

Homicides, alcohol and drugs in Belo Horizonte, Minas Gerais State, Brazil, 2000-2009

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Abstract

Objective: to estimate the prevalence and factors associated with the results of post mortem examinations positive for alcohol (EPA), marijuana (EPM) and/or crack-cocaine (EPCC) among people resident in Belo Horizonte-MG, Brazil, who were homicide victims between 2000-2009. **Methods:** This was a cross-sectional study using Mortality Information System (SIM) data; Poisson regression was used to obtain prevalence ratios (PR) and confidence intervals (95%CI). **Results:** 8,091 homicides were included in the study; in 29.7% of deaths EPA, EPM and/or EPCC were found more frequently among males (PR=1.87; 95%CI: 1.65; 2.11), youth (PR=1.39; 95%CI: 1.26; 1.53), those with no partner (PR=1.64; 95%CI: 1.49; 1.81), black skin color (PR=1.66; 95%CI: 1.51; 1.82), low education (PR=1.42; 95%CI: 1.28; 1.57), injured by firearms (PR=1.81; 95%CI: 1.63; 2.01) and occurrence in the street (PR=1.82; 95%CI: 1.64; 2.01). **Conclusion:** integrating forensic information with SIM data enabled risk behaviors - alcohol and drug use by the victim – to be captured, thus strengthening mortality information as a tool for estimating the size of the complex problem of interpersonal violence and drugs in Brazil.

Key words: Cross-Sectional Studies; Homicide; Information Systems; Alcohol-Related Disorders; Street Drugs.

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Introduction

Homicides are defined as deaths caused by someone else, by using any means, with the intention to injury (hurt) or to kill.¹ In 2012, homicides counted to almost half a million deaths around the world, with an annual average rate of 6.2 per 100 thousand inhabitants.² It is widely known that homicides are not homogeneously distributed among populations, varying according to place, social and economic conditions, age group, sex, ethnicity/skin color, amongst other determining factors. Some countries, such as the South Africa, and some continental regions, like the Central America, have mortality rates due to homicides four times higher than the global rate, whilst Western Asia, South Europe and Western Europe have homicide rates five times lower than the world rate.² South America, Eastern Africa and the Caribbean report rates between 16 and 23 homicides per 100 thousand inhabitants.²

Consumption of alcohol and illegal drugs among young people represents a big public health issue.

From 2002 to 2012, Brazil had a 13.4% increase in the total number of homicides registered by the Mortality Information System (*SIM*);³ in 2007, 92% of the homicide victims in the country were male, and the age group between 20 and 29 years of age was the most affected, representing 40.3% of the total of these deaths.⁴ In the same period between 2002-2012, there was a decrease in homicide rates in the capital cities of the Southeast region, although Belo Horizonte, the third most populous municipality of the region, has shown the smallest decrease among these capital cities (5.2%);³ Vitória, Rio de Janeiro and São Paulo showed decreases of 28.5%, 65.8% and 70.7% in the homicides rates, respectively.³ Similarly to the rest of the world, men, youngsters and people who live in poor neighborhoods are the main victims of homicides in the municipality of Belo Horizonte.⁵ Consumption of alcohol and illegal drugs among young people represents a big public health issue of global level, with impacts in Brazil.⁶ Immediate and long-term physical and mental effects, due to the use and abuse of these substances, are associated to violent behaviors.⁷ In many cases, assaults have as

a background the use of such substances,⁴ whether it is due to the disinhibition caused by them, due to the need of engaging into crime to obtain the money needed for drugs use, or due to its close relation to drug trafficking.^{4,6,8-9} Illegal drugs can induce different levels of crimes, many times headed by criminal gangs and powerful drug dealers,¹⁰ and can also enable one's inclusion into a social group and provide immediate compensations, such as the access to power and money and concrete benefits to which young people openly submit to.

The direct information regarding the prevalence of drugs and alcohol use among victims of assault and their assaulters¹¹ are insufficient.

Although the information about homicides obtained in *SIM* is becoming more agile and reliable, it does not reflect on how good the integration between this system and the information from the Institutes of Legal Medicine (IML) is, where the circumstances related to violent death and the results of *post mortem* examinations of victims are found, according to a recommendation from the World Health Organization (WHO).¹²

The results of *post mortem* examinations related to legal drugs (alcohol) and the illegal drugs (cannabis, crack-cocaine) in homicides victims could be used as associative markers between the consumption of these drugs and the homicidal violence, contributing to the formulation of public policies.

The objective of this study was to estimate the prevalence and factors associated with the results of *post mortem* examinations positive for alcohol (EPA), cannabis (EPC) and/or crack-cocaine (EPCC) among people resident in Belo Horizonte-MG, who were homicide victims between 2000-2009.

Methods

This was a cross-sectional study with residents of Belo Horizonte, capital city of Minas Gerais State-MG, Brazil about homicides that occurred in this municipality in the period between January of 2000 and December of 2009.

In this period, the municipality had around 2,306,613 inhabitants/year. Belo Horizonte is the sixth most populous capital city in Brazil, and has the fifth best gross domestic product (GDP) of the country.¹³ Data from the Human Development Atlas for

Brazil show a Municipal Human Development Index (MHDI)¹⁴ of 0.810, which corresponds to high MHDI – between 0.800 and 1 – to the year of 2010.

The mortality data was obtained in the Mortality Information System (*SIM*), provided by the Municipal Health Department of Belo Horizonte. The municipality is responsible for feeding *SIM* since 2000. It presents a good coverage, and the average percentage of deaths caused by external causes of undetermined intent was equal to 11.3% in the analyzed period. Matos et al.,¹⁵ in a study focused in the 1998-2000 period, found out that the information of the police reports, although very summarized, are enough for defining homicides, leading to a smaller amount of problems for its typological qualification. The homicides were selected from the group “Assaults” code X85 and Y09, related to injuries caused by someone else, by any means, with intention to injury (hurt) or to kill, according to the International Statistical Classification of Diseases and Related Health Problems (ICD-10).¹

In this analysis, the choice of exclusively select deaths of residents in Belo Horizonte occurred due to the better possibility of calculating the rates. On the other hand, the decision to study deaths that occurred in Belo Horizonte was due to the fact that the Municipal Health Department incorporates the forensic information in the local *SIM* routine. That is, the system is also fed by data from the forensic report, in which the results of *post mortem* examinations performed in the necropsy for alcohol, cannabis and crack-cocaine are included, having the ICD-101 codes as reference. It is, however, a procedure that is not a part of the daily routine of the *SIM* in all municipalities.

As a variable of interest, there is the presence – categorized with ‘yes’ or ‘no’ – of positive *post mortem* examinations for alcohol (EPA), cannabis (EPC) and/or crack-cocaine (EPCC). The cases registered with ‘yes’ were those that had, in any lines of the death statement (DS), the following codes:

- a) to alcohol – R78,9; e Y90,0 to Y90,9 (with blood alcohol concentration inferior to 20mg/ml up to higher than 240mg/ml);
- b) to cannabis metabolites – F12,0 to F12,9, and T40,7; and
- c) to crack-cocaine metabolites – F14,0 to F14,9; R78,2 and T40,5.

The cases registered “no” were those in which no examination was performed and those without any record of having or having not performed an examination

in the *IML* registers. Therefore, due to the absence of an ICD-10 code for the examination with a negative result, in this study, cases where the examination’s result was negative and where the examination was not performed were not separated and were not differentiated, thus all were considered as a “no” for the analysis.

It is important to enhance that, in Brazil, toxicological examinations are performed in homicide victims only when the police authorities consider that these examinations will help clarify the crime; so they are not mandatory – the same happens with transport accidents. Thus, the responsible police chief may order the examination to be performed, and this fact may lead to selection and outcomes interpretation biases.

To detect cannabis (presence of tetrahydrocannabinol – THC and/or THC acid) and crack-cocaine (presence of crack-cocaine itself and benzoylecgonine, the main metabolite of crack-cocaine), the immunochromatography and the gas chromatography (GC) with mass spectrometry are used. The *IML* uses GC to evaluate the blood alcohol concentration. In this study, the time between the death and the necropsy to collect the necessary material for the toxicological examination was not determined, which may lead to a reduction of positive results – especially regarding alcohol.

Three groups of explanatory variables were included:

- 1) Social and demographical characteristics of the victim – sex (male; female); age, in years (≤ 29 and ≥ 30); schooling, in years of study (≤ 7 and ≥ 8); marital status (with a partner/without a partner); and ethnicity/skin color (black/ brown) and not black [other categories]).^{5,16}
- 2) Place of occurrence of the death – health facilities, household or public streets or highways.
- 3) Means used in the assault – firearms (X93 to X95) and other types of guns (X85 to X92; X96 to Y09).

To calculate the mortality rates, the data from the 2000 Demographic Census and the census projections for the other years, estimated by the Brazilian Institute of Geography and Statistics (IBGE) and provided by the IT Department of the National Health System (*Datasus*), were used.

At first, a descriptive analysis of the victims’ social and demographical characteristics, of the place of occurrence of the death, and of the means used for the assault, was performed.

The prevalence of positive (yes; no) *post mortem* examinations were estimated. The prevalence of

positive *post mortem* examinations was defined by dividing the total number of victims with this result by the total number of victims. The confidence interval of 95% (95%CI) was also estimated. The effect size between the variables and the positive *post mortem* examination was estimated by the prevalence ratios (PR) with 95%CI through the Poisson regression with variables adjustments. The statistical significance was evaluated through Wald's qui-square test. All variables' significance levels were tested separately. All variables that showed $p \leq 0.05$ were kept. For the final model, the variable group was analyzed in only one block. The model was significantly adjusted, with no need to exclude variables.

The final model adequacy was evaluated through the omnibus test. For data processing, selecting and tabulating, the software Tabwin 3.6 was used. Statistical analyses were performed with the R 2.15.1 (The R Foundation for Statistical Computing, Viena, Áustria) software, available at: <http://www.r-project.org>.

The study project was approved by the Ethics in Research Committee of the Municipal Health Department of Belo Horizonte: Certificate of Presentation for Ethical Consideration (CAAE) No. 14685113.0.0000.514.

Results

The homicide mortality rate in Belo Horizonte, in the period between 2000 and 2009, was 38.92 per 100 thousand inhabitants. In the period, 9,147 deaths of local residents occurred. 1,056 homicides of residents in Belo Horizonte that did not occur there were excluded, due to the fact that the codification of *post mortem* examinations is not standardized in all municipalities. Therefore, the following results correspond to the 8,091 homicides of Belo Horizonte local residents whose death occurred in that capital city. In table 1, characteristics of homicide victims are presented, as well as positive, negative or not performed *post mortem* examinations rate, according to social and demographical variables, place of death occurrence and means used in the assault.

Among all homicide victims, men (92.0%), with age ≤ 29 years (67.5%), with no partner (84.2%), of black/brown ethnicity/skin color (76.2%), with seven or less years of schooling (71.9%) were the most frequent victims.

Most deaths occurred due to assaults by firearms (87.9%). In the analyzed period, the proportion of victims with a positive *post mortem* examination was of 29.7% ($n=2,402$). An increase in the proportion of positive cases, from 0.7% (2000) to 47.8% (2009) was observed (Table 1).

Among positive *post mortem* examinations, 25.1% showed the presence of crack-cocaine and cannabis, 21.3% of alcohol, 17.4% of cannabis and 15.5% of crack-cocaine (Table 2). Still with regard to positive *post mortem* cases, the most frequent occurrence place was public streets or highways (62.4%) (Table 3), whilst those with a negative or not performed *post mortem* examination, showed that most deaths occurred in health facilities (55.0%) (Table 1).

Table 3 represents the multivariable analysis, indicating seven variables independently associated to the positive *post mortem* examination result: male (PR=1.87; 95%CI 1.65;2.11); age in years ≤ 29 (RP=1.39; 95%CI: 1.26;1.53); low schooling (PR=1.42; 95%CI 1.28;1.57); not having a partner (PR=1.64; 95%CI 1.49;1.81); black/brown ethnicity/skin color (PR=1.66; 95%CI 1.51;1.82); assault by firearm (PR=1.81; 95%CI 1.63;2.01); and occurrence of the death in public streets or highways (PR=1.82; 95%CI 1.64;2.01). After adjusted analysis, all investigated variables remained significantly associated to the positive *post mortem* examination result. The final model was considered adequate (*omnibus test* = 687.8; $p < 0.001$).

Discussion

These results showed that almost a third of the assault victims had a positive *post mortem* examination for alcohol, cannabis and/or crack-cocaine. The prevalence of positive examinations was higher among men, young people, those without a partner, with black/brown skin color, with low schooling, assaulted by firearms, and the occurrence being in public streets or highways.

Nevertheless few Brazilian studies having analyzed the pattern over homicide under alcohol¹¹ and illegal drugs influence, possibly, this prevalence is underestimated. Among the main factors that could contribute to such underestimation, these could be mentioned: (i) performing examinations only among victims where this seemed to be relevant for the clarification of the case; and

Table 1 – Characteristics of homicides of local residents of Belo Horizonte-MG with positive, negative or not performed *post mortem* examination results, whose death occurred in that municipality, 2000 to 2009

Variable	All deaths ^a	Deaths with a positive <i>post mortem</i> examination result ^b	Deaths with a negative or not performed <i>post mortem</i> examination result ^c
	n=8,091 (%)	n=2,402 (%)	n=5,689 (%)
Sex			
Male	7,442 (92.0)	2,267 (94.4)	5,175 (91.0)
Female	649 (8.0)	135 (5.6)	514 (9.0)
Age group (in years)			
≤29	5,459 (67.5)	1,714 (71.3)	3,745 (65.8)
≥30	2,632 (32.5)	688 (28.7)	1,944 (34.2)
Schooling (in years of study)			
≤7	5,823 (71.9)	1,736 (72.3)	4,087 (71.8)
≥8	2,268 (28.1)	666 (27.7)	1,602 (28.2)
Marital status			
Without a partner	6,811 (84.2)	2,149 (89.5)	4,662 (81.9)
With a partner	1,280 (15.8)	253 (10.5)	1,027 (18.1)
Ethnicity/ skin color			
Black/Brown	6,163 (76.2)	1,861 (77.5)	4,302 (75.6)
Not black	1,928 (23.8)	541 (22.5)	1,387 (24.4)
Place of occurrence of the death			
Household	689 (8.5)	208 (8.7)	481 (8.5)
Public streets or highways	3,578 (44.2)	1,499 (62.4)	2,078 (36.5)
Health facilities	3,824 (47.3)	695 (28.9)	3,130 (55.0)
Means used in the assault			
Firearm	7,115 (87.9)	2,174 (90.5)	4,941 (86.9)
Other types of guns	976 (12.1)	228 (9.5)	748 (13.1)
Post mortem examination			
2000	581 (100.0)	4 (0.7)	577 (99.3)
2001	607 (100.0)	2 (0.3)	605 (99.7)
2002	672 (100.0)	73 (10.9)	599 (89.1)
2003	995 (100.0)	204 (20.5)	791 (79.5)
2004	1,077 (100.0)	323 (30.0)	754 (70.0)
2005	971 (100.0)	330 (34.0)	641 (66.0)
2006	869 (100.0)	394 (45.3)	475 (54.7)
2007	913 (100.0)	379 (41.5)	534 (58.5)
2008	758 (100.0)	383 (50.5)	375 (49.5)
2009	648 (100.0)	310 (47.8)	338 (52.2)

a) All deaths due to homicide of local residents of Belo Horizonte and whose death occurred in that city: n=8,091

b) Death with a positive *post mortem* examination result: n=2,402c) Death with a negative or not performed *post mortem* examination result: n=5,689

Table 2 – Presence of substances (alcohol, cannabis, and/or crack-cocaine) with a positive *post mortem* examination among homicide victims in the municipality of Belo Horizonte-MG, 2000 to 2009

Substances ^a	n ^b	%
Crack-cocaine/cannabis	604	25.1
Alcohol	512	21.3
Cannabis	419	17.4
Crack-cocaine	372	15.5
Alcohol/crack-cocaine	317	13.2
Alcohol/cannabis	118	4.9
Alcohol/crack-cocaine/cannabis	60	2.5
Total	2,402	100.0

a) Substances detected in *post mortem* examinations

b) Deaths with positive *post mortem* examination results for local residents in Belo Horizonte and whose death occurred in the city: n=2,402

Table 3 – Prevalence and associated factors to the positive *post mortem* examination result for alcohol, cannabis and crack-cocaine among homicide victims in the municipality of Belo Horizonte-MG, 2000 to 2009

Variable	Deaths with a positive <i>post mortem</i> examination result ^a	PR ^b	95%CI ^c	p value ^d
	n (%)			
Sex				
Male	2,267 (94.4)	1.87	1.65;2.11	<0.001
Female	135 (5.6)	1	–	–
Age group (in years)				
≤29	1,714 (71.3)	1.39	1.26;1.53	<0.001
≥30	688 (28.7)	1	–	–
Schooling (in years of study)				
≤7	1,736 (72.3)	1.42	1.28;1.57	<0.001
≥8	666 (27.7)	1	–	–
Marital status				
Without a partner	2,149 (89.5)	1.64	1.49;1.81	<0.001
With a partner	253 (10.5)	1	–	–
Ethnicity/skin color				
Black/Brown	1,861 (77.5)	1.66	1.51;1.82	<0.001
Not black	541 (22.5)	1	–	–
Means used in the assault				
Firearms	2,174 (90.5)	1.81	1.63;2.01	<0.001
Other types of guns	228 (9.5)	1	–	–
Place of occurrence of the death				
House	208 (8.7)	0.92	0.84;1.02	0.115
Public streets or highways	1,499 (62.4)	1.82	1.64;2.01	<0.001
Health facilities	695 (28.9)	1	–	–

a) Deaths with positive *post mortem* examination results for local residents in Belo Horizonte and whose death occurred in the city: n=2,402

b) PR: prevalence ratio

c) 95%CI: 95% confidence interval

d) Value of p obtained by Wald's qui-square test

(ii) the indetermination of the time spent between the alcohol/illegal drugs intake, the death, and the collecting of the *post mortem* material. Especially regarding the – relatively – low prevalence of positive *post mortem* examinations for alcohol – EPA – it is known that it may be caused by problems related to variations linked to *post mortem* alcohol metabolizing (such as male sex and smaller bodily surface).

The prevalence, the volume and the amount of alcohol and drugs used vary between both sexes. Although women are traditionally considered to consume smaller amounts regarding volumes and frequency, they are more vulnerable to the harmful effects of these drugs – also regarding domestic violence, use and abuse of alcohol and drugs observed among them.¹⁷ In the population analyzed in this study, 8% of the homicide victims and the 5.6% of victims with positive *post mortem* examinations were women. Policies regarding the decrease of alcohol and drugs consumption could contribute to diminishing these alarming rates of homicides with female victims, which are usually related to domestic violence and drug trafficking.

The EPA percentage detected in this study (21.3%) was inferior to the one observed in other Brazilian municipalities.^{18,19} A meta-analysis study conducted in 2011, with 71,031 toxicological examination results, performed in 78,265 victims of homicides coming from 13 countries, most from the United States of America, found an average of 48% of victims with a positive test for alcohol.²⁰ The percentage found in Belo Horizonte is surprising due to the small scale and slight difference observed in the positive examinations proportions between the three tested substances. Although there are reported variations in the detected substances according to country and region, alcohol has been the most frequently found drug among victims and offenders, with proportions higher than 40%.^{21,22} Alcohol consumption is known to be associated to a bigger possibility of one being a victim or a violence perpetrator; besides that, places where the alcohol consumption is bigger have higher rates of violent behaviors. The disinhibition caused by alcohol consumption favors these behaviors and, somehow, is included among the reasons of assaults, especially in sexist societies and those that have a strong sense of impunity as well. The consumption of alcoholic beverages has been stimulated in Brazil, also to under-eighteens: heavy publicity advertisements, broadcasted in all types of media,² relating drinking

to attributes such as charm, sensuality and power, besides reinforcing concepts and stereotypes related to the masculinity.²⁴ The inclusion of how the alcohol consumption is approached between the victims aimed to widen the most traditional – and, somehow, legalistic – definition of which drugs could be considered legal and which could not.²⁵

It is interesting to note the high percentage of positive *post mortem* examinations for cannabis – EPC – found in this study (17.4%). This is almost three times the amount obtained in a meta-analysis conducted by Kuhns et al.,²⁶ which showed 11% of positive results for cocaine and 6% for cannabis by analyzing 28,868 toxicological examinations from 30,482 homicides victims. The bigger use of cannabis, especially among adolescents up to 19 years old, as a way of being introduced to heavier drugs, may reinforce delinquent behaviors, as pointed out by other Brazilian studies.^{6,18,27}

The result of positive post mortem examinations for crack-cocaine – EPCC – (15.5%) was slightly superior than the one obtained by Kuhns et al. on the aforementioned meta-analysis.²⁶ The violence perception, associated with crack-cocaine refers, many times, to crimes committed for buying the drug and trafficking. Yet, there are reports on a raising of aggressive behaviors associated to acute and chronic uses of these drugs, also observed in researches using animals.²⁸

The world of drugs may represent opportunities for a small part of the Brazilian youth. Living a life of difficulties and social exclusion, its victims, mostly black and poor people, probably attribute a special meaning to the visibility and the recognition from their communities that the drug trafficking can guarantee. Furthermore, unequal opportunities of access to education and to formal work make these youngsters lose interest in studying and working, seeking this immediate recognition, for example in the entrance/cooptation in the drug dealing market.

Public policies especially directed to this vulnerable group, as well as the creation of articulation nets to support and offer new opportunities to these adolescents, have proved to be inefficient as an alternative to this situation, despite its attested efficiency. One of the main goals of these policies, which is to offer more attractive and rewarding opportunities than those found in the trafficking and drug world, has as essential partners, the schools, where these adolescents can be moved away from the alcohol and drugs²⁷ initiation, and also

can have new opportunities for education, as well as a promotion of their self-esteem and life quality.

Power disputes related to trafficking, debts with drug traffickers, reckonings, gang fights and homicides for “witness elimination” exacerbate violent acts. In São Paulo, a particular study draws attention to the intention to kill with the use of firearms aiming to the victim’s head and the execution in public spaces, with no possibility of medical assistance.²⁹ In Belo Horizonte, the blind desire to kill and the bigger will of the offender to execute the victim are evident due to the fact that the homicides are increasingly caused by gunshots from firearms of high calibers in public spaces. A study held in Belo Horizonte’s *IML*³⁰ revealed an annual increase in the average number of gunshots per victim, reaching the average of 4.21 shots in 2001, almost twice the average of gunshots noted in São Paulo for the same year.²⁹

The lack of examinations performed in all victims as well as the lack of codification of the cases in which the examination had a negative result must be recognized as an important limitation to this study, possibly with a reflex in the underestimation of the prevalence. Besides, the fact that these examinations are only performed upon the indication of legal agents leads to the hypothesis of selectivity in this indication, according to the characteristics of the individuals, overestimating the associations identified in the study. A better approach would be to separate cases where an examination was not performed from those where the result was negative – which was not possible from the available data. It must be highlighted that the increasing awareness of coroners front of the relevance of this matter has been raising the percentage of *post mortem* examinations in Belo Horizonte, even in cases where such examination is not mandatory. Therefore, the increase of positive examinations, observed in the previous years, could reflect higher drugs consumption among victims, a bigger amount of examinations held among coroners, or, also, a better register of the data into *SIM*. Some important factors for the comprehension of the role of drugs in personal violence were not approached in this study. Among these factors and the limitations found by this study and related to it, is important to enhance (i) the lack of information regarding the use of the same substances by the offender, (ii) an exclusive approach of fatal victims, (iii) the absence of use of information related to the occurrence and (iv) the lack of information regarding the use of other abuse drugs by the victims (such as opioids).

The access of health professionals to forensic information, which is not always easy or facilitated, needs to be regulated and formalized. However, the daily incorporation of information from necropsies and police reports (*BO*) into the *SIM* system was a decisive factor for the achievement of this study. Once more, the importance of the integration between health care services and public security, as well as of the search and standardized and systematic collection of these data is noticed, which are unquestionably relevant for the Public Health.

Such results show some challenges to be yet overcome. Among them, the further development of the peace culture and health promoting actions, as well as the need to continually invest in a bigger integration among social policies and the overcoming of health inequalities. According to evidences produced by qualified information, public policies are potentially beneficial, if oriented to restrict alcoholic beverages advertisements and the utilization of gender stereotypes, the access to firearms and illegal drugs, and also diminish impunity in solving these crimes.

In the complex Brazilian epidemiological profile, the use/abuse of alcohol and illegal drugs, and the assaults are enhanced as a Public Health issue. Therefore, the role of quality information is undeniable for the growth of the national political discussion regarding drugs, towards a more reasoned and balance debate, where excessively moralist and legalist approaches are avoided. This study, by tracing the epidemiological profile of homicide victims and their association to alcohol and illegal drugs consumption, aims to contribute to a better dimensioning of such complex problems as the ones involving homicidal violence and alcohol and heavy drugs use, while offering subsidies for the elaboration of strategies that prioritize specific actions towards its prevention.

Authors' contributions

EF Drumond participated in the conception of the research, the outlining, analysis, data interpretation, writing, formatting and critical review of the paper.

HNF Souza e TA Hang-Costa participated in the analysis, data interpretation, writing, formatting and critical review of the paper.

All the authors have approved the final version of the manuscript and are responsible for all aspect of the work, assuring its accuracy and integrity.

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