

Table 2. Homicide mortality ratios (x100,000), by sex and age group. Metropolitan area of Belo Horizonte, Southeastern Brazil, 1980-2005.

Age (years)	15-19		20-29		30-39		40-49		50-59		60-69	
Sex	M	F	M	F	M	F	M	F	M	F	M	F
1980	19.64	3.91	44.59	3.57	54.55	1.9	56.12	8.49	40.68	0	7.99	7.3
1981	32.17	3.77	36.91	4.51	25.22	5.2	32.59	5.27	25.54	0	7.49	0
1982	12.68	5.41	46.55	7.42	36.93	14.13	32.7	4.87	23.82	3.87	21.05	6.25
1983	12.15	3.46	35.11	5	46.79	2.87	43.71	9.05	29.76	0	32.98	0
1984	13.33	1.66	32.43	1.89	27.61	2.64	30.8	6.33	31.49	0	24.89	0
1985	14.43	1.6	33.65	6.3	22.07	1.22	21.31	1.98	16.52	0	17.67	10.24
1986	6.18	1.54	35.64	6	31.03	4.56	23.85	1.87	18.79	9.03	5.6	0
1987	16.41	1.49	34.16	4.09	32.47	1.07	24.4	1.76	23.82	0	5.33	4.58
1988	12.98	5.77	32.82	5.49	27.65	3.02	23.27	5.03	17.05	5.44	20.39	0
1989	29.36	0	45.49	4.52	28.21	6.67	25.44	4.79	32.64	0	14.66	4.16
1990	23.07	1.36	48.38	7.98	37.11	3.62	28.98	3.06	28.72	4.98	18.8	3.99
1991	22.31	0	49.38	2.09	29.94	6.86	39.35	2.91	17.47	0	18	3.8
1992	18.48	4.94	43.45	3.38	31.15	7.34	24.39	2.7	14.19	2.25	8.5	0
1993	32.17	7.43	55.34	3.94	36.5	6.46	21.98	4.12	14.15	4.49	34.07	0
1994	19.57	1.22	45.38	5.19	32.81	2.39	21.74	5.43	18.65	2.22	4.21	3.56
1995	33.88	2.42	53.47	4.49	44.63	7.9	33.6	8.06	25.37	6.59	16.66	3.52
1996	34.6	3.99	60.85	8.41	43.35	5.41	26.38	4.18	23.16	0	10.45	0
1997	36.15	4.8	74.08	8.68	45.16	8.46	30.49	3.02	24.21	1.8	16.82	2.85
1998	40.57	6.51	82.95	5.61	56.39	6.95	41.4	3.91	27.13	3.5	16.35	2.77
1999	39.36	4.51	84.28	9.25	56.01	4.9	36.35	5.7	26.38	1.7	15.91	2.69
2000	86.91	7.15	129.2	10.37	64.44	6.97	35.35	6.35	25.38	4.29	30.32	2.35
2001	100.86	6.88	131.43	9.51	80.72	7.27	52.22	3.06	37.35	2.75	29.15	2.26
2002	117.69	11.75	177.51	10.2	105.56	7.09	66.39	7.46	42.07	5.38	38.83	4.42
2003	186.69	17.16	230.34	13.09	123.92	13.28	83.47	5.82	53.33	9.18	42.71	4.31
2004	207.4	13.54	280.06	15.4	134.33	9.84	74.77	14.89	61.36	6.4	41.9	2.11
2005	183.22	12.8	219.68	14.97	130.61	10.78	72.12	8.05	50.56	6.07	30.39	2

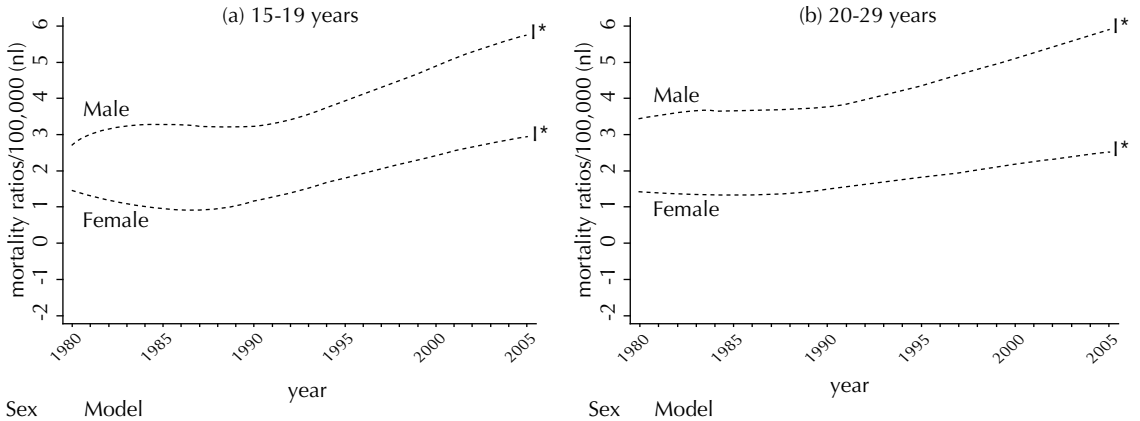
Caiaffa et al,[4] based on data related to the municipality of Belo Horizonte, also associated violence in the large cities with inequalities in urban living conditions, low socioeconomic indicators and worse access to the benefits of social services. Ishitani et al,[10] in their analysis of mortality differences in urban areas in the 1990s, in Belo Horizonte and the metropolitan area, identified that living in favelas was associated with higher rates of homicide mortality, independent of sex and age.

According to Souza,[23] in 2003, the homicide mortality rate ratio in Brazil was 12.3 times greater in males than in females. In the age group of 20-24 years the rate ratio was 17.2, and among young adults (25-29 years) it was 15.2.

In the present study, an increasing homicide mortality trend was observed throughout the series studied, in both sexes and in almost all the age groups, principally beginning in the 1990s, and in the metropolitan region. Different time series studies of homicide mortality in Brazil, between 1980 and 2000, also point out that homicides are an urban phenomenon, with increasing trends in all the Brazilian capitals, and in their peripheries.[1,5,7,12]

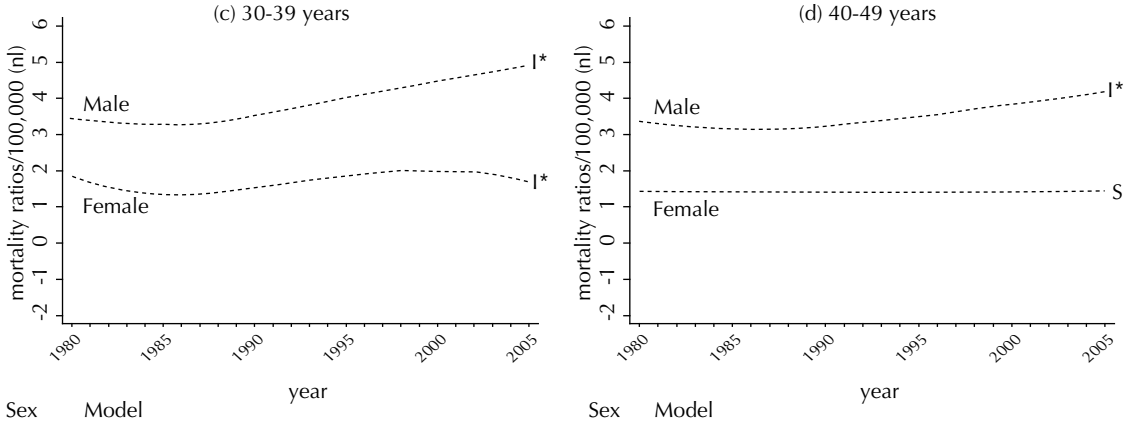
According to Vermelho & Mello Jorge,[25] from the beginning of the 1990s, in Brazil, the homicide mortality rates continued growing. Despite presenting slower increases than in the 1980s, this was the period that stood out for its concentration of mortality in the younger age groups (10 to 39 years). For Minayo,[18] Gawryszewski & Costa,[9] the victims are usually low-income, without professional skills or with a lack of formal employment opportunities. They also live in abnormal urban sections of metropolitan areas (favelas), places recognized as having precarious living conditions for the population.

Barata et al[1] established a relationship between homicide mortality, socioeconomic indicators and geographical areas. They observed, in the municipality of São Paulo during the period between 1988 and 1994, that



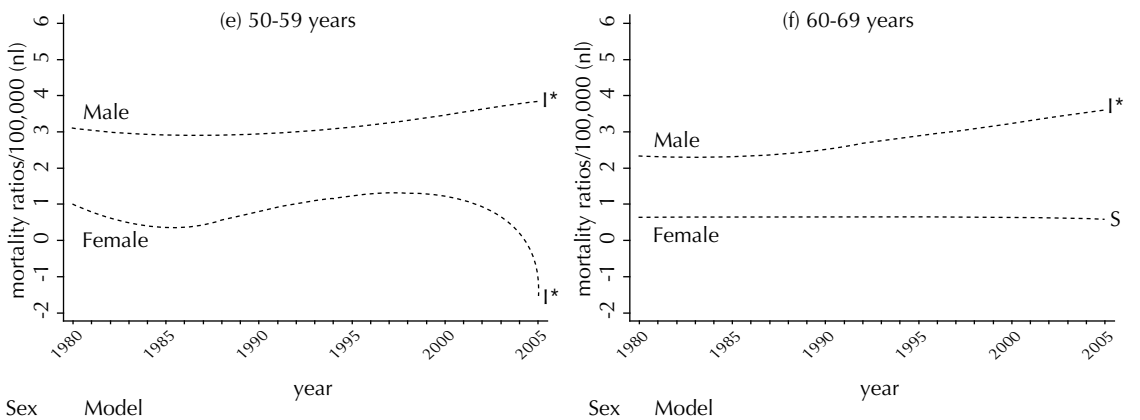
Sex	Model
Male	$Y=32.24001+4.4239(x^1)+0.8425(x^2)+0.0479(x^3)$
Fem	$Y=4.2444+0.5826(x^1)+0.0472(x^2)$

Sex	Model
Male	$Y=55.2862+6.3751(x^1)+0.8631(x^2)+0.0405(x^3)$
Fem	$Y=5.0661+0.3231(x^1)+0.0205(x^2)$



Sex	Model
Male	$Y=42.2659+4.0875(x^1)+0.2621(x^2)$
Fem	$Y=5.4547+0.3622(x^1)+0.0031(x^2)-0.0025(x^3)$

Sex	Model
Male	$Y=28.2652+1.5252(x^1)+0.1209(x^2)$
Fem	$Y=4.1683$

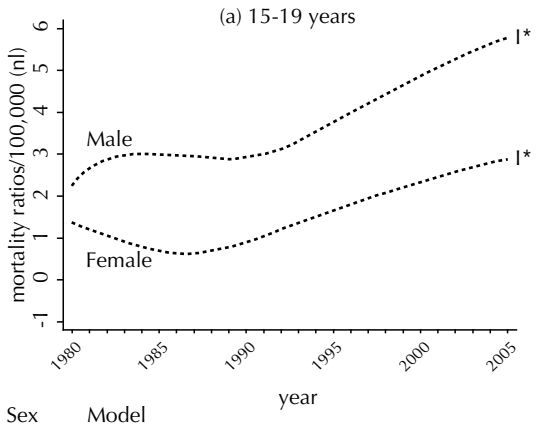


Sex	Model
Male	$Y=20.5487+0.9437(x^1)+0.0878(x^2)$
Fem	$Y=2.8729+0.2581(x^1)-0.0088(x^2)-0.0023(x^3)$

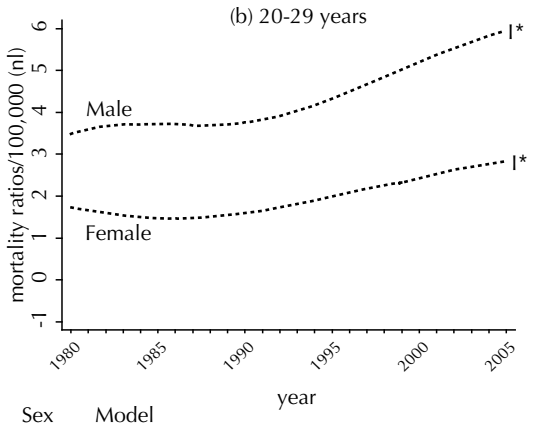
Sex	Model
Male	$Y=14.6148+1.0522(x^1)+0.0558(x^2)$
Fem	$Y=1.8634$

* $p<0.001$
I: Increasing trend
S: Stationary trend

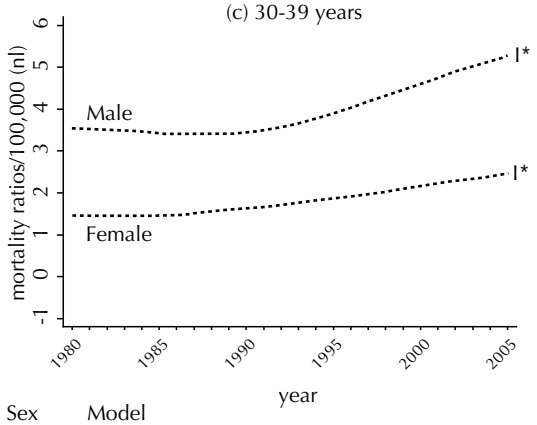
Figure 1. Estimated homicide mortality ratios (x100,000), by sex and age group. Municipality of Belo Horizonte, Southeastern Brazil, 1980-2005.



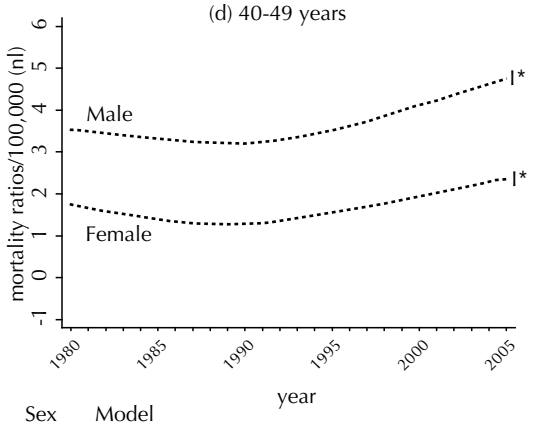
Sex	Model
Male	$Y=24.8976+4.4746(x^1)+0.8914(x^2)+0.0507(x^3)$
Fem	$Y=3.5666+0.5628(x^1)+0.0468(x^2)$



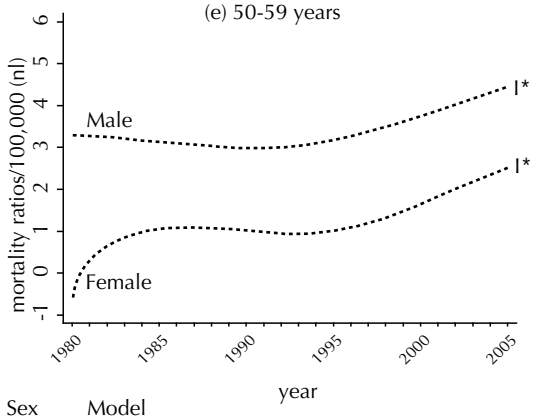
Sex	Model
Male	$Y=53.0587+6.2986(x^1)+1.0030(x^2)+0.0507(x^3)$
Fem	$Y=5.8665+0.4661(x^1)+0.0357(x^2)$



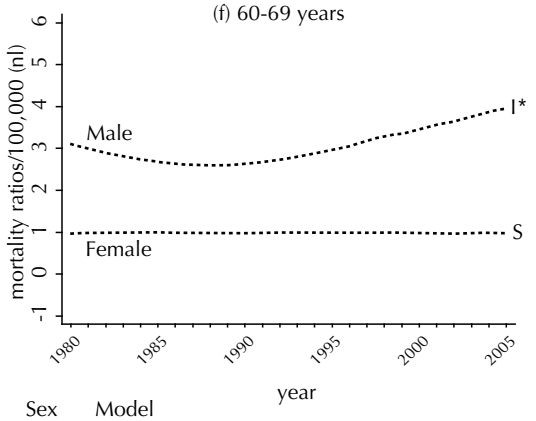
Sex	Model
Male	$Y=37.4594+3.4467(x^1)+0.4920(x^2)+0.0191(x^3)$
Fem	$Y=5.6831+0.2887(x^1)+0.0147(x^2)$



Sex	Model
Male	$Y=27.3903+1.6952(x^1)+0.2986(x^2)+0.0093(x^3)$
Fem	$Y=4.1533+0.2655(x^1)+0.0198(x^2)-0.0012(x^3)$



Sex	Model
Male	$Y=20.4433+0.7902(x^1)+0.2198(x^2)+0.0091(x^3)$
Fem	$Y=2.5856-0.0285(x^1)+0.0252(x^2)+0.0032(x^3)$



Sex	Model
Male	$Y=14.9565+0.7222(x^1)+0.1798(x^2)+0.0075(x^3)$
Fem	$Y=2.6577$

* $p<0.001$
I: Increasing trend
S: Stationary trend

Figure 2. Estimated homicide mortality ratios (x100,000), by sex and age group. Metropolitan Region of Belo Horizonte, Southeastern Brazil, 1980-2005.

individuals living in regions of low economic attainment had homicide mortality rates three times greater than those who lived in areas with better conditions. For Souza & Lima,[23] homicide mortality in Brazil has been occurring mainly in poorer neighborhoods and, to a lesser extent, in more privileged areas. The authors reinforce the idea that inequalities in the population's living conditions and in the occupation of urban areas are determinants for the progressive increase in homicides, and that violence is an expression of the population's needs such as social, economic and institutional services. The victims, in general, are absent from school, are involved with drugs and/or with friends connected to criminal activities. These circumstances decrease opportunities for personal and professional growth and therefore restrict their rights as citizens.[4,22]

The unavailability of information on potential risk or protective factors for homicide mortality over long time series, limits the investigation of their influence upon the outcomes, prohibiting causal inferences even in an ecological basis. Nonetheless, it can be inferred that the economic crisis, which began in Brazil in the beginning of the 1980s, when the formal job market went into recession, is a possible explanation for the increasing trend of the indicators in subsequent years due to the increase in underemployment and unemployment, which contributed to increasing the amount of people in misery.

The metropolitan region of Belo Horizonte consists of 34 municipalities and has an estimated population of 4,939,053 inhabitants. It is the third largest Brazilian population center and ranks third in economic importance for national industry. Its population growth rate has decreased in the last decades, even though it is still greater than the state average Demographic growth has increasingly been concentrated in the surrounding municipalities, each year reducing the contribution of Belo Horizonte.[c] The main explanation for this phenomenon is the reduction in living areas in Belo Horizonte, which increases the price of land in the city and makes the population live in municipalities outside the capital. Thus, the metropolitan area of Belo Horizonte stands out for its high rates of immigration, urbanization and population growth. Together, these indicators are employed in measuring the level of social cohesion and, certainly, have been contributing to the increase in homicide mortality rates.

The results of this study showed the magnitude and increased growth of homicide mortality rates, especially in young male residents, of the metropolitan area of Belo Horizonte. This confirms the findings in the literature and shows the need for different public policies to be articulated, focusing on the National Policy to Reduce Accidents and Violence, together with health service professionals and managers, community representatives and the general population.

The reality of the large urban centers require special attention to their risk areas, so that specific promotion and prevention measures can be implemented to efficiently control homicide mortality and violence in these two regions over time.

[c] Instituto Brasileiro de Geografia e Estatística. Contagem da população 2007. Rio de Janeiro; 2007.

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