Firearm-related violence in Brazil

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Firearm-related violence in Brazil
Summary report

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Preface

This report provides a summary of the major findings and conclusions of a research effort to create a comprehensive profile of firearm-related violence in Brazil. The research was undertaken and coordinated by the Centre for the Study of Violence at the University of São Paulo, and received technical support from the World Health Organization (WHO), and the Small Arms Survey (SAS).

The WHO has drawn attention to the fact that violence is a major global public health problem through a variety of World Health Assembly resolutions and comprehensive reports such as the *World report on violence and health*. The statement that violence is a public health problem may not, at first view, be easily understandable. In Brazil, as in many other countries around the world, violence is traditionally approached almost exclusively as a public security problem, with major responses focused on police action and judicial mechanisms. However, this view is beginning to change, and there is increasing recognition of the role of the public health sector and perspective in preventing violence. A public health approach to violence promotes analysis of the distribution of violence and it's determinants, and advocates drawing from this analysis coherent preventive strategies which involve a variety of sectors, including the health sector. This does not mean that violence should be viewed only as a health problem, but that it is important to consider the effects of violence on public health and the potential contributions for preventing violence that can be made through the public health sector. In sum, a public health approach to violence advocates understanding violence through the study of its social determinants, knowing its frequency and distribution in population groups, identifying its risk factors, proposing preventive measures and evaluating and monitoring preventive actions.

Thus, far from viewing violence only as a health problem, the public health approach argues that violence must be understood in terms of it's distribution and determinants, and that from understanding these complexities societies can engage in preventive measures. This is neither an easy task, nor is it the task of a single sector. Violence is a social problem with public health, development and security dimensions, and rising to meet this challenge will require the combined and coherent efforts of a broad variety of sectors - both governmental and non-governmental.

While there have been a number of studies addressing violence within Brazil, particularly since the late 1980's, the specific issue of firearm-related violence has not always been addressed. Over and above this, many academic studies have tended to circulate mainly within academic networks, with relatively little impact on policy-making or practitioners of violence prevention. The purpose of this publication is to provide a means for the broad dissemination of the summary results of an extensive research undertaking regarding firearm-related violence in Brazil, and in particular to underline the policy-oriented relevance of this work. We hope to contribute to the public debate, as well as towards the formulation of new proposals for such a serious problem in the country.

Preventing firearm-related violence will require multi-sectoral approaches. The WHO's *World report on violence and health* rightly draws attention to the fact that no single factor is responsible for any form of violence. Firearm-related violence, like all other forms of violence, arises from a complex interaction of determinants that can be situated at the level of the individual, their relationships, the community, and society. Multi-sectoral and integrated preventive measures that include structural measures to reduce inequity are essential. Furthermore, the reduction of impunity, reforms within police, judicial and penitentiary systems are all necessary to reduce perceived insecurity within the Brazilian population, particularly since

perceived insecurity is the fundamental driver of demand for firearms. Ample evidence indicates that ready access to firearms dramatically increases the lethality of violent encounters, thereby augmenting feelings of fear and insecurity. As a result the demand for firearms fuels increasing insecurity, which fuels further demand for firearms and so on and so forth.

The pages of this report demonstrate clearly that firearm-related violence has become an everyday fact of life within Brazilian society, and that this tragedy is experienced most acutely by Brazil's urban youth. Illicit trafficking in drugs and firearms, limited opportunities and perspectives on life for the young population, combined with a social context characterized by unemployment and huge socioeconomic disparities, all contribute to the strikingly high levels of firearm-related violence among Brazil's urban youth.

It is beyond the scope of this work to answer all questions about armed violence in Brazil, and this has not been our intent. Our intent has been - through the presentation of a comprehensive profile of firearm-related violence within the country - to contribute to the recognition of the scale and characteristics of this problem, and to advance the case that a broad grouping of sectors within Brazil need to move forward in developing coherent solutions to the problem of firearm-related violence.

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Acknowledgements

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Boa Vista
RORAIMA

AMAPÁ
Macapá

Manaus

AMAZONAS

PARÁ

Belém

São Luís

MARANHÃO

Fortaleza

Teresina

CEARÁ

RIO GRANDE
DO NORTE

Natal

PIAUÍ

João
Pessoa

PARAÍBA

PERNAMBUCO

Recife

ACRE

Porto
Velho

Rio
Branco

RONDÔNIA

MATO GROSSO

Palmas

TOCANTINS

ALAGOAS

Maceió

SERGIPE

Aracaju

BAHIA

Cuiabá

Salvador

FEDERAL
DISTRICT

GOIÁS

Goiânia

MINAS GERAIS

ESPÍRITO SANTO

MATO GROSSO
DO SUL

Campo Grande

Belo Horizonte

Vitória

SÃO PAULO

RIO DE JANEIRO

PARANÁ

São Paulo

Rio de
Janeiro

Curitiba

SANTA CATARINA

Florianópolis

RIO GRANDE
DO SUL

Porto Alegre

- Northern region
- Northeastern region
- Central-western region
- Southeastern region
- Southern region

Introduction

The purpose of this report is to present the summary results of a research undertaking to comprehensively document firearm-related violence in Brazil. As the most developed source of data that can provide insight into firearm-related violence is the Brazilian Ministry of Health's Mortality Information System, much of the data within the larger study from which this summary is drawn reflects fatal firearm-related violence. It should be noted at the outset that non-fatal outcomes of firearm-related violence represent a largely unknown - and likely very large - dimension of the problem. Given the pre-eminence of the available mortality data one of our primary objectives was to characterize the impact of firearm-related deaths on Brazilian mortality. Advantage was taken of the fact that the Mortality Information System provides historical data as well to conduct a time-series analysis, which has allowed us to distinguish developments in the impact and distribution of Brazilian firearm-related mortality from 1991 to 2000.

The text is divided into three chapters. In the first, the principal results and conclusions of an extensive review of the literature are presented. In the second, the major results of the firearm-related mortality analysis are presented along with a discussion on relevant data limitations. Initially, this analysis looks at the data in a consolidated manner, in order to reveal the magnitude of the problem in the country in the 1990's, as well as the distribution of firearm-related mortality within the five major Brazilian regions. After this consolidated view, the results of the time-series analysis for the country, its five major regions, states and capitals are presented. Trends of firearm-related death are identified through the analysis of mortality rates. Major considerations related to the quality of the information regarding firearm-related deaths in the process of completing death certificates, and their influence relative to the time-series analysis, are discussed. In the third chapter the main results and recommendations are summarized and presented.

Chapter 1

Violence in Brazil: a review of the literature

Studies in Brazil that have documented the growth of violence over recent decades are numerous, and tend to have focused on homicide deaths. Paradoxically, social scientists point out that the growth of violence coincides with the transition to democracy and the country's political opening in the mid 1980's[1,9,37,45] when violence and criminal activities reached new levels. Deaths from all external causes grew substantially and as a group had become the second leading cause of death within the Brazilian population by 1989[53]. One of the key components of this growth was homicide, and since 1994 homicide ranks first among all forms of externally caused death in Brazil, exceeding deaths from road traffic injuries[34]. Although deaths by homicide have grown throughout the country, this growth did not occur uniformly throughout the Brazilian population, but instead has been strongly concentrated in certain groups and geographical areas.

Homicide and gender

Review of existing literature reveals that the vast majority of homicides within Brazil have been shown to occur in males (see Figure 1). During the 1980's, a man's risk of being murdered was 11 times higher than that of a woman. While rates of homicide increased during the 1980's for men in particular, there has also been an increase over this period in homicide among women[53].

Figure 1: Homicide deaths by sex, Brazil, 1980-1988

Female
9%

Male
91%
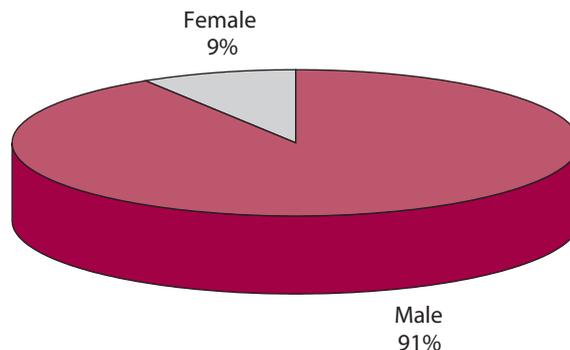
Source: Souza, ER., Homicídios no Brasil. CSP 10(1s), 1994.

Homicides and the young population

Continued growth in homicides during the 1990's meant by 1997 homicides ranked first as a cause of early death in the country, and by consequence had become Brazil's principal cause of potential years of life lost[2]. This increase in the number of deaths by homicide during the 90's was higher in the 15 to 24 age group, when compared to the growth in the total population[55] (see Figure 2). In some states such as São Paulo, Rio de Janeiro, Espírito Santo, and Pernambuco, homicides

were responsible for more than half of the deaths from external causes in the young population. The homicide mortality rate in the 15 to 24 age group in Rio de Janeiro and Pernambuco exceeded 100/100,000 inhabitants in the year 2000, one of the highest found in the country.

Figure 2: Homicide rates (/100.000). Total population and 15-24 year olds. Brazil, 1991-2000
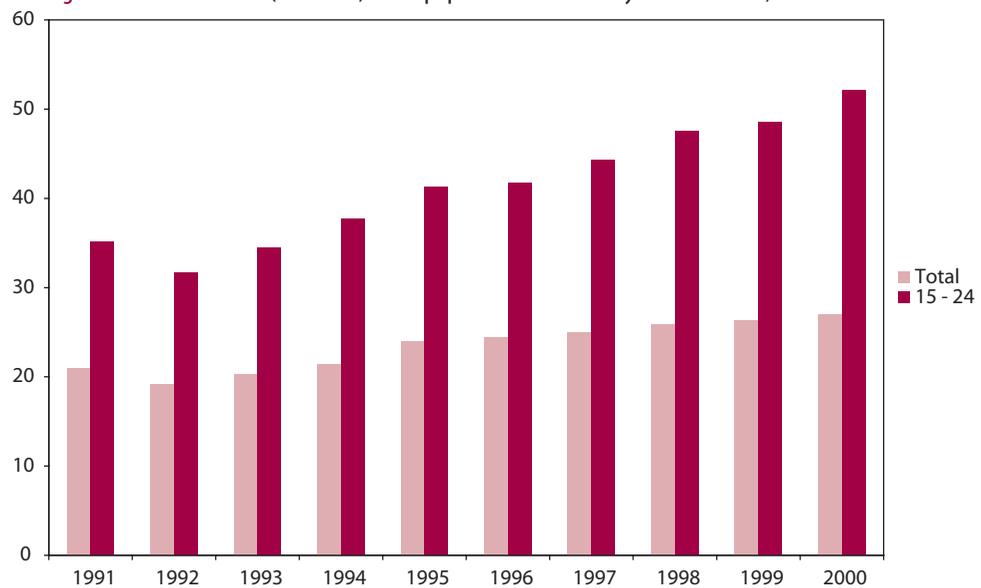
Homicides within urban areas

Differences in the spatial distribution of homicides within cities have also been described in several studies. The findings are consistent in the sense that they document higher mortality rates in urban areas with poor socioeconomic indicators in the municipalities of São Paulo[4,6,11,12], Salvador[32,42], Recife[30], Belo Horizonte[8], and Porto Alegre[51]. While this may appear to suggest a connection between socioeconomic conditions and homicide mortality, a more comprehensive examination is necessary for understanding the association between socioeconomic deprivation and homicide. It is important to consider a broader set of characteristics that typify the so-called areas of exclusion, where homicide mortality rates reach alarming proportions. In such areas, the concentration of disadvantages reflects a fundamental lack of investment in public policies which, in addition to precluding easy access to goods and services, contributes towards a low efficiency and social legitimacy and, consequently, to the fragmentation of social cohesion, the combined effect of all of which fuels a great variety of conflicts[3,11].

The role of firearms

In spite of the growth of violence over the past decades, few studies have focused on firearm-related violence specifically and whether and to what extent ready access to firearms may have contributed to this process. Underreporting of official data, and the non-existence of a reliable and available database for research, are partially accountable for this deficit. Little is known for instance, about the number and types of firearms in circulation, their use in criminal activities, and related morbidity and mortality.

Table 1 provides number of seized weapons in the states of Brazil in 1999, 2000, and 2001

according to the data supplied by the Ministry of Justice's National Department of Public Security (SENASP/MJ). Examining these data reveals that there are large gaps in the notification process of seized firearms in the different states. Additionally, instability in state reporting from one year to the other may reflect either genuine differences in seized weapons, changes in how these have been classified, or underreporting, making the utility of these data for research and planning purposes limited at present. Nevertheless, it is encouraging to note that in 2001 the majority of the states presented data regarding seized firearms, which may be a direct result of the Ministry of Justice's efforts vis-à-vis the State Public Security Departments to improve the relevant criminal justice databases. However, as of this writing, there are no established and standardized procedures for the collection, processing, analysis, and remittance of data to a central public administration level, as well as to enable access of these data to the population.

Table 1: Number and rates (/100.000 inhabitants) of firearms seized by the police, Brazilian states, 1999-2001

	1999		2000		2001	
	n	Rate[1] (/100.000)	n	Rate[1] (/100.000)	n	Rate[1] (/100.000)
Acre	-	-	265	47,5	209	36,4
Alagoas	-	-	538	19,1	-	-
Amapá	159	36,2	80	16,8	310	62,2
Amazonas	-	-	-	-	153	5,3
Bahia	-	-	-	-	4898	37,1
Ceará	4079	57,4	3402	45,9	17463	231,4
Distrito Federal	889	45,1	815	39,9	2892	137,9
Espírito Santo	502	17,1	1024	33,1	-	-
Goiás	-	-	-	-	519	10,1
Maranhão	84	1,6	-	-	200	3,5
Mato Grosso	-	-	-	-	541	21,1
Mato Grosso do Sul	-	-	-	-	1715	81,2
Minas Gerais	6588	38,1	6985	39,2	797	4,4
Pará	-	-	-	-	-	-
Paraíba	-	-	-	-	1231	35,5
Paraná	-	-	2718	28,4	1082	11,2
Pernambuco	4102	54,1	4102	51,9	3617	45,2
Piauí	-	-	-	-	217	7,6
Rio de Janeiro	-	-	-	-	7753	53,3
Rio Grande do Norte	-	-	-	-	788	28,0
Rio Grande do Sul	-	-	-	-	-	-
Rondônia	-	-	-	-	-	-
Roraima	30	11,2	6	1,9	17	5,0
Santa Catarina	-	-	-	-	663	12,2
São Paulo	-	-	40226	108,8	-	-
Sergipe	-	-	-	-	79	4,3
Tocantins	-	-	-	-	435	36,7

I. Firearm-related mortality and morbidity

Review of the Ministry of Health's Mortality Information System (SIM) data indicate that, starting in the 1980's, the majority of homicides in Brazil were committed with firearms, and this characteristic applied particularly to homicides that occurred in state capitals[53]. Furthermore, the increase in homicide rates between 1980 and 1996 was mainly due to the growth in firearm-related homicides[37]. In 1999, 27% of all deaths from external causes that occurred in Brazil were firearm-related. If one narrows concern to the Brazilian 15 to 19 year-old population, 42% of the deaths from external causes were the result of a firearm injury. If one considers only 15 to 19 year olds in Rio de Janeiro, fully 72% of all deaths from external causes were firearm-related[20].

An insight into some of the non-fatal consequences of firearm-related violence is provided by a study conducted at the Sarah Kubitscheck Hospital Chain in Brasília and in Salvador[16]. It is important to emphasize that the results of this study cannot be generalized to the entire Brazilian population and that they can not be considered as representative of all non-fatal firearm injuries, since they reflect the more serious cases requiring hospitalization. Nevertheless, within the study setting considered, firearm injuries overall were the third most common cause for hospitalization (see Figure 3). Firearm-related injury hospitalizations ranked second among hospitalizations for external cause injury in Salvador and third in Brasília. The vast majority of victims were males between the ages of 15 and 39. In the particular setting studied the degree of residual disability among these survivors was very high, with 90% sustaining an injury involving the central nervous system and 80% of these resulting in paraplegia.

Figure 3: Hospital admission due to external causes, Sarah Kubitcheck Hospital, Salvador and Federal District, Brazil, 1999
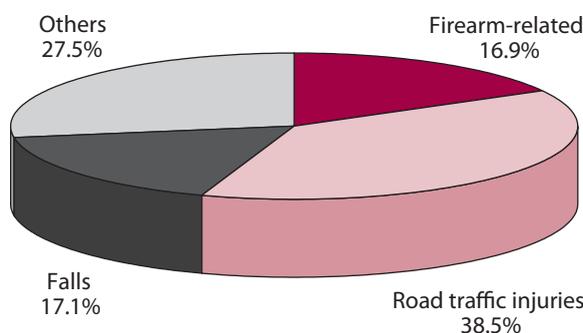
Source: CEPES/Sarah, 2000.

Some additional data available from the contexts of these non-fatal shootings provides deeper insight into the occurrence of events that led to the injuries. The vast majority of cases were the result of an intentional shooting, a significant proportion of this violence being motivated by non-criminal conflicts (interpersonal disputes). In addition, in more than one third of cases the aggressors were known to the victims (friend, neighbour or relative). These data are consistent with, and support, an evolving awareness within Brazil that patterns of violence have changed in the country. Interpersonal disputes such as quarrels among neighbours, between families and in traffic disputes, all of which would most often be banal, increasingly culminate in grave injuries and death when the dispute escalates to involve a shooting, facilitated by the presence of a firearm.

II. Victimization studies

Victimization studies collect data of self-reported experience of a variety of forms of victimization, typically being victim of a criminal act which may or may not have involved use of a weapon such as a firearm. The majority of the victimization studies conducted in Brazil have been limited to either Rio de Janeiro and São Paulo. Two of them were conducted in more than one capital for the purpose of estimating the victimization rates and evaluating the awareness of the population in relation to two government programs implemented in the country: the National Human Rights Program[13] and the Plan for Integration and Follow-up of Urban Violence Prevention Social Programs (PIAPS)[25]. A number of findings from these latter two studies provide further contextual information relating to firearm-related violence within Brazil.

In a study conducted in four Brazilian capitals[25], half of those interviewed were victims of some crime in the previous five years, and more than one third reported having been a victim in the year prior to the research. Higher victimization rates were found in Recife followed by São Paulo, Vitória, and Rio de Janeiro. The use of a weapon was reported in approximately two thirds of robberies, with this proportion declining in cases of physical assaults to just under a half, and declining still further to 8% among those reporting sexual assaults (see Table 2). Higher proportions of firearm use in crimes against individuals were found in Recife and Rio de Janeiro.

Table 2: Use of weapon by type of crime (%) in four Brazilian state capitals, 2000

	Total	São Paulo	Rio de Janeiro	Recife	Vitória
Robbery	68	70	66	63	50
Physical aggression	44	42	46	51	33
Sexual aggression	8	5	12	14	9

Source: Kahn, Tulio et al. Pesquisa de Vitimização 2002 e avaliação do PIAPS, Ilanud/FIA-USP/GSI, 2002.

The results provide ample evidence of the concern for avoiding victimization resulting in fundamental changes in how the urban Brazilian population approaches their daily life. More than half of those interviewed reported having changed their habits, avoiding places or people due to fear, and approximately one third reported feeling extremely unsafe in their own neighbourhoods. More than half considered that lack of public security was Brazil's principal problem, and 80% felt that criminality was worse during the period of the survey than it had been five years previously[25].

Feelings of fear and insecurity, as well as high victimization rates, were also readily apparent in a study conducted in ten Brazilian state capitals[13]. Table 3 provides some results from this study related to exposure to homicides, firearm carriage, and firearm-related violence. In the 12 month period prior to the study, fully 1 in 5 people reported having seen someone being threatened with a firearm, and 1 in 7 reported having seen someone being shot. Six percent of respondents indicated they felt it a necessity to carry a firearm.

Table 3: Victimization rates in the neighborhood in the last 12 months, Brazil, 1999

	%
Was threatened by someone bearing a firearm to steal something	6
Felt the necessity to carry a firearm	6
Was injured by a firearm	1
Had a family member injured by a firearm or a knife	5
Had a family member murdered	4
Witnessed someone being threatened with a firearm	21
Witnessed someone being shot	14
Witnessed someone being murdered	11

Source: Cardia, N. Atitudes, normas culturais e valores em relação à violência. NEV/USP, 1999 (adapted).

Considering the responses of young people to this survey is quite revealing. Among those less than 20 years old, 36% knew someone who carried a weapon. A further 29% knew someone who had been shot with a firearm, and 21% knew someone who had been murdered (see Table 4)[13].

Table 4: Percentage of young individuals (less than 20 years old) who know victims or aggressors, by sex groups, Brazil, 1999

Know someone who	Males (%)	Females (%)	Total (%)
Carries a weapon	41	32	36
Has already killed someone	13	15	14
Was shot with a firearm	30	28	29
Had his/her life threatened	37	21	29
Was murdered	23	20	21

Source: Cardia, N. Atitudes, normas culturais e valores em relação à violência. NEV/USP, 1999 (adapted).

High victimization rates, awareness that violence is increasing, and a general dissatisfaction with police action, contributed to the reported feelings of fear and perceptions of insecurity[13,25]. In this context, the main rationale provided for possessing firearms were self-protection and in order to "feel strong"[13]. It is important to stress, however, that only a minority of the population felt that having or bearing a firearm increased safety[13]. When questioned about what could be done to reduce crime in Brazil, preventive and social measures were cited alongside repressive and police measures[25]. In addition, more than 80% of those interviewed considered that the control of bearing and possessing firearms would be an important contribution towards reducing crimes in the country[25].

Chapter 2

Firearm-related mortality in Brazil

This chapter presents the results of an analysis of mortality data extracted from the Ministry of Health's Mortality Information System (SIM). Data subjected to analysis covered the years between 1991 and 2000. For the calculation of population based mortality rates, population data from the Brazilian Institute of Geography and Statistics (IBGE) were used for the years of 1991, 1996 and 2000, and population estimates for the years between censuses were drawn from the Ministry of Health's website (http://www.datasus.gov.br). The mortality rates for the entire population were standardized by age, using the 1998 revision of the United Nations population division as the standard population. The results shall be presented in two parts: a consolidated view of firearm-related mortality in the 1990's, where aggregated data for the entire period shall be discussed; followed by a temporal analysis which will highlight important trends during this period within regions, states, and state capitals.

Firearm mortality in the 1990's

According to the Mortality Information System data for the period 1991 to 2000, a total of 1,108,422 deaths from external causes occurred in Brazil. Figure 4 demonstrates the relative contributions of firearm-related and road traffic causes to this mortality burden, with these two conditions together accounting for half of all externally caused deaths for the country. Figure 4 also reveals an important gender difference, with firearm-related deaths representing the leading cause of external cause death in males. Figure 5 disaggregates the data for Brazil's five regions, highlighting regional differences and revealing that firearm-related causes were the leading cause of external cause mortality for the Northeastern and Southeastern regions.

Figure 4: Proportion of external cause deaths attributable to firearm-related, road traffic injuries, and non-firearm deaths (%) by sex groups and total population, Brazil, 1991-2000
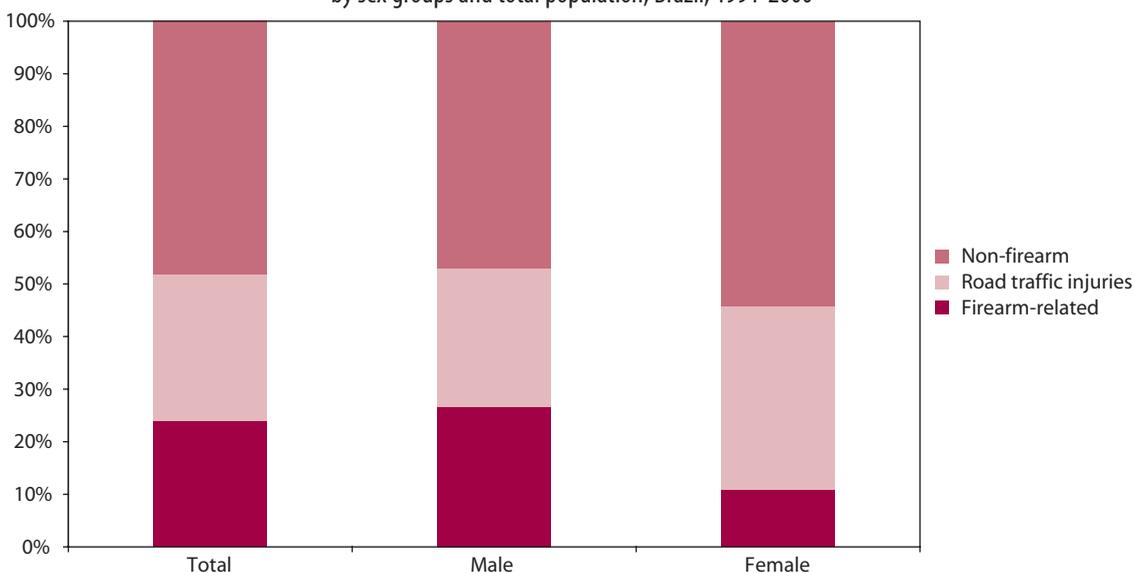
Source: Mortality Information System (SIM)/Ministry of Health, Brazil.

Figure 5: Proportion of external cause deaths attributable to firearm-related, road traffic injuries, and non-firearm deaths (%), Brazil and major regions, 1991-2000
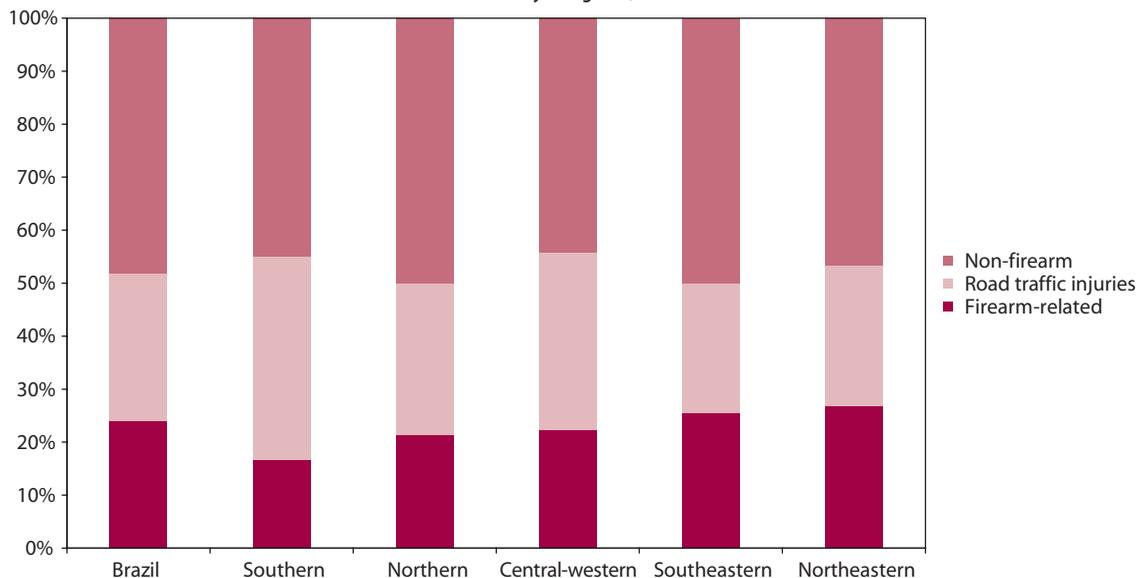
Figure 6 shows that, for Brazil as a whole and for four of its major regions, more than 80% of firearm-related deaths over the period were classified as homicides. Inspecting data for regions reveals between 10 and 13 percent of firearm-related deaths in the Southern and Southeastern regions were deaths where it had not been possible to determine intentionality. Likely this implies an even higher underlying homicide rate, as a large part of the deaths of undetermined intention are non-classified homicides[a]. Further inspection of data provided in Figure 6 suggests possible misclassification of some of these firearm-related deaths. The high proportion of unintentional firearm death in the Northeastern region is particularly striking. In Brazil, a total of 5,450 deaths were classified as unintentional during the 1990's, 42% of which (n = 2,314) occurred in Bahia, a state of Northeastern region. Another aspect that merits consideration is the low number of deaths classified as resulting from legal intervention. Such deaths officially numbered only 359 during the time period 1991 to 2000, of which 249 (69.4%) were firearm-related.

Figure 7 provides data suggesting an important contribution of firearm-related injuries to total homicide deaths. From a total of 369,068 deaths classified as homicides for the 10 year period studied, 218,679 (59.3%) were committed with firearms. The real number is almost certainly even higher, considering the sources of misclassification referred to above. Among those deaths where intentionality remained undetermined, 25% were firearm-related.

To summarize the results discussed to this point, during the period 1991 to 2000 firearm-related deaths were responsible for almost the same amount of deaths as traffic accidents, ranking first in the male population. Most of the firearm-related deaths were classified as homicides in all five major Brazilian regions. The following section will disaggregate this consolidated overview and examine trends in firearm-related death within Brazil, it's regions, states, and state capitals over the period 1991 to 2000.

a. *This issue is broadly discussed in the literature. For this, see Souza (1994) and Mello-Jorge (1997).*

Figure 6: Firearm-related deaths by classification of cause (%), Brazil and major regions, 1991-2000
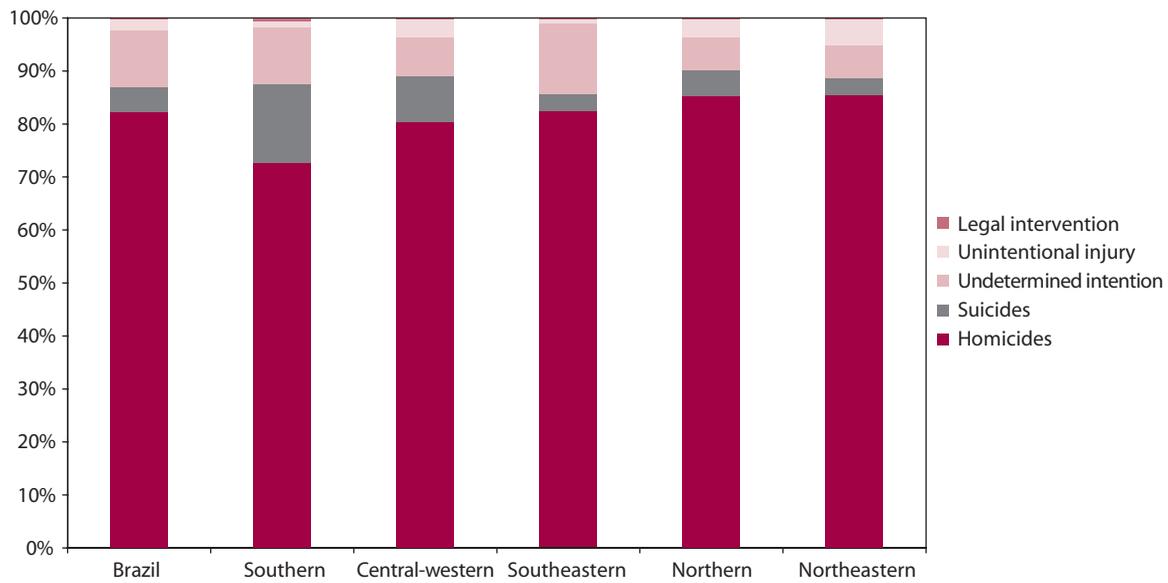
Source: Mortality Information System (SIM)/Ministry of Health, Brazil.

Figure 7: Classification of external cause deaths by proportion of firearm-related deaths (%), Brazil, 1991-2000
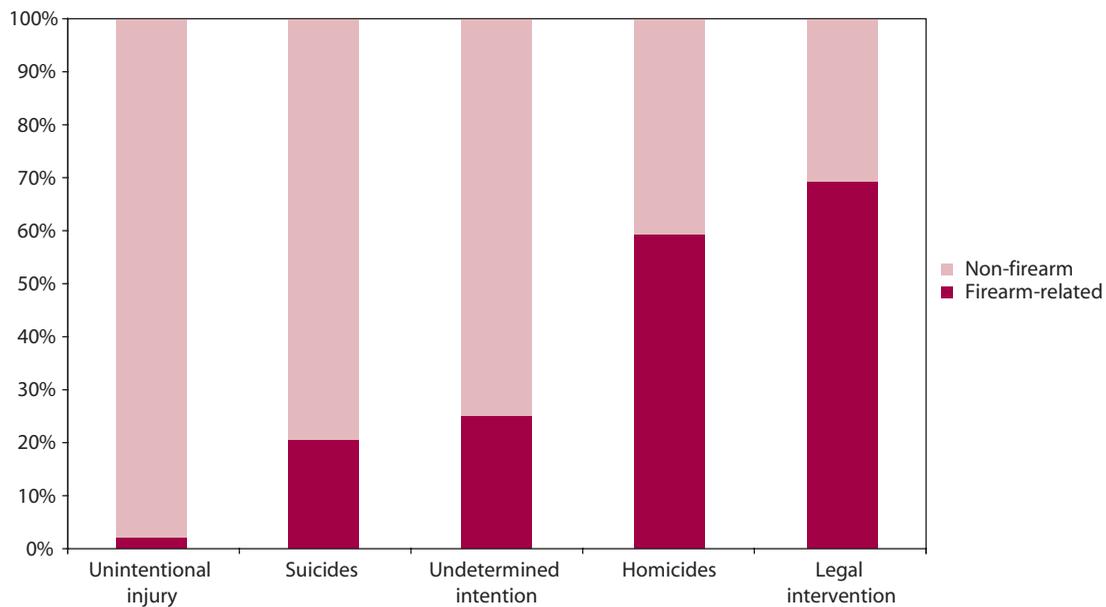
Source: Mortality Information System (SIM)/Ministry of Health, Brazil.

Evolution of firearm-related deaths in Brazil: 1991 to 2000

The proportion of externally caused death attributable to firearm-related causes grew throughout the 1990's in Brazil. Figure 8 reveals this increase and shows firearm-related deaths surpassing road traffic injury as the principal cause of external cause mortality in 1999. By the year 2000 firearm-related deaths accounted for 30% of all external cause mortality within Brazil.

Figure 8: External cause death by manner and year (%), Brazil, 1991-2000
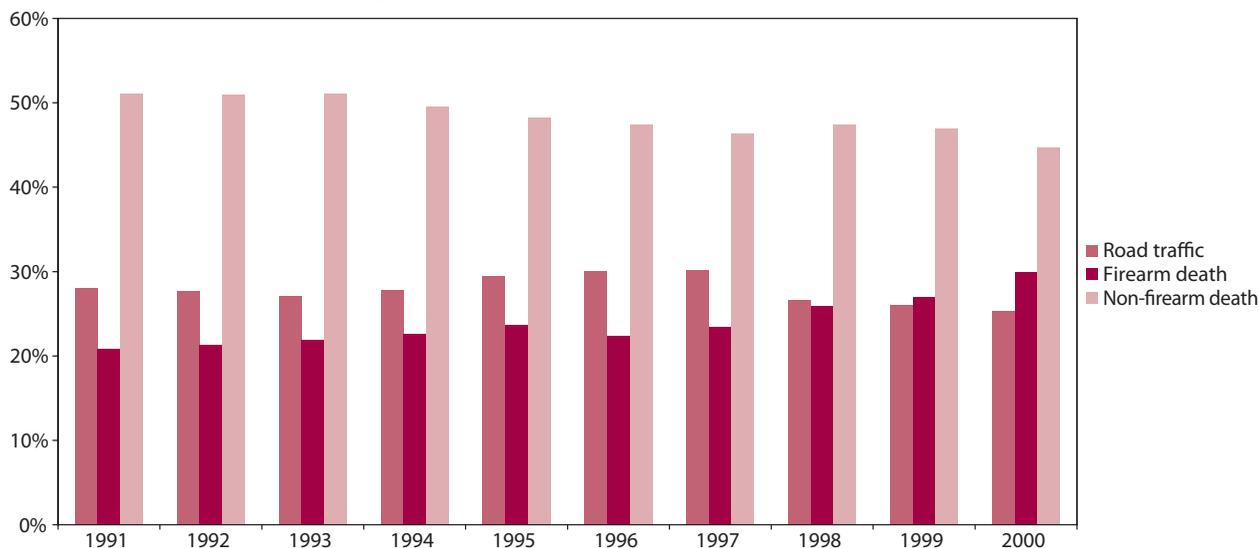
Source: Mortality Information System (SIM)/Ministry of Health, Brazil.

Figure 9 disaggregates the annual proportion of external cause mortality attributable to firearm-related causes by gender. Increases were observed across the time period in both sexes - firearm-related deaths accounted for 9.3% of external cause mortality in females at the start of the period and 13.3% in 2000, whereas amongst males, they were responsible for 23.3% of external cause mortality in 1991 and 33% in 2000.

Figure 10 provides the annual proportion of firearm-related external cause mortality by age group for the years 1991, 1996, and 2000. Two aspects deserve further comment. The first is the strikingly high proportion of firearm-related external cause mortality in the 15-19 and 20-29 year old age groups. In either of these age groups firearm-related causes accounted for over 40% of all external cause mortality by the year 2000. The second aspect is that, despite the relatively smaller contribution made by firearm-related external cause mortality for the 5 –9 and 10 – 14 year old age groups, the greatest percentage increases in the proportion of firearm-related deaths occurred in these groups.

Figure 11 presents external cause mortality rates for the years 1991-2000. A slight reduction in external cause mortality is apparent following 1996. While this reduction is also apparent with fatalities related to road traffic crashes, the component of external cause mortality that is firearm-related shows a constant increase of just over 38% across the time period.

Figure 9: Proportion of external cause deaths that were firearm-related by year and sex (%), Brazil, 1991-2000
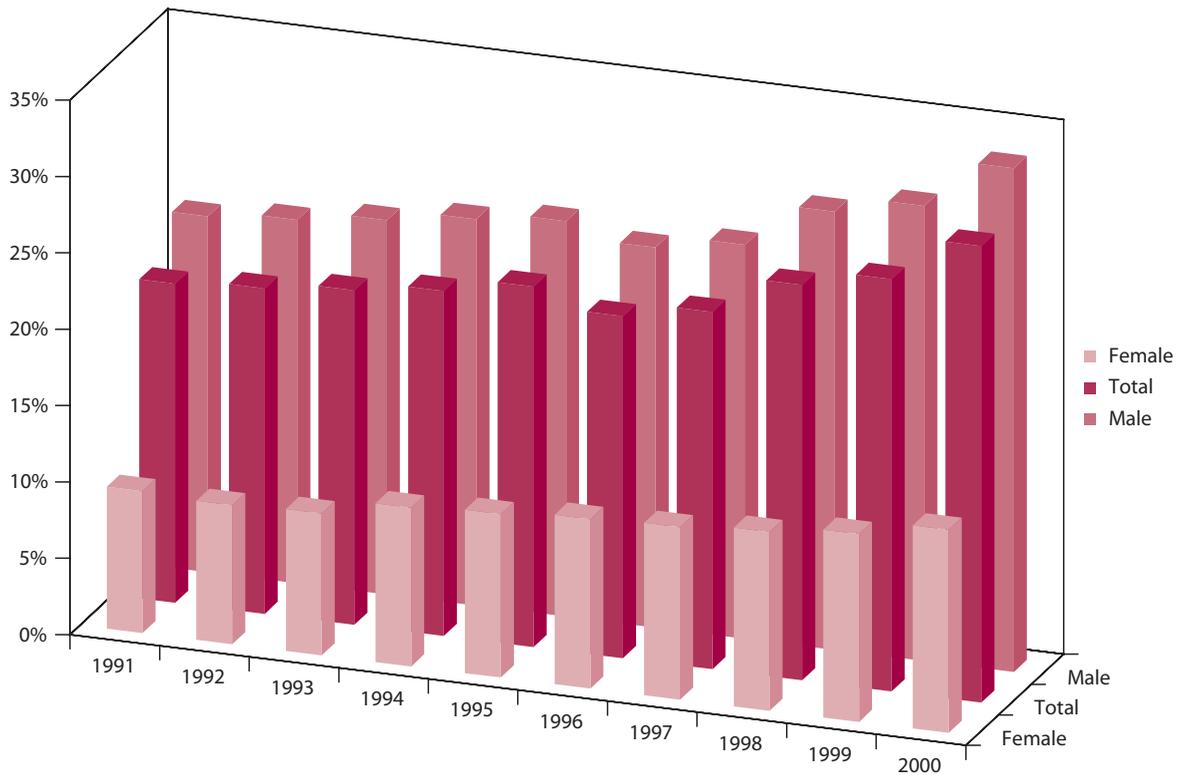
Figure 10: Proportion of external cause deaths that were firearm-related by age groups (%), Brazil, 1991, 1996, 2000[*]
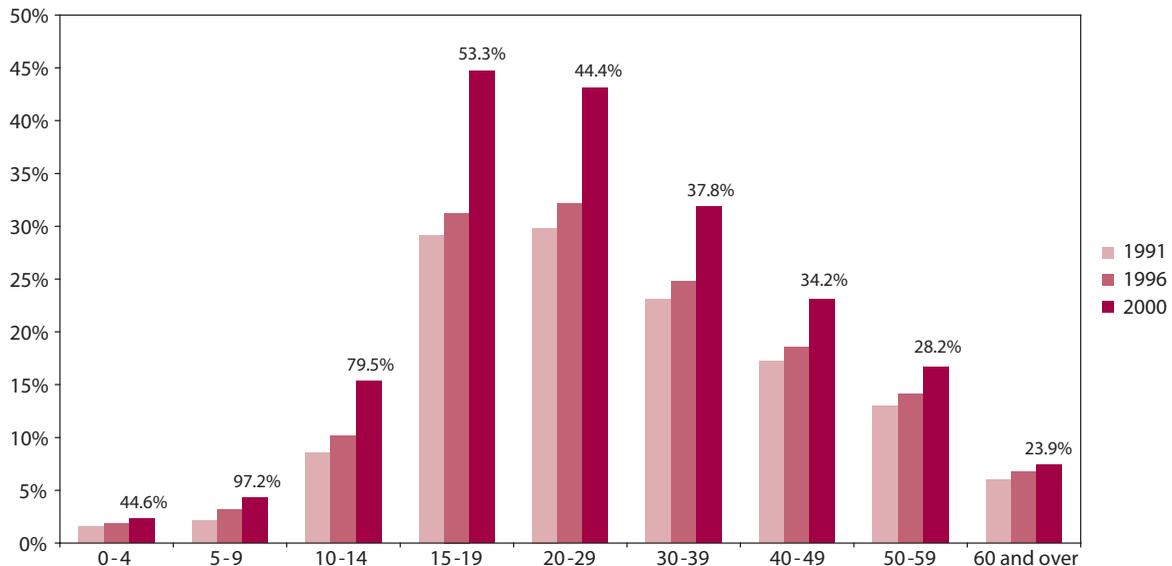
* Percentages above data for each age group provide percentage increase for the age group observed between 1991 and 2000.

Any time-series analysis is subject to influences from changes in the quality of the information over the time period studied. In the case of the Brazilian data presented here it is important to consider the proportion of homicides from unspecified means. Homicides are of particular importance for this report as they represent about 80% of the firearm-related deaths. Generally, an increase in the proportion of homicide cases from unspecified means indicates a decrease in the quality of the information on homicides, and may partially account for eventual drops in firearm-related mortality rates. Conversely a drop in the proportion of cases of homicides from unspecified means indicates that there was an improvement in quality of the information, which may account, fully or partially, for eventual changes in firearm-related mortality rates. At the end of this report, issues related to the quality of data within Brazil shall be discussed in greater detail.

Figure 11: Standardized external cause mortality rate (/100,000) and incremental change (%), Brazil, 1991-2000

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
External Causes	73.4	68.9	72.6	73.9	78.0	77.4	76.6	74.2	73.0	69.4
Road traffic injuries	21.3	19.7	20.3	21.2	23.5	23.9	23.8	20.5	19.7	18.2
Firearm-related	14.0	13.3	14.4	15.2	16.6	16.1	16.7	17.8	18.2	19.4
Others	38.1	36.4	36.9	37.5	37.9	37.3	35.8	35.9	35.0	31.8
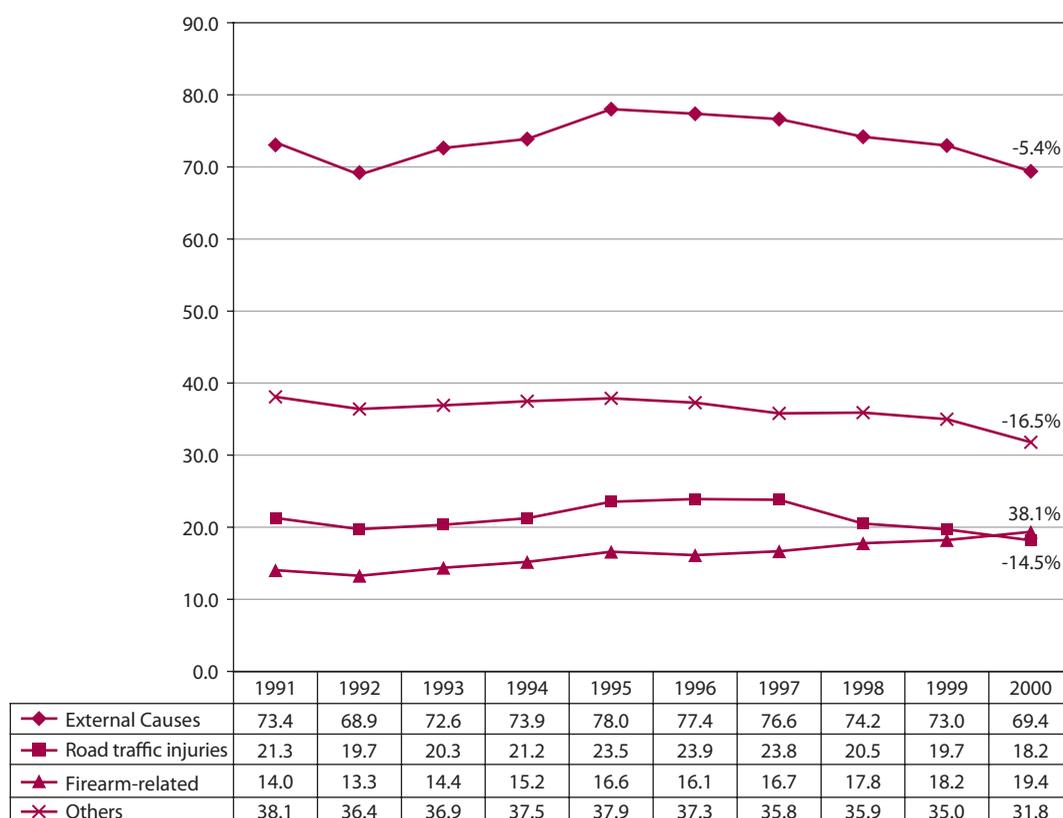
Source: Mortality Information System (SIM)/Ministry of Health, Brazil.

In Figure 12 the steady increase in firearm-related mortality noted in Figure 11 is presented for both males and females. Once again, the strikingly higher rates of firearm-related mortality among men as compared to women must be noted. Furthermore, one can observe that the 38% increase that was noted from Figure 11 is made up mostly by a rise in the rate of firearm-related mortality among men.

Firearm-related mortality in Brazil

Figure 12: Firearm-related mortality rate (/100,000) and incremental change (%) by sex, Brazil, 1991-2000

44.9%

38.1%

28.4%

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Total	14.0	13.3	14.4	15.2	16.6	16.1	16.7	17.8	18.2	19.4
Male	26.9	26.5	27.7	29.1	31.7	31.2	32.5	35.1	35.8	39.0
Female	2.2	2.0	2.2	2.5	2.7	2.9	2.7	2.7	2.7	2.8
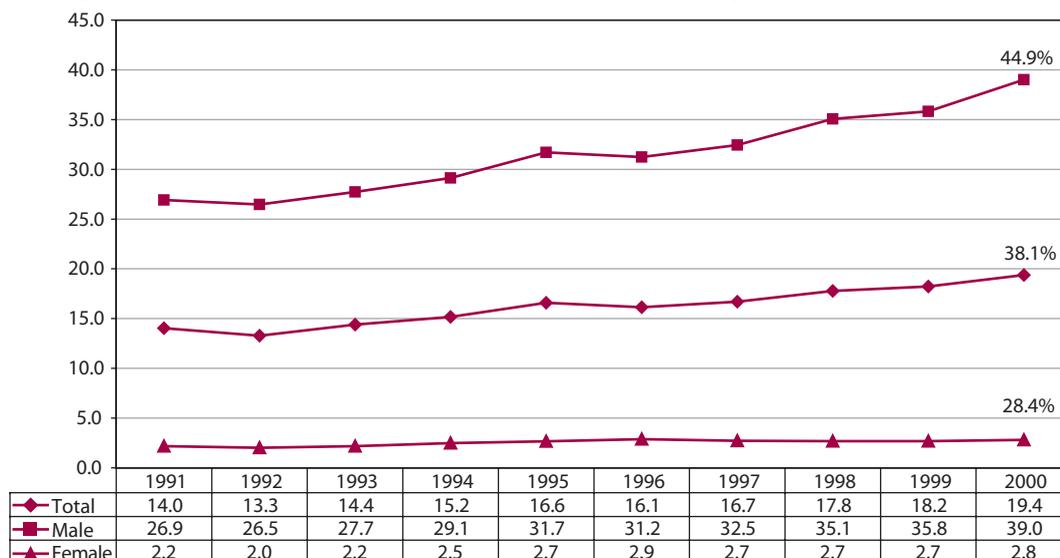
Source: Mortality Information System (SIM)/Ministry of Health, Brazil.

It was already noted in Figure 10 that in the 15 to 19, and 20 to 29 age groups, firearm-related injuries are responsible for more than 40% of all deaths from external causes. In Figure 13 the time trend in mortality rates among these groups is presented. Rates increased 49% over this period for the 20-29 year old age group, and by over 66% for the 15-19 year old age group.

Figure 13: Firearm-related mortality rate (100,000) and incremental change (%) by age, Brazil, 1991-2000

49.2%

66.1%

38.1%

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Total	14.0	13.3	14.4	15.2	16.6	16.1	16.7	17.8	18.2	19.4
15-19	20.2	18.3	21.2	23.0	25.3	23.3	25.6	28.7	29.8	33.5
20-29	31.9	30.5	31.1	34.3	36.7	36.9	38.8	42.0	43.3	47.6
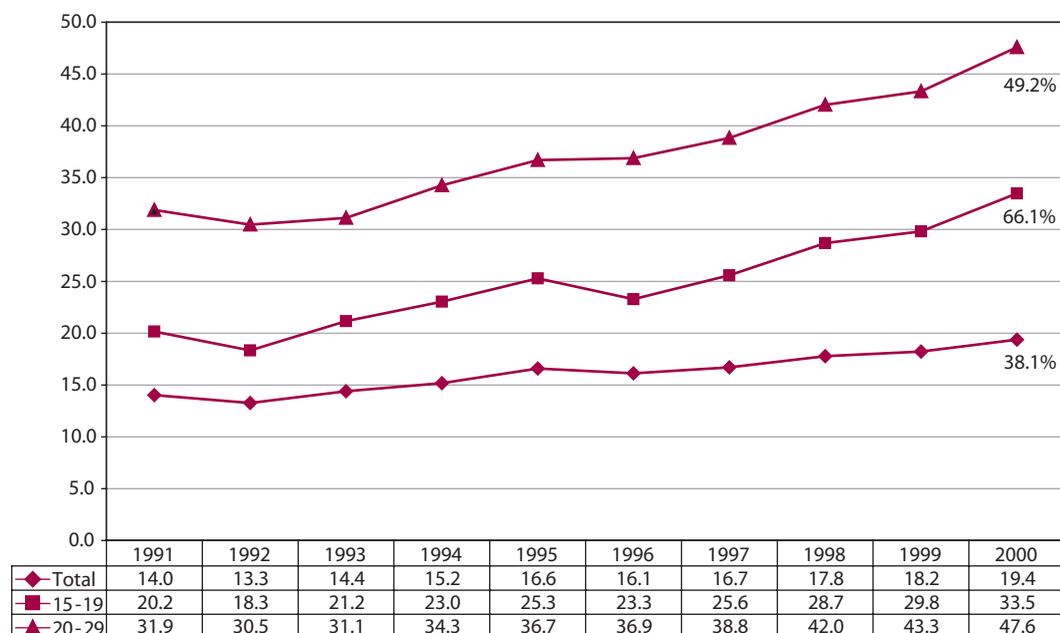
Source: Mortality Information System (SIM)/Ministry of Health, Brazil.

The differences found in the mortality rates among men and women, and among age groups, mean that men and young adults have a higher risk of dying from firearm injuries in Brazil. A measure of this risk would be the relative risk, a measure that establishes a comparison between the mortality rates in the different groups. In our case, a meaningful comparison is to contrast the relative risks that are apparent by considering gender and age groups. Table 5 shows relative risk of death by firearm injuries among men compared with the women in the total population and by age groups.

Thus, when considering Brazil's total population, Table 5 shows that in the year 2000 men had a 14 times higher risk than women to die from a firearm-related injury. Furthermore, this relative risk increased over the time period 1991 to 2000. In fact, for every age group and at every time point considered in the table, males were at a higher risk than females to die from a firearm-related injury. Beginning from age 10 onwards this relative risk begins to increase dramatically, and then again begins to decline after the 20-29 year old age group. The peak relative risk was observed for 20 to 29 year-old men in the year 2000, who were 19.5 times as likely as similarly aged women to die of firearm-related injury.

Table 5: Male relative risk of firearm-related death by age group and incremental change (%), Brazil, 1991-2000

	91	96	2000	increase (%)
Total population	12.35	10.85	13.93	12.82
0 to 4	1.94	1.82	2.37	22.10
5 to 9	2.43	1.71	2.04	-15.94
10 to 14	3.08	3.05	3.12	1.28
15 to 19	10.50	10.08	12.33	17.42
20 to 29	14.94	13.22	19.53	30.70
30 to 39	14.75	11.73	13.09	-11.29
40 to 49	9.64	9.17	11.23	16.58
50 to 59	13.25	10.61	13.09	-1.20
60 and over	10.62	11.98	12.11	13.95

Source: Mortality Information System (SIM), Ministry of Health, Brazil

Table 6 presents the age related relative risk of dying from firearm injuries, for the entire population and by sex groups. The population aged 15 to 39 have considerably higher risks of dying than the reference group, which in this case is the population aged 10-14. This age related risk is much higher among the male population than females - while a young adult male, between the age of 20 to 29, has a 23 times higher risk of dying from firearm injuries than a boy aged between 10 to 14, a female in the same age group runs a 3.6 times higher risk than a girl aged 10 to 14. Thus, passing into adolescence implies a substantial increase in the risk of dying from firearm-related injuries in Brazil, for both males and females. However, it's in the male population that this risk takes on dramatic dimensions.

Table 6: Age related relative risk of firearm-related death by sex groups and among total population, Brazil, 1991, 1996, 2000

| | 1991 | | | 1996 | | | 2000 | | |
	Total	Male	Female	Total	Male	Female	Total	Male	Female
10 to 14	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
15 to 19	12.6	15.4	4.5	10.6	12.8	3.9	12.6	15.4	3.9
20 to 29	20.0	25.3	5.2	16.7	21.0	4.8	17.9	22.8	3.6
30 to 39	14.1	17.9	3.7	11.7	14.7	3.8	11.0	13.8	3.3
40 to 49	9.4	11.5	3.7	7.8	9.5	3.2	6.9	8.7	2.4
50 to 59	6.6	8.4	2.0	5.3	6.6	1.9	4.4	5.6	1.3
60 and over	3.8	5.0	1.4	3.1	4.1	1.0	2.4	3.3	0.8

Source: Mortality Information System (SIM), Ministry of Health, Brazil.

Firearm-related mortality in the states and in Brazilian capitals

Figure 14 shows the evolution of firearm-related mortality rates in the large Brazilian regions. The Southeastern and Central-western regions stand out as the regions with the highest increases over the time period. Firearm-related mortality shows an increase throughout all regions, with the exception of the Northern region, where a drop of 17.9% was observed over the period.

Interpretation limits

Throughout the regions and in the country, the proportion of homicides from unspecified means fell. This indicates a global improvement in the quality of information regarding firearm-related means in death certificate data during the 1990's. It is therefore possible that part of the growth observed in the country and it's regions reflects an improvement in the quality of the information (Table 7).

Figure 14: Standardized firearm-related mortality rate (100,000) and incremental change (%),
Brazil and major regions, 1991 and 2000
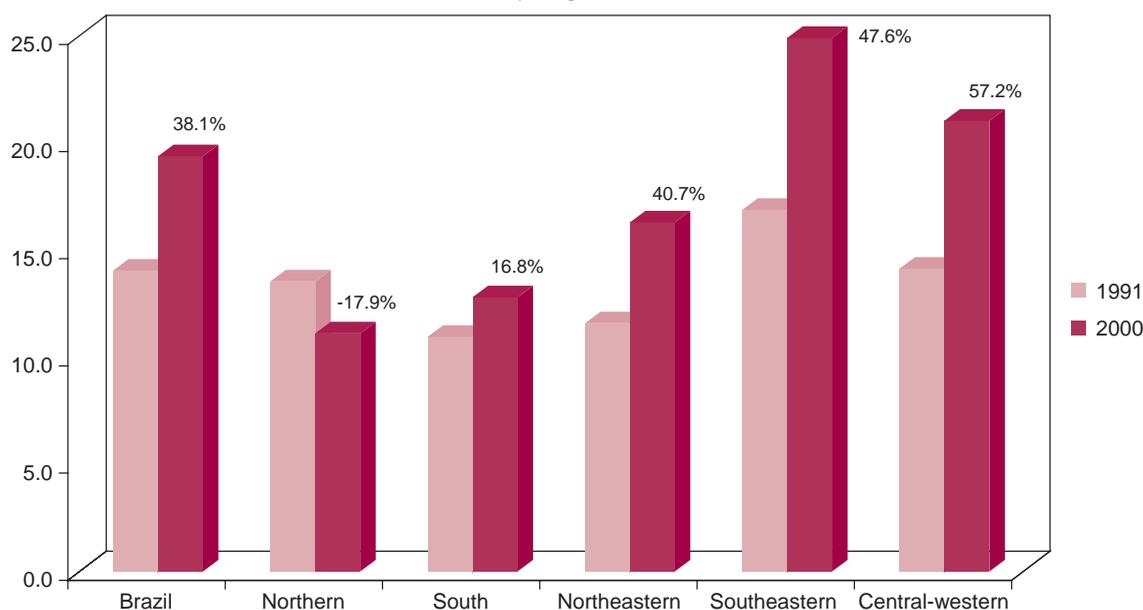
Source: Mortality Information System (SIM)/Ministry of Health, Brazil.

Northern region

The Northern region is something of an exception for Brazil in the sense that during the 1990's firearm-related mortality dropped almost 18% (Figure 14). However, looking at the data by states and capitals shows that this trend was not uniform throughout the region. In three of the region's seven states – Roraima, Amapá, and Tocantins – there was a growth in the firearm-related mortality rates in the period (Figure 15). In the state of Tocantins, the increment was on the order of 111%, which is a situation of great concern in spite of the rates being lower than those for Brazil during the whole period (Figure 14). Another state that presented a significant growth, higher than the average growth for the country, was Roraima, where the mortality rate reached 24.9/100,000 inhabitants in 1996 falling to 17.5/100,000 in the year 2000. The state of Rondônia, despite a decrease in the mortality rates during the decade, also stood out, since it presented substantially high rates exceeding those of Brazil.

Interpretation limits
Throughout the states of the Northern region, the proportion of homicides from unspecified means fell. While this indicates a global improvement in the quality of information and suggests that the decreases in firearm-related mortality rates are unlikely due to changes in quality of information, it is possible that an improvement in quality of data may have contributed to observed increases in firearm-related death in those states where increases were observed (Table 7).

Figure 15: Standardized firearm-related mortality rate (100,000) and incremental change (%), Northern region, Brazil, 1991 and 2000

Source: Mortality Information System (SIM)/Ministry of Health, Brazil.

In four of the capitals of the Northern region – Porto Velho, Boa Vista, Macapá, and Palmas – the firearm-related mortality rates increased in the 90's (Figure 16). The greatest increment was found in Palmas, where the mortality rate was 4.1/100,000 in 1991, moving to 12.7/100,000 inhabitants in the year 2000. In the remaining capitals where an increase was observed, it was lower than the average growth for Brazil (Figure 14). The elevated mortality rates in Porto Velho, capital of the state of Rondônia, are striking, and reached 35.4/100,000 in 2000, substantially higher than those for the country as a whole. Rio Branco, Manaus, and Belém presented a decrease tendency in the mortality coefficients, which became the lowest in the country in the year 2000.

Interpretation limits
In all the capitals of the Northern region, with the exception of Porto Velho, the proportion of homicides from unspecified means fell. In Porto Velho, the increase in the proportion of homicides from unspecified means indicate that during this period the quality of the information worsened. This implies that the increase in the mortality rates may actually underestimate what genuinely occurred. Conversely, in the remaining capitals where increases in the mortality rates were found, there was an improvement in the quality of information, which may partially explain the incremental increase. In Rio Branco, Manaus, and Belém, the decreases observed in the mortality rates don't appear to result from relapses in the classification of the deaths, since there was a reduction in the proportion of cases classified as homicides from unspecified means (Table 8).

Figure 16: Standardized firearm-related mortality rate (100,000) and incremental change (%), state capitals, Northern region, Brazil, 1991 and 2000

Source: Mortality Information System (SIM)/Ministry of Health, Brazil.

Northeastern region

In Figure 14 we have seen that the Northeastern region presented a growth of 40.7% in the mortality rates during the 1990's. Analysis of data by states reveals this tendency towards increasing rates of firearm-related death was present in eight of the nine states of the region, with the exception of Maranhão, where firearm-related mortality experienced a slight drop (Figure 17). Among the eight states that presented an increase over the period, six – Piauí, Ceará, Rio Grande do Norte, Paraíba, Pernambuco, and Alagoas – had a greater increment than that of the country (Figure 14). The increases observed in Piauí (163%) and Ceará (94%) were particularly striking. It should be noted, however, that all states in the Northeastern region experienced lower rates than those for Brazil, with the exception of Pernambuco, which observed higher rates throughout the 1990's, reaching 45.6/100,000 inhabitants in the year 2000.

Interpretation limits
There was a decrease in the proportion of homicides from unspecified means throughout all the Northeastern region's states. The decrease observed in Maranhão was extremely small and we may consider that there was no change in the quality of information in this state. In all the other states of the Northeastern region, part of the observed increase in firearm-related mortality might reflect an improvement in the classification of the deaths (Table 7).

Figure 17: Standardized firearm-related mortality rate (100,000) and incremental change (%), Northeastern region, Brazil, 1991 and 2000

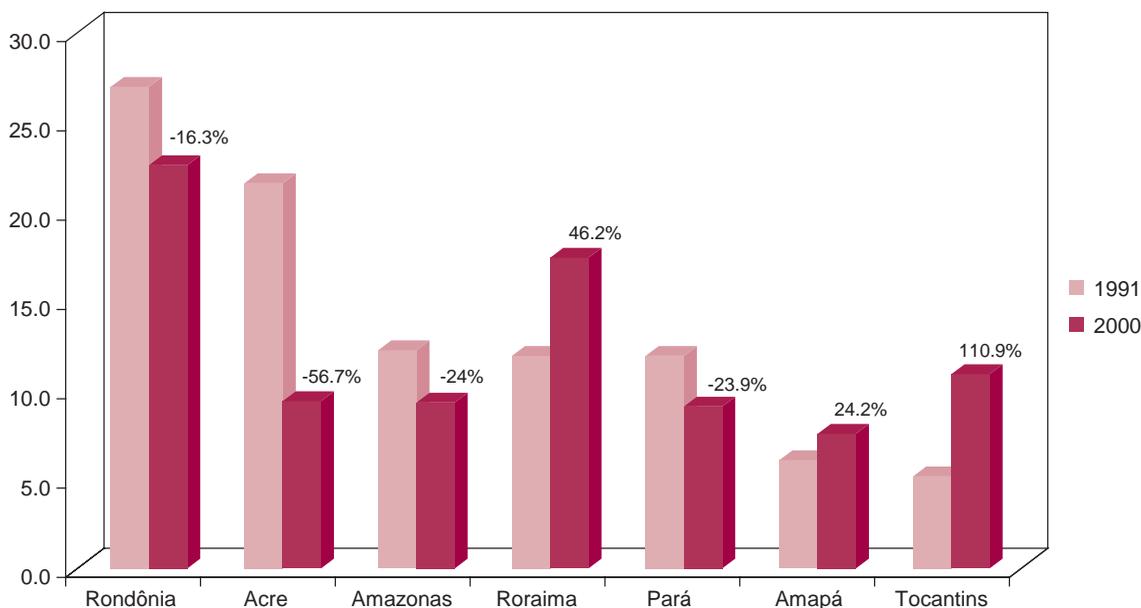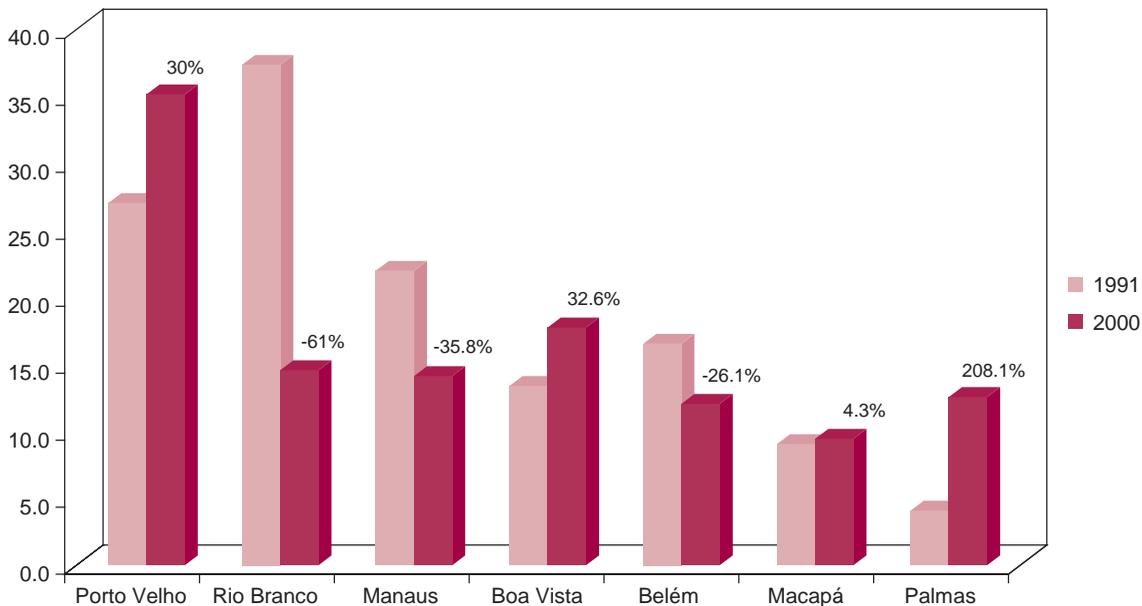*Source: Mortality Information System (SIM)/Ministry of Health, Brazil.*

An increase in firearm-related mortality rates was observed in seven of the nine capitals of the Northeastern region (Figure 18). In Teresina, João Pessoa, and Maceió the increment exceeded 100% over the period, far in excess to the average growth of the country and of the region (Figure 14). Moreover, while in 1991 only three capitals of the region presented higher coefficients than that of the country – Recife, Aracaju, and Salvador – in 2000 five capitals were found in the same situation – João Pessoa, Recife, Maceió, Aracaju, and Salvador, with coefficients exceeding 20/100,000 inhabitants. For the region the firearm-related mortality in Recife stands out in particular as being highest at the start of the period, experiencing a substantial increase, and reaching 56.5/100,000 inhabitants in the year 2000.

Interpretation limits

In São Luis and Fortaleza there was an increase in the proportion of cases classified as homicides from unspecified means over the period. In Recife quality of data would not appear to have changed over time, as the proportion of cases classified as homicides from unspecified means was extremely low. In the other capitals there was an improvement in the classification of the cases. It is therefore possible that the decrease in the mortality rate observed in São Luis may be partially explained by deteriorating data quality and should be interpreted with some caution. Similarly, the increases observed for Natal, João Pessoa, Maceió, and Aracaju may be partially explained by an improvement in the quality death certificate data (Table 8).

Figure 18: Standardized firearm-related mortality rate (100,000) and incremental change (%), state capitals, Northeastern region, Brazil, 1991 and 2000

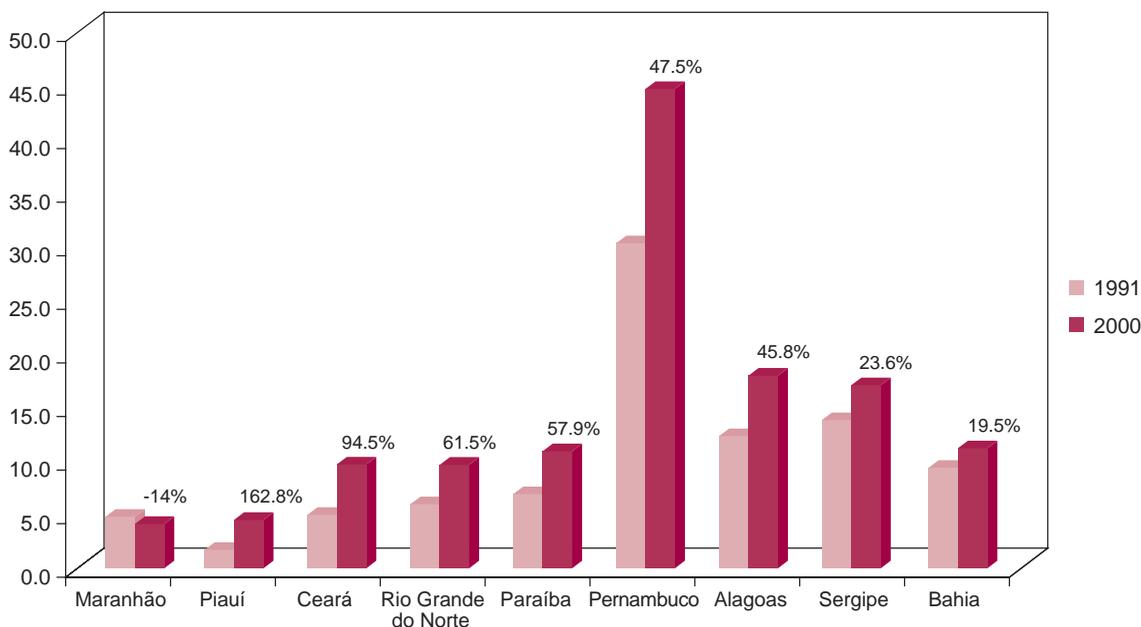Source: Mortality Information System (SIM)/Ministry of Health, Brazil.

Southeastern region

The Southeastern region experienced an increase in firearm-related mortality rates on the order of 47.6% in the 1990's, and the highest coefficients of the country. In Figures 19 and 20, data is presented by states and capitals, and clearly shows the magnitude of the problem in the region. Firearm-related mortality grew in three of the four states of the region with the exception of Rio de Janeiro, where a decrease of 9.3% was observed. In spite of the drop observed in Rio de Janeiro, this state has one of the highest firearm-related mortality rates of the entire country. In three states within the region the growth was greater than that for the country and for the region. The increase was particularly striking in the state of São Paulo, where the growth was a staggering 146.1% over the time period.

Interpretation limits
In the Southeastern region throughout the time period there are rather variable proportions of homicides from unspecified means and some important changes over the time period. São Paulo in particular begins the time period with a very high proportion of homicides classified as by unspecified means and finishes the period with a proportion that had fallen by a half. Accordingly, some of the observed increase in São Paulo was likely due to improvements of classification of cause of death. In Minas Gerais, Espírito Santo, and Rio de Janeiro data quality would also appear to have improved with the implication that time series changes observed in these settings need to be interpreted with some degree of caution. In Rio de Janeiro, however, the drop in the firearm-related mortality rates could not be explained by an amelioration in data quality (Table 7).

Figure 19: Standardized firearm-related mortality rate (100,000) and incremental change (%), Southeastern region, Brazil, 1991 and 2000
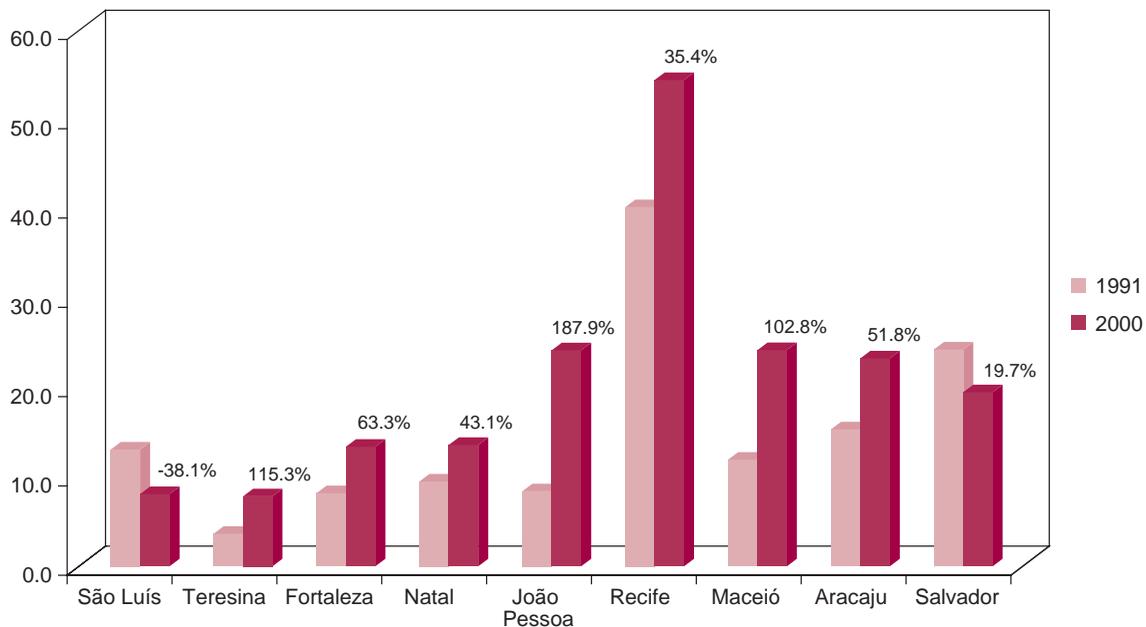

Source: *Mortality Information System (SIM)/Ministry of Health, Brazil.*

All four capitals of the Southeastern region experienced higher mortality rates than those found for Brazil in the year 2000, as compared with only two regional capitals – Vitória and Rio de Janeiro - during 1991. The increase in firearm-related mortality in Belo Horizonte and São Paulo exceeded 100%, with rates in Belo Horizonte passing from 8.4/100,000 to 22/100,000 inhabitants in the year 2000, and from 12.4/100,000 to 33/100,000 inhabitants in São Paulo, one of the highest in the country. A critical situation was found in Rio de Janeiro where, despite the drop observed over the period, very high rates were observed. The same can be said for Vitória which also presented very high rates, albeit with an increase which was far below that found for the remaining capitals of the region.

Interpretation limits

Special attention must be given to the improvement in the quality of information in Vitória and in São Paulo, considering the interpretation of the increases in the firearm-related mortality rate. In São Paulo, despite the decrease in the proportion of homicides from unspecified means, this proportion has remained relatively high in the year 2000. The drop in the firearm-related mortality rates observed in Rio de Janeiro would not appear to result from a deterioration in the quality of the information, since there was also a decrease in the proportion of homicides from unspecified means in this capital (Table 8).

Figure 20: Standardized firearm-related mortality rate (100,000) and incremental change (%), state capitals, Southeastern region, Brazil, 1991 and 2000

Source: Mortality Information System (SIM)/Ministry of Health, Brazil.

Southern region

In the 90's, firearm-related mortality rates increased 16.8% in the Southern region, reaching 12.8/100,000 inhabitants in the year 2000, one of the lowest in the country (Figure 14). Figures 21 and 22 present data by states and state capitals, and make apparent that rates increased in two states and all three capitals of the region. Only the state of Santa Catarina registered a drop over the period - as a state Santa Catarina had one of the lowest rates for both the region and the country as a whole. All states of the Southern region presented lower rates than those for the country as a whole in 2000. Among the capitals, however, the elevated rates of Porto Alegre stand out, where rates increased 80% over the period, rising to 28/100,000 inhabitants in 2000 (Figure 22).

Interpretation limits
There was a reduction in the proportion of homicides from unspecified means throughout the states and capitals of the region, with the exception of Porto Alegre, where a slight increase in the proportion of homicides in this category was observed. The increase in the firearm-related mortality rates in Paraná, Rio Grande do Sul, Curitiba, and Florianópolis may be partially accounted for by this improvement in the classification of deaths. However, the growth in the mortality rates observed in Porto Alegre do not appear to result from changes in the quality of the information, since they were followed by an increase in the proportion of homicides from unspecified means (Tables 7 and 8).

Figure 21: Standardized firearm-related mortality rate (100,000) and incremental change (%), Southern region, Brazil, 1991 and 2000

Source: Mortality Information System (SIM)/Ministry of Health, Brazil.

Figure 22: Standardized firearm-related mortality rate (100,000) and incremental change (%),
state capitals, Southern region, Brazil, 1991 and 2000
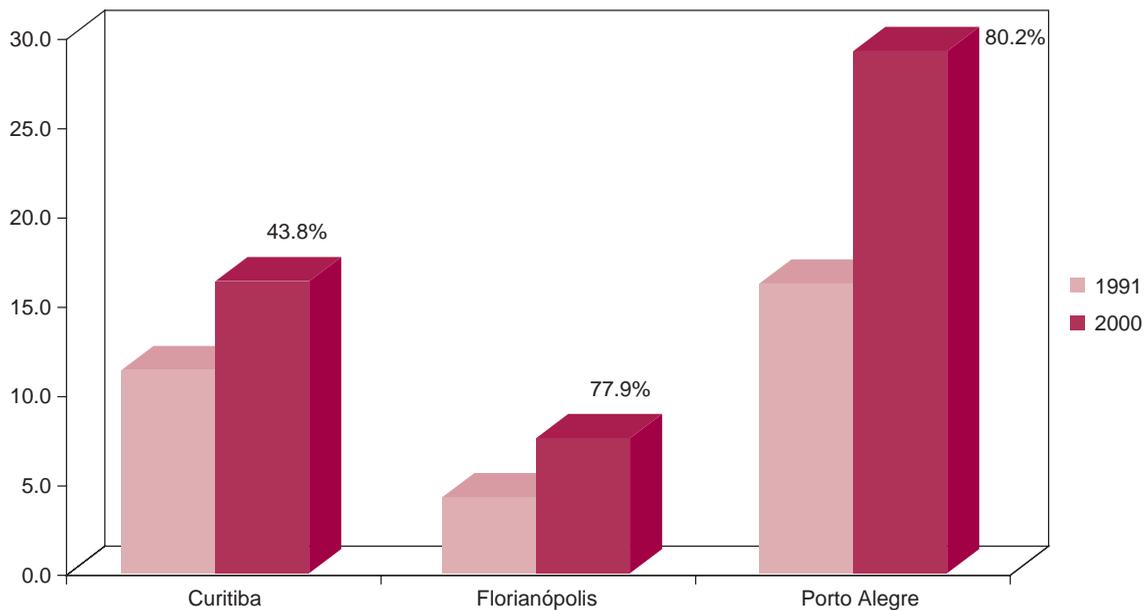
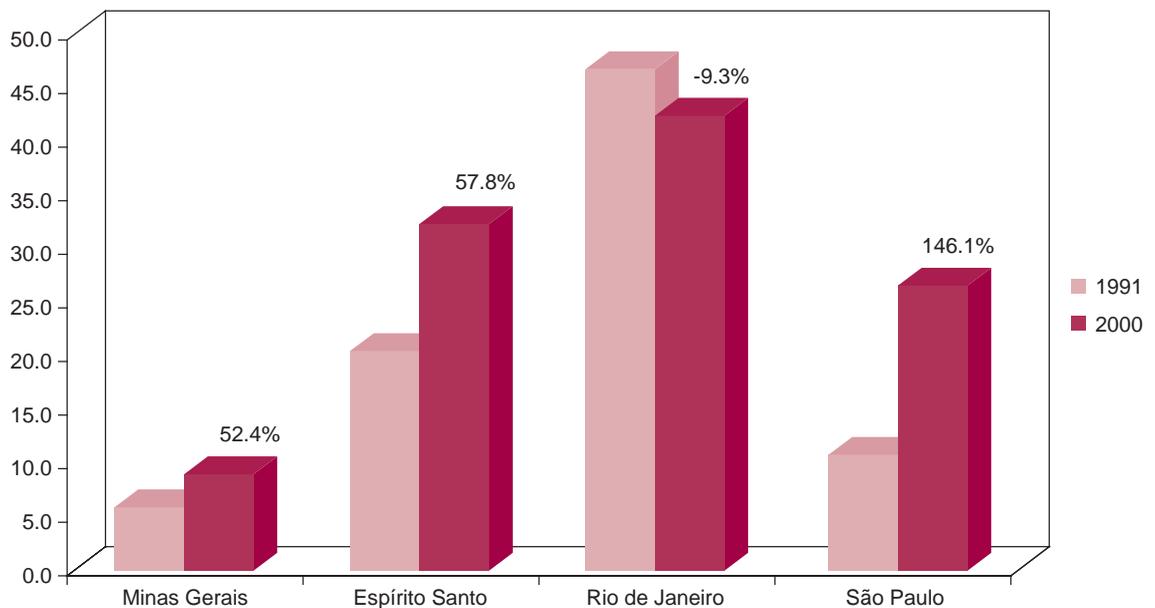Source: Mortality Information System (SIM)/Ministry of Health, Brazil.

Central-western region

The Central-western region presented the greatest increase in firearm-related mortality in the 90's (57.2%) (Figure 14). The mortality rate in the region was initially lower than the national rate in 1991, but by 2000 had reached 21/100,000 inhabitants per year, which exceeded the national rate. This increase is largely attributable to a substantial increase in the firearm-related mortality rate in the state of Mato Grosso and in Cuiabá, its capital (Figures 23 and 24). Figure 23 shows that firearm-related mortality rate increased in all three states of the region and in the Federal District. However, the increase found was lower than that for the country and for the region, with the exception of the state of Mato Grosso, where a 371% increase was observed for the period. The mortality rate in the state of Mato Grosso, which in 1991 had been lowest in the region, increased to 28.9/100,000 inhabitants in 2000, making it the highest in the region. Mato Grosso do Sul and the Federal District, which even in 1991 had higher rates than for the country as a whole, continued to have rates which exceeded the national rate in 2000.

Interpretation limits

With the exception of the Federal District, where no change would appear to have occurred in data quality, in the remaining states of the region the proportion of homicides from unspecified means dropped. In Mato Grosso in particular this may be of importance in interpreting the important increase in firearm-related mortality, as homicides from unspecified means decreased from 28.3% in 1991, to 2% in 2000 (Table 7).

Figure 23: Standardized firearm-related mortality rate (100,000) and incremental change (%), Central-western region, Brazil, 1991 and 2000
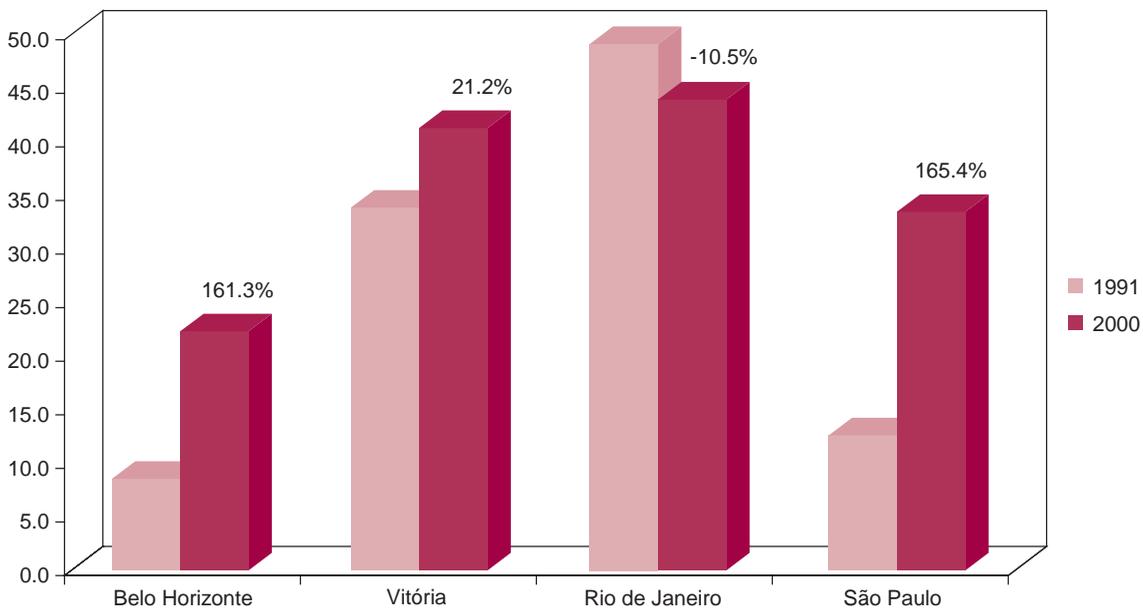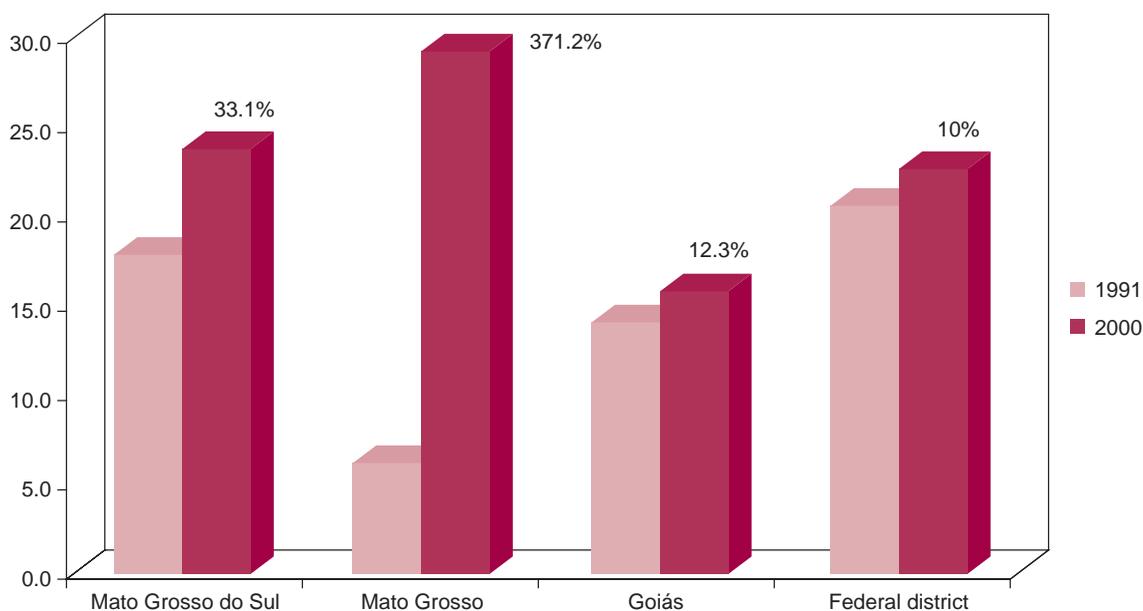

Source: Mortality Information System (SIM)/Ministry of Health, Brazil.

Figure 24 provides data for the capitals of the region, and shows firearm-related mortality rates increased in Campo Grande and Cuiabá and decreased in Goiânia. The increase in Cuiabá was a staggering 690% - in 1991 it had been one of the lowest rates in the country, but by 2000 mortality rates in Cuiabá were one of the highest, at 48.4/100,000 inhabitants.

Interpretation limits
As was commented for the state of Mato Grosso, the increase in firearm-related mortality rates for Cuiabá must be interpreted carefully, given the improvement in data quality observed (Table 8).

Figure 24: Standardized firearm-related mortality rate (100,000) and incremental change (%), state capitals, Central-western region, Brazil, 1991 and 2000

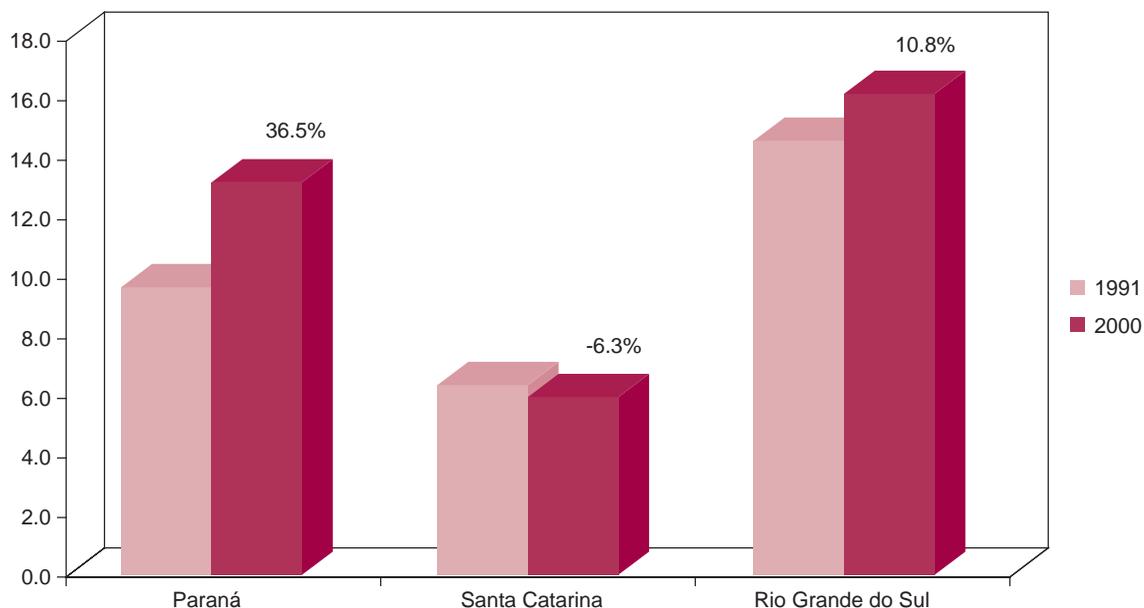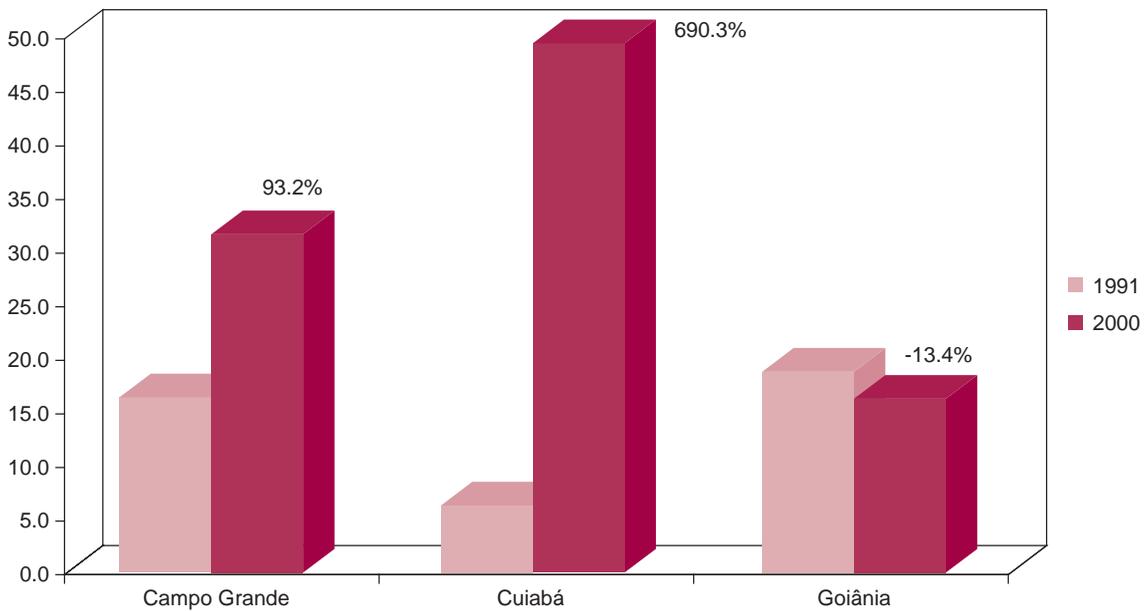*Source: Mortality Information System (SIM)/Ministry of Health, Brazil.*

States and capitals: a global view

In Figures 25 and 26 the firearm-related mortality rates of the Brazilian states and capitals are presented for the year 2000. Eight states presented higher firearm-related mortality rates than those for Brazil for the year 2000, whereas among the capitals, thirteen presented firearm-related mortality rates greater than those found for the country in 2000. Figures 25 and 26 also make readily apparent the fact that firearm-related mortality rates in the capitals were higher than those observed for the Brazilian states, emphasizing the urban nature of the problem. Figures 27 and 28 make an even more dramatic point, by illustrating the impact of firearm-related mortality among the young male population. Whereas for the country as a whole the firearm-related mortality rate is 19.4/100,000 inhabitants, if one considers the 15 to 19, and 20 to 29 year-old male populations it reaches 61.7/100,000 and 91.3/100,000 inhabitants respectively for Brazil, and for a number of cities the rate exceeds 200 per 100,000.

Figure 25: Standardized firearm-related mortality rate (100,000) in 20 Brazilian states, 2000
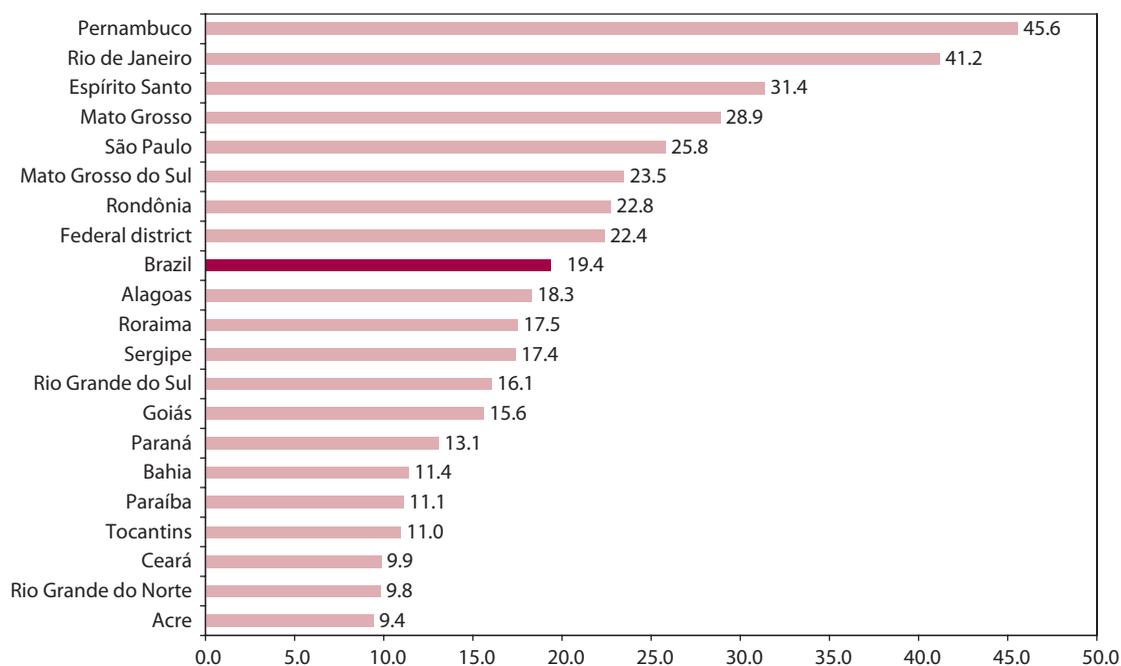
Source: Mortality Information System (SIM)/Ministry of Health, Brazil.

Figure 26: Standardized firearm-related mortality rate (100,000), Brazilian state capitals, 2000

Capital	Rate
Recife	56.5
Cuiabá	48.4
Rio de Janeiro	43.4
Vitória	40.8
Porto Velho	35.4
São Paulo	33.0
Campo Grande	30.9
Porto Alegre	28.0
Maceió	25.1
João Pessoa	25.1
Aracaju	24.1
Belo Horizonte	22.0
Salvador	20.2
Brazil	19.4
Boa Vista	17.9
Goiânia	15.9
Curitiba	15.7
Rio Branco	14.7
Manaus	14.2
Natal	14.1
Fortaleza	13.9
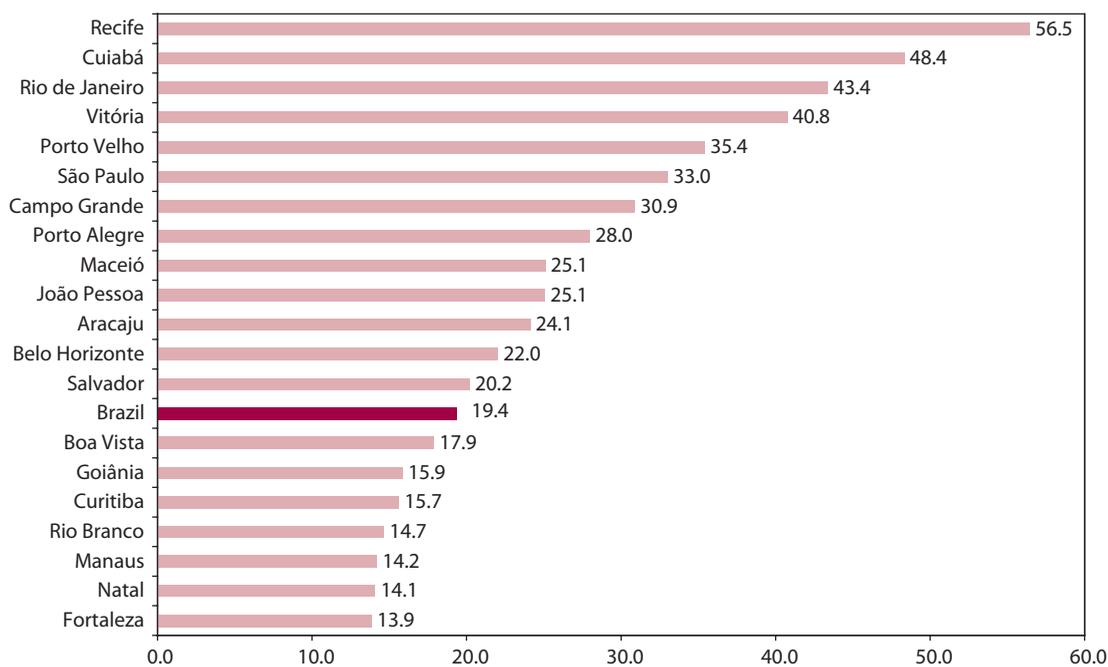
Source: Mortality Information System (SIM)/Ministry of Health, Brazil.

Figure 27: Firearm-related mortality rate (100,000), 15-19 year-old male population, Brazil and state capitals, 2000

Capital	Rate
Recife	222.1
Rio de Janeiro	202.8
Cuiabá	181.9
São Paulo	152.1
Vitória	126.2
João Pessoa	110.8
Campo Grande	104.5
Maceió	102.7
Belo Horizonte	102.2
Aracaju	90.2
Porto Alegre	87.5
Porto Velho	84.1
Goiânia	75.5
Salvador	72.9
Boa Vista	70.5
Curitiba	67.1
Brazil	61.7
Macapá	60.3
Natal	60.2
Manaus	52.0
Fortaleza	51.6
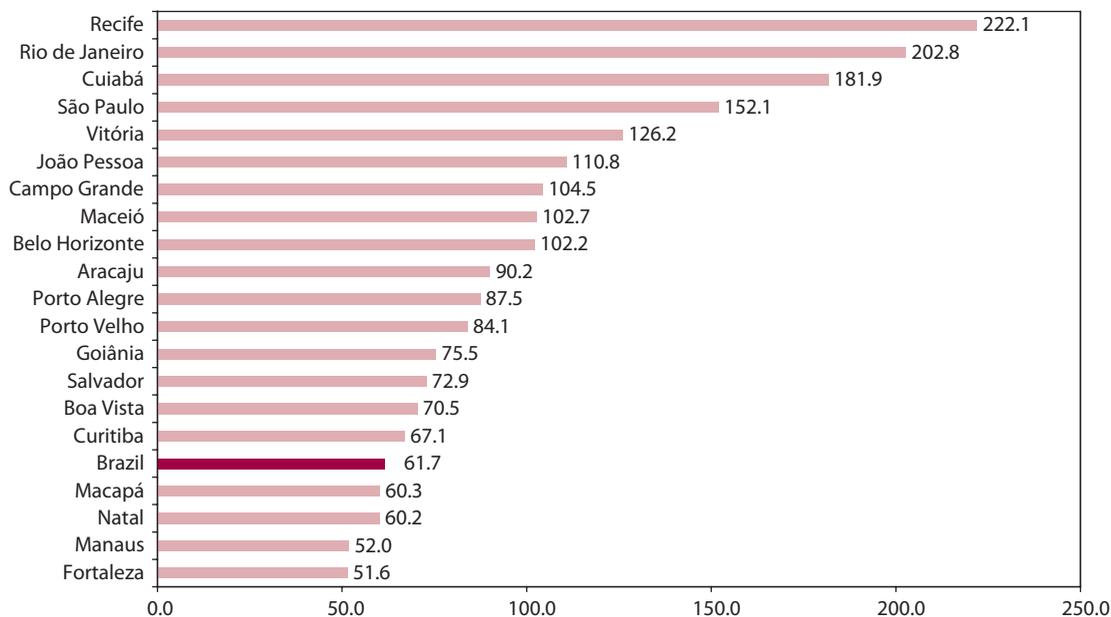
Source: Mortality Information System (SIM)/Ministry of Health, Brazil.

Figure 28: Firearm-related mortality rate (100,000), 20-29 year-old male population, Brazil and state capitals, 2000

Capital	Rate
Recife	327.4
Rio de Janeiro	220.6
Vitória	207.0
Cuiabá	206.5
São Paulo	169.1
Porto Velho	161.9
Aracaju	158.7
Campo Grande	149.4
Porto Alegre	145.9
João Pessoa	142.8
Maceió	132.1
Salvador	118.3
Belo Horizonte	114.5
Brazil	91.3
Natal	82.9
Manaus	71.9
Curitiba	70.3
Boa Vista	67.6
Fortaleza	63.6
Belém	62.0
Rio Branco	60.18
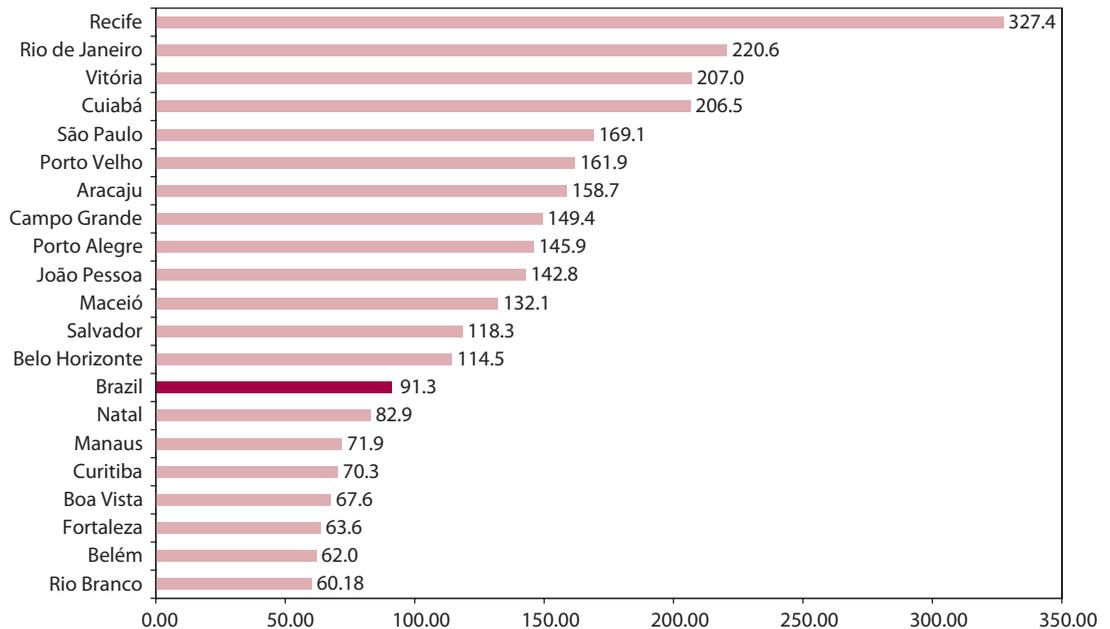
Source: Mortality Information System (SIM)/Ministry of Health, Brazil.

Overall firearm-related mortality rates in the 15 to 19 year-old male population surpassed that of the country within sixteen capitals, and were higher than 100/100,000 inhabitants in nine capitals, reaching 202.8/100,000 and 222/100,000 inhabitants in Rio de Janeiro and Recife, respectively. In the 20 to 29 age group, the rate exceeded 100/100,000 in thirteen capitals, and exceeded 200/100,000 in Cuiabá, Vitória, and Rio de Janeiro and reached 327.4/100,000 in Recife.

Interpretation limits:
The quality of information regarding firearms in death certificates

In order to conduct a study on firearm-related mortality, the information contained in the death certificates regarding the type of instrument that lead to death is of primary importance. This information is part of the information specified within the International Classification of Diseases (ICD) in its ninth and tenth revisions, through sub-codes in each category (accidents, homicides/aggressions, suicides, undetermined intention and legal intervention). Likewise, the ICD provides sub-codes to be used in cases where it is not possible to define the type of weapon/instrument that lead to death. Changes in the standards of classification, as well as in the use of these sub-codes over periods of time, may interfere in the analysis of data based on death certificates.

Lack of quality in data produced by State Departments of Security is one of the major obstacles for research on violence in Brazil. Mortality information provided by the Ministry of Heath on external cause deaths is widely used by researchers in the field, and is considered a more reliable data source, since the collection procedure is standardized and data is coded according to ICD-9 and ICD-10. Despite this, a number of authors have pointed out some issues that compromise the quality of data provided, particularly regarding the kind of violence that resulted in death[34,41,53]. In relation to the type of weapon used, death certificates also present important limitations[22].

Tables 7 and 8 provide data on the number and proportion of all homicide deaths where the instrument of homicide was not identified for Brazil, the regions, states, and state capitals. As previously seen in our data, homicide is the major cause of firearm-related deaths in the country, as well as in all its regions and states. According to the SIM data source almost 15% of all the homicides that occurred in Brazil in the 1990´s were committed with an unknown weapon, suggesting a strong potential that firearm homicides are underreported. Considering data for the states (Table 7) higher percentages were found in Espírito Santo, São Paulo, Maranhão, Minas Gerais, Tocantins, and Pará. The very high proportion of homicides with an unknown weapon in São Paulo is noteworthy, representing more than 50% of all homicides in 1991, and dropping to 25% in the year 2000. Considering data for state capitals presented in Table 8, in the 1990's only São Paulo presented percentages of homicides with an unknown weapon higher than the percentages found for Brazil or all the capitals together.

Comparing the data in Tables 7 and 8 one finds that in all states, except Tocantins and São Paulo, higher percentages of undetermined weapon classifications were found for the state as a whole rather than for the capitals. This may reflect a generally higher quality of information in the capitals resulting from better technological and human resources in the Medico-Legal Institutes located within state capitals. In the São Paulo and Tocantins states, however, higher percentages were found in their capitals - Palmas and São Paulo respectively –, in 1991, 1996, and 2000. The very high percentages found for the São Paulo state capital is once again noteworthy, constituting more than 60% in 1991, dropping to 29% in the year 2000. São Paulo is the most highly populated and developed state of Brazil and, it would therefore seem difficult to account for the classification difficulties by citing a lack of necessary technology or adequate human resources. These serious problems regarding the filing of death certificates within the Medico-Legal Institute should be better evaluated.

Table 7: Homicide with unknown instruments as a proportion of all homicide deaths, Brazil, regions and states, 1991-2000

	1991		1996		2000		1990´s	
	n	%	n	%	n	%	n	%
Brazil	8029	26.1	4818	12.4	5381	11.9	54873	14.9
Northern region	220	10.8	226	11.6	127	5.3	2193	10.8
Rondônia	51	10.4	40	13.3	40	8.6	445	10.7
Acre	8	7.5	6	5.8	2	1.9	58	5.9
Amazonas	39	9.7	31	6.9	7	1.3	275	6.2
Roraima	12	15.2	0	0.0	7	5.4	47	4.6
Pará	88	10.9	134	19.1	63	7.8	1121	15.4
Amapá	3	5.7	3	1.9	4	2.6	68	5.5
Tocantins	19	20.9	12	9.5	4	2.3	179	16.1
Northeastern region	771	12.2	442	5.4	332	3.6	5518	7.2
Maranhão	95	20.2	65	18.0	70	19.9	768	21.5
Piauí	17	16.5	13	11.1	21	9.1	160	12.4
Ceará	83	13.7	164	18.6	62	5.0	1143	13.4
Rio Grande do Norte	39	17.9	12	5.0	12	4.7	160	7.0
Paraíba	54	13.5	2	0.3	13	2.6	290	6.6
Pernambuco	225	7.6	63	2.1	18	0.4	895	2.7
Alagoas	50	7.5	4	0.5	3	0.4	259	4.0
Sergipe	16	5.0	7	2.9	12	2.9	173	5.7
Bahia	192	32.2	112	5.9	121	9.7	1670	12.4
Southeastern region	6340	37.4	3670	16.1	4659	17.6	41887	19.6
Minas Gerais	310	25.2	213	16.9	144	6.8	2580	18.8
Espírito Santo	307	31.7	410	34.5	279	19.5	3354	26.9
Rio de Janeiro	660	13.1	612	7.6	340	4.6	5788	8.5
São Paulo	5063	52.3	2435	19.8	3896	25.0	30165	25.2
Southern region	315	9.6	279	8.6	158	4.1	2800	8.4
Paraná	155	12.7	93	6.8	56	3.1	1034	7.3
Santa Catarina	69	19.4	39	9.6	36	8.5	478	12.4
Rio Grande do Sul	91	5.4	147	10.0	66	4.0	1288	8.6
Central-western region	383	17.6	201	7.2	105	3.1	2475	9.6
Mato Grosso do Sul	50	12.9	76	10.5	26	4.0	610	10.6
Mato Grosso	128	28.3	24	3.7	20	2.0	632	10.3
Goiás	203	23.8	98	12.6	57	5.3	1181	14.5
Federal District	2	0.4	3	0.5	2	0.3	52	0.9

Source: Mortality Information System (SIM), Ministry of Health, Brazil

Table 8: Homicide with unknown instruments as a proportion of all homicide deaths, Brazil and state capitals,1991-2000

	1991		1996		2000		1990´s	
	n	%	n	%	n	%	n	%
Brazil	8029	26,1	4818	12,39	5381	11,9	54873	14,9
Porto Velho	12	7.7	12	13.64	24	11.8	152	11.7
Rio Branco	6	6.5	4	5.00	1	1.1	43	5.1
Manaus	31	8.1	27	6.78	3	0.7	220	5.6
Boa Vista	9	16.1	0	0.00	0	0.0	15	2.1
Belém	35	10.9	23	10.65	20	7.1	306	12.6
Macapá	2	4.9	3	2.29	3	2.4	52	5.3
Palmas	1	50.0	1	12.50	1	3.3	14	12.5
São Luís	11	5.9	16	9.70	20	15.4	169	11.5
Teresina	4	7.4	8	10.81	6	4.1	57	7.2
Fortaleza	9	3.0	57	13.04	40	7.7	430	10.5
Natal	9	10.6	2	2.06	1	2.1	41	4.9
João Pessoa	10	12.2	1	0.54	0	0.0	65	4.4
Recife	1	0.1	3	0.42	4	0.4	22	0.3
Maceió	9	4.4	1	0.33	0	0.0	47	2.0
Aracaju	3	3.3	4	4.55	1	0.6	57	4.9
Salvador	4	10.3	6	0.79	5	1.7	155	3.3
Belo Horizonte	10	3.6	20	5.95	20	3.2	247	6.7
Vitória	38	27.3	18	12.33	6	3.8	158	9.6
Rio de Janeiro	73	4.7	235	7.90	94	3.2	1353	6.0
São Paulo	2566	60.9	853	15.59	1776	29.1	12251	23.9
Curitiba	19	12.3	15	5.66	9	2.7	171	6.5
Florianópolis	2	15.4	1	3.85	1	2.6	10	4.4
Porto Alegre	5	2.0	4	1.39	11	2.7	84	2.9
Campo Grande	3	2.5	3	1.24	5	2.0	68	3.7
Cuiabá	14	28.0	1	0.59	0	0.0	54	3.4
Goiânia	33	16.2	9	4.46	4	1.6	167	8.2

Source: Mortality Information System (SIM), Ministry of Health, Brazil

One can also observe from Tables 7 and 8 that from 1991 to 2000 the percentage of homicides with an unknown weapon fell in the country and in all states with the exception of Maranhão, and in all state capitals except Porto Velho, São Luis, Fortaleza, and Porto Alegre. It would therefore seem that there has been a generally global improvement in the quality of information provided by the SIM. Whereas in 1991, the proportion of homicides with unknown weapons exceeded 10% in 19 of 27 states, by the year 2000 this was the case in only 3 states - Maranhão, São Paulo, and Espírito Santo. Comparable figures for state capitals are that 12 of 26 had proportions higher than 10% in 1991 while only 3 did so in the year 2000 - Porto Velho, Palmas, and São Paulo.

Chapter 3

Final remarks and recommendations

The results of this study clearly show that firearm-related violence has become an everyday fact of life in Brazil, and that the magnitude and impact of the problem is experienced primarily by Brazil's urban male youth. Over the course of the last decade the scale of the firearm-related violence has generally worsened and there are a number of settings within Brazil where there have been dramatic increases in rates and a smaller number where declines have been observed.

As stated in the preface to this report, no single factor can be held responsible for the occurrence of violence[27]. Violence results from dynamic interactions involving multiple determinants that include individual, relational, social, and community factors. The ready availability of firearms and ability to make recourse to these lethal tools during a violent encounter, the presence of interrelated activities of drugs and arms trafficking often involving gangs, the lack of economic opportunities for youth living in areas of concentrated poverty, childhood experience of violence, and massive socioeconomic disparities are all factors that contribute to the toll of firearm-related death and injury documented here. With the magnitude of rates documented here one must not forget that our lowest level of aggregation for purposes of analysis was the level of state capitals - in Brazil many of these represent large geographic areas with huge populations. For example, the 2000 census estimated that over 10 million people lived in the São Paulo municipality - however the rates of firearm-related mortality we presented here would in fact be much higher had we been able to analyse data at the level of *favela,* where the vast majority of these violent encounters are happening. In these areas of concentrated poverty the high rates of armed violence are a powerful driver of decision making to acquire firearms, which in turn increases the likelihood for a violent encounter to result in death or serious injury.

Coherent recommendations to prevent firearm-related violence therefore, need to address a wide range of factors, including those that influence both the ready availability of, and demand for, firearms. The preventive approaches must be mult-sectoral and integrated and inevitably include structural measures for reducing inequalities. As Cardia et al. (2003) state "In Brazil at least, the growth of violence in urban areas cannot be properly understood – and consequently prevented – if the abyss that characterizes the access to socioeconomic rights for large sectors of the population is not taken into consideration"[11].

The data presented shows that there are significant deficiencies in the quality of data regarding firearms, which in turn limits use of the available data for policy planning and research purposes. The number and types of weapons in circulation in Brazil are not known. Information sent by the states to the Ministry of Justice regarding seized weapons in the country, only available for the years 1999, 2000, and 2001, has proved to be inconsistent and incomplete. The characteristics of illegally used firearms in the country are unclear, either in relation to the type of weapons or relative to their origin and use in criminal activities, which are important issues for the planning of police actions and for an effective control of armed violence.

The problems that exist based on police[b] data are broadly discussed in the literature. Authors point to the lack of standardization in the information collection process by the public security agencies, duplication of information collected in different police departments, underreporting,

b. *For a more detailed critical analysis of the police sources see Beato-Fo (2000); Cano (2000); Piquet-Carneiro (2000); Cardia et al. (2003), Kahn (2002b).*

lack of the required technology for information processing and analysis, and a lack of a culture that prioritizes the collection of information for the planning of actions, as some of the major reasons for the low level of consistency and validity of criminal data in Brazil[7,10,11]. Additional problems that make use of police information difficult for monitoring criminal and violent activities in Brazil, are gaps in information regarding characteristics of victims, perpetrators, circumstances of particular crime and types of weapons used, as well as the use of the event as a unit of analysis[10,11,26]. In addition to the technical and methodological issues, authors indicate problems of a political and administrative nature that influence the quality of the police information and do not allow for the transparency and availability of the data[11].

Considering the mortality data that was analysed extensively for the preparation of this report, there are also important considerations and deficiencies that need to be noted. The high proportion of homicide cases with undefined weapon type is an obvious source of concern, and makes it difficult to interpret temporal tendencies in firearm-related mortality, as well as to compare these changes within the country. For example, this fact needs to be borne in mind when considering the increases observed in in Mato Grosso, Cuiabá, and São Paulo, among others, as well as the drop observed in São Luis. In a study carried out in the municipality of São Paulo in 2000[22], important discrepancies in the proportion of homicides committed with firearms were found when compared with the data in death certificates, police reports and Medico-Legal Institute reports, which indicate problems in the completion of the death certificates. As could be seen through data presented here, this problem is not limited to the municipality of São Paulo, with the consequence that official data from the Ministry of Health's Mortality Information System (SIM/MS) tends to result in an underestimation of the firearm-related deaths in the country.

While the SIM database is considered more reliable than police sources, and has the additional advantage of encompassing national scale data over a long period of time[d], there are some additional considerations with a bearing on the quality of the information and scope of analyses possible. Firstly, it is important to consider the general problem of underreporting of death within Brazil that affects mainly those areas in the country that have limited access to the health system and services. Normally, the legal requirement for autopsy in cases of external cause death would mitigate this factor, but this does not mean that all deaths from external causes are officially recorded. Another problem identified in the completion of death reports is the inconsistent provision of data regarding the deceased's sociodemographic characteristics (occupation, marital status, schooling, place of birth, race), place of death, and medical assistance. Finally, several authors have highlighted the problematic use of the "undetermined intention" category that does not allow for knowledge of the real proportion of unintentional deaths, homicides, and suicides. The consequences of this problem are broadly discussed in the literature relative to the underestimation of deaths by homicide/aggression in the country[29,34,35,37,41,53].

Overall, the limitations in data quality have the effect that firearm-related mortality rates will tend to be underestimated in Brazil, and time-series analysis of temporal changes can have limited interpretation attached, owing to variation in quality of classification. However, in spite of the foregoing, the fact remains that the Ministry of Health data are nevertheless a valuable source of information and document unequivocally the very substantial impact of firearm-related mortality in the 1990's. In Brazil as a whole, and in the Northeastern and Southeastern regions, firearm-related mortality occupies the second position as external cause of death, surpassing deaths related to road traffic crashes, and representing the single largest category, since the primary position is in fact 'other' external cause mortality. It's important to stress that the vast majority of firearm-related deaths resulted from homicides, and that the majority of homicides in Brazil were committed with firearms. These data therefore document a pressing social problem

that challenges a wide variety of sectors to engage in the planning of preventive and control actions. In addition to the growth of urban criminality, it appears that in Brazil there is an increase in the number of interpersonal conflicts considered as commonplace, in which resort to interpersonal violence as a manner of "conflict resolution" frequently involves recourse to firearms, resulting in disablement and by no means rarely, lethal outcomes[1].

As has been stated previously, firearm-related deaths presented a growing trend in the country and exceeded those due to road traffic crashes in the year 2000. This increase was observed throughout the Brazilian population, affecting men and women, children, adolescents, adults and the elderly. However, within the context of this evolution towards an increased number of firearm-related deaths in the country throughout the decade, four different patterns of change can be identified which are presented in Chart 1. Particularly worrisome are the states and state capitals which began the period with elevated rates and where rates showed a tendency to continue to increase.

Chart 1: Evolution of firearm-related mortality rates in Brazilian states and state capitals, 1991-2000

Evolution pattern	States	State Capitals
Lower rates and decreasing tendency	Acre, Amazonas, Pará, Maranhão and Santa Catarina.	Rio Branco, Manaus, Belém, São Luis and Goiânia.
Higher rates and decreasing tendency	Rondônia and Rio de Janeiro	Salvador and Rio de Janeiro
Lower rates and increasing tendency	Tocantins, Paraíba, Alagoas, Piauí, Ceará, Rio Grande do Norte, Sergipe, Bahia, Minas Gerais, Paraná, Rio Grande do Sul and Goiás.	Palmas, Teresina, Fortaleza, Natal, Curitiba and Florianópolis.
Higher rates and increasing tendency	Amapá, Roraima, Pernambuco, Espírito Santo, São Paulo, Mato Grosso do Sul, Mato Grosso and Distrito Federal.	Boa Vista, Macapá, Porto Velho, João Pessoa, Recife, Maceió, Aracaju, Belo Horizonte, Vitória, São Paulo, Porto Alegre, Campo Grande and Cuiabá.

A number of attributes about the extent to which firearm-related mortality is not uniformly distributed in the Brazilian population deserve further comment. Considering all firearm-related deaths in the 1990's, 60% of the cases occurred within three states only: Rio de Janeiro, São Paulo, and Pernambuco. Furthermore, when states and capitals are compared, it is in the latter that we find the greatest firearm-related mortality rates, underlining the fact that firearm-related violence in Brazil is primarily an urban problem and making evident the need to analyze distribution of determinants and the dynamics of firearm-related violence within these urban areas. Young males are at dramatically higher risk of dying in these areas than young females, and in quite a number of municipalities in Brazil entering adolescence as a male means a substantial increase in the chance of dying from firearm injuries - and were one able to provide data for *favelas* one would expect the magnitude of this increased risk to take on a very worrying dimension indeed.

Answering the question of why the young population of Brazil, principally young males, have such a high risk of dying from firearm-related injuries requires going beyond quantitative analyses and developing a more nuanced understanding of the context in which these deaths occur. Such work, while desperately needed, goes beyond the scope of this report, however some studies point to important issues that contribute to a better understanding of this scenario. Homicide deaths in large cities are concentrated in areas of exclusion, peripheral areas characterized by a series of social disadvantages[4,11]. The lack of effective functioning of public institutions, particularly those of security and justice, for the mediation of conflicts in these areas, seems to facilitate development

of private mechanisms of "defense" and "justice", and to increase likelihood of interpersonal conflict ending in interpersonal violence[1]. Within these areas of concentrated poverty, prospects of the young are very limited indeed, and the combined effects of living in a context of socioeconomic deprivation and exposure to such high levels of armed violence has very real effects on life expectancy and perspective of one's life expectancy. Within such settings, resorting to violence seem to be a form of both personal affirmation and survival[44,59].

The analysis presented here leads to a number of questions which could form the basis of a potential research agenda. How many firearms are circulating within Brazil and what are their characteristics? What is the distribution of legally registered versus illegally held firearms that are used in the perpetration of homicides? What are the characteristics of homicide victims and their aggressors? What factors account for deficiencies in classification of death certificate data and what are the characteristics of homicide cases where weapon type was not specified? How are firearm-related deaths distributed within the urban areas of large Brazilian cities? What factors are most important in accounting for the different relative risks of firearm-related death within subsets of the Brazilian population? What is the importance attributed to firearms by the population, especially by the young male population, where the greatest burden of deaths is concentrated? Answers to these and other questions would make a contribution towards a deeper understanding, and therefore a more effective set of approaches for violence reduction and prevention.

This summary report has presented the major findings and conclusions of a research effort to create comprehensive profile of firearm-related violence in Brazil. The work has relied heavily on the mortality data source of the Brazilian Ministry of Health as this is the most suitable database to inform such a report, but has also been complemented by literature review, criminal victimization survey data and non-fatal outcome data. Five recommendations emerge from this analysis:

Recommendations
1. Improve the quality of the information on violence in the country and promote information exchange among the different agencies.
2. Provide support to research in the area, especially in relation to the causes, consequences, costs and the development of evaluation methods and indicators.
3. Develop strategies for reducing impunity and improving the Public Security agencies and access to justice.
4. Develop primary prevention strategies and reduction of inequalities.
5. Create mechanisms for the implementation of integrated and multi-sectoral actions for the prevention of violence with the state and municipal authorities.

1. Improve the quality of the information on violence in the country and promote information exchange among the different agencies

There are many institutions in Brazil that collect information on violence, among which the most important are police institutions, the medico-legal institutes and health institutions that provide care to victims. In addition to official information gathered by public agencies, there are also important sources of information resulting from victimization studies, where typically a sample of the population is surveyed and asked to answer specific questions regarding acts of

violence suffered, their perceptions regarding violence and safety, as well as other questions.

When sources of data such as the foregoing are collected routinely and in a standardized form with minimal changes to factors that influence validity of the data, they become a source of valuable information, contributing towards the knowledge of the frequency and distribution of events in population groups and allowing a basis for evidence guided policy formation. Sadly however, there are a number of important deficiencies to be found in data collection, processing, analysis, and availability within Brazil. For sufficiently detailed understanding of firearm-related violence to allow for coherent development of preventive strategies, it is essential that the information be reliable, available, and shared in a digestible fashion among those who need to develop and implement preventive strategies. In order for preventive strategies to be developed the information required need not be detailed for the entire country but does, in some settings, need to provide sufficient detail on factors such as victims' and aggressors' socio-demographic characteristics, use and type of weapon, day, time and circumstance of the event, motivation and intention, indications of alcohol and/or drug use involved, etc. in order to allow for accurate diagnosis and planning of actions for control and prevention[17,18].

Efforts should therefore be made to improve the information already collected, taking into account the major existing problems with data sources documented here and elsewhere. An important obstacle to overcome is the view that data collection is merely a bureaucratic activity, as well as the tendency for information to be housed and used within a single sector of government. Thus, the development of integrated systems to make use of firearm-related violence data is of fundamental importance for planning, monitoring and evaluation of preventive strategies. In order to develop such an integrated system to allow for a better understanding of such a serious social problem within Brazil, it is essential that data, including data related to firearm seizures and registration, be made available in a transparent manner, with due respect being given to confidential information.

Sensitizing Medico-Legal Institutes to the policy relevance of their data, and working with them on training and standardization of approaches to improve completeness of death certificate data would be a strategic first step for improving the databases on mortality in the country, particularly in relation to external cause deaths.

There is still no information system in Brazil regarding external cause morbidity[33]. Isolated experiences have been conducted in some areas, which can serve as a basis for broad discussions towards establishing a system on a nationwide basis, something that is essential for generating a profile of the full dimension of firearm-related violence.

In addition to technical improvements and consolidation required within existing systems, there needs to be an exchange of information among the different sectors and agencies involved in the collection of data relevant to violence in Brazil. An integrated system involving public administrators who regularly exchange processed data would be an important component enabling the construction of multi-sectored interventions for violence prevention and control. Given the growth of firearm-related mortality in Brazil, the implementation of a surveillance system of firearm injuries could become an important tool for the planning and monitoring of prevention and control actions, as well as for a more in-depth knowledge of the problem at a local level. A firearm-related injuries surveillance system could moreover serve as a pilot experience for the integration of the different official data collection agencies[15,17,18].

This does not mean creating exhaustive and inoperable information systems, but rather creating systems that are practical, standardized and informative, and ensuring that the data developed within various systems can be and is shared within a policy shaping network.

2. Provide support to research in the area, especially in relation to the causes, consequences, costs and the development of evaluation methods and indicators.

Little is known in Brazil regarding the role that firearms play in the growth of violence, the costs related to firearm-related violence as well as the number and type of firearms circulating in the country. Even more disturbingly, desperately little is known regarding the effectiveness of preventive actions, despite the fact that the high rates of firearm-related violence have led to an array of governmental and non-governmental attempts to prevent armed violence. Given the obvious need to understand the magnitude and distribution of firearm-related violence, as well as its social determinants in order to plan effective control and prevention actions, academic and research institutions have a vital role to play in providing this knowledge. In view of the results presented here it would seem particularly important to support research and research institutions that have a particular interest in establishment and evaluation of strategies to prevent violence, particularly those focused on the young population in the large urban centers.

Many initiatives towards violence prevention and control in specific areas of the country are being taken in an isolated and fragmented manner. However, very little is known about the effectiveness of these efforts, and in particular there is a lack of methodologically rigorous evaluation studies. Evaluation of violence prevention programs is an area of research that is still in development, but the Brazilian context provides an excellent setting in which to advance this vital area.

It is important to stress that the knowledge required for addressing a problem of such complexity should go beyond quantitative analyses, and needs also to understand the role of violence in social relationships, the unequal distribution of violence within urban areas, and reason for the use of firearms and the perception of young individuals relative to their personal risk and vulnerability.

3. Develop strategies for reducing impunity and improving the Public Security agencies and access to justice

A number of studies reviewed for this research stress that the feeling of insecurity is one of the major concerns of the Brazilian population and is associated with an array of behavioral changes and the search for individual defense mechanisms[13,25]. Lack of confidence in the police force and the justice institutions is one of the factors that contributes towards this sentiment. Impunity and violence perpetrated by police, together with difficult access to justice faced by large segments of the Brazilian population, and the crisis in the penitentiary system, contribute towards the population's low level of confidence in government security systems[1,9,44]. One of the consequences attributed to this problem is the increase in demand for firearms as a means of individual protection. Reforms in the police, prison and justice systems are important steps for improving perceptions of safety in the population, thus contributing towards the reduction in the demand for firearms. Reducing impunity through improvements in the police, prison and justice institutions is therefore a central and strategic challenge for armed violence prevention and control within Brazil.

4. Develop primary prevention strategies and reduction of inequalities

Many studies document the link between social inequities and homicide mortality. Lack of access to public goods and services, low efficacy of services in disadvantaged regions of large cities, and associated low socioeconomic indicators, all are partially explain the concentration of homicides in these areas and contribute towards the population's feeling of insecurity. Besides social inequities, differences in gender and ethnicity that sustain discriminatory practices are also important factors that contribute to the perpetration of violence. Investments in measures for the promotion of equality are in this sense, fundamental for the prevention of violence. This does not

mean transforming social policies into policies of which the ultimate goal is violence reduction. Promoting equality and reduction of inequality must be considered as ends in themselves, justifiable even in the absence of high violence rates. However, it is important to consider that violence is a part of and contributes towards group insecurity and vulnerability in areas of exclusion, especially in the young Brazilian population strata.

In addition to primary prevention strategies aimed at the social level there are also other strategies that can contribute to primary prevention of violence. Many of these have been comprehensively documented in the WHO's *World report on violence and health*[27], and it is important to point out that there can be important mutual reinforcing effects of primary prevention interventions.

5. Create mechanisms for the implementation of integrated and multi-sectoral actions for the prevention of violence with the state and municipal authorities

This report has made a contribution to documenting, in a comprehensive manner, the complexity and magnitude of the impact of firearm-related violence within Brazil. There are important sex and age effects, and there are important regional and urban level factors resulting in pockets of the country's population living in conditions characterised by alarmingly high levels of armed violence. This variation in levels of armed violence exists not for one reason, but for many, and a number of studies reviewed here plus the original data analysed for this report lead to a central conclusion that contextual and socio-structural elements are of fundamental importance in determining rates of armed violence. This poses a central challenge to the task of planning and implementing measures for the prevention and control of violence. There is a broad consensus that preventing violence, in particular firearm-related violence, necessarily calls for broad and integrated measures, which begin with a local understanding of the problem and develop from this understanding direction for preventive actions and establishing priorities[27]. In Brazil, efforts are being made in this sense, through nationwide plans and policies. However, to date progress in this direction has unfortunately been limited.

Public policies in Brazil are traditionally fragmented, be it among the different government levels – municipal, state and federal – or among the different public administrative bodies – departments and ministries. The creation of mechanisms for the integration of these different sectors among themselves and with the organized civil society, such as courts, boards, working groups or others, - due respect being given to their competencies and responsibilities - is extremely important. A broad diagnosis of the preventive interventions already under development as well as of the local capacities for the collection, processing and analysis of the information are initial steps towards integrated actions, by allowing for the identification of the actions underway and for identifying existing gaps. Establishment of a consensus regarding the priorities and the development of integrated plans of action that define the objectives, aims, activities, roles and responsibilities, monitoring mechanisms and outcome indicators, are essential for addressing armed violence in a coherent and evidence guided manner. For a problem of the scale of what has been shown in this report, it would seem of fundamental importance to move all relevant stakeholders towards such a multi-sectoral collaboration to prevent armed violence.

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Glossary of technical terms and definitions

Accidents, deaths from – Included in this category are deaths classified as "other external causes of accidental injuries". The pertinent codes are: ICD-9: E850 to E869; ICD-10: W00 to X59.

Bias – Bias is defined as a systematic error that may influence the results of a study, leading to incorrect estimates. A bias may be the result of the deviation or distortion of the measuring operation, instrument or applicator, as well as of the sampling selection procedure. Information biases result from the manner in which the information is obtained, either due to problems with the collection instrument or with interviewers. For example, in victimization surveys the manner in which the question is posed may inhibit the interviewee, who may fail to properly report a given violent situation. This influences the results of the research. Recall biases are related to the interviewee's capacity to remember the occurrence of the event under study. Generally, the gravest situations are more easily remembered and, because of this, better reported in victimization surveys (Almeida-Fo., N. & Rouquayrol, M. Z. Introdução à Epidemiologia Moderna.BH/SSA/Rio de Janeiro: Coopmed/Apce/Abrasco, 1992.; Hennekens, C.H. et al., Epidemiology in Medicine. Boston: Little, Bowon & Co., 1987).

Consistency – Is an attribute of the data collection instruments that refer to the capacity of not varying the results when used by different people or at different times. A highly consistent instrument produces highly consistent results. Generally, the more structured the instrument is, the better is the consistency of the data produced (Almeida Fo, N. & Rouquayrol, M.Z. Introdução à Epidemiologia Moderna. BH/SSA/Rio de Janeiro: Coopmed/Apce/Abrasco, 1992.; Elwood, J. M. causal relationship in medicine – a practical system for critical appraisal. Oxford University Press, 1988).

Correlation – A statistical parameter that aims to establish whether the behavior of two variables of a study are related so that with a modification of the values of one of the variables (increase or decrease) there will be a modification of the other variable (increase or decrease) (Berquó, E. et al. Bioestatística. São Paulo: EPU, 1981.Rosner, Bernard. Fundamentals of Biostatistics. Boston: PWS-Kent Publishing Company, 1990).

Direct standardization – a strategy used for annulling the effect of differences in the age distribution on mortality coefficients, when the purpose is to establish comparisons between different places or periods of time. By using the age distribution of a reference population (standard) a new "standardized" coefficient is calculated, or rather, artificially adjusted to the standard age distribution. (See: Medronho, et al. Epidemiologia. São Paulo: Atheneu, 2003; Hennekens, C.H. et al., Epidemiology in Medicine. Boston: Little, Bowon & Co., 1987).

External causes, deaths from – Deaths resulting from environmental factors, which are not natural, such as accidents, homicides, suicides, etc. which in ICD-9 are presented as a complementary classification (E 800 to E980) and in ICD-10 in chapter -XX (V01 to Y36). For this study, the following sub-categories were excluded: a) death due to medical and surgical complications (ICD-9 – E870 a E879; E930 a E949; ICD-10 – Y40 a Y84); b) Latter effects and sequels of external causes of morbidity and mortality (ICD-9 – E929, E959, E969, E989; ICD-10 – Y85 a Y89). The latter were excluded due to the fact that the type of weapon/instrument that lead to death was not specified.

External validity – The capacity of generalizing the results of a study conducted on the basis of samples (Rouquayrol, MZ e Almeida Fo., N. Epidemiologia e Saúde. 5a. Ed., Rio de Janeiro: MEDSI, 1999; Rothman, KJ. Modern Epidemiology. Boston: Little, Brown and Co., 1986).

Firearm-related, deaths – All deaths that occurred as a result of the use of firearms, be they accidents, homicides, suicides, deaths of undetermined intention or legal intervention. The pertinent codes are ICD – 9: E922, E955.0 a E955.4, E965.0 a E965.4, E970, e985.0 a E985.4; ICD-10: W32 a W34, X72 a X74, X93 a X95, Y22 a Y24, Y35.0.

Homicides, deaths from – According the ICD definition, included in this category, are deaths resulting from intentionally caused injuries by third parties. In ICD-10 these cases are designated under the title of "aggressions". The pertinent codes are: ICD – 9: E960 to E968; ICD-10: X85 to Y09.

Incidence – A health indicator that provides information on the frequency in which new cases of a certain disease or health hazard arises at a determined period of time and place, in relation to a population that is susceptible of developing the disease at the same period of time and in the same place (Almeida Fo, N. & Rouquayrol, M.Z. Introdução à Epidemiologia Moderna. BH/SSA/Rio de Janeiro: Coopmed/Apce/Abrasco, 1992; Hennekens, C.H. et al., Epidemiology in Medicine. Boston: Little, Bowon & Co., 1987).

Increment – A relative increase of the rate within a period of time, presented as a percentage.

Infant mortality rate – A health indicator that provides information regarding the risk of death for children under the age of one, being useful for the evaluation of the health levels and existence of regional inequalities. The numerator is made up by the number of deaths of children under the age of one and the denominator is comprised of the total number of live births, in a specific place and period (Almeida Fo, N. & Rouquayrol, M.Z. Introdução à Epidemiologia Moderna. BH/SSA/Rio de Janeiro: Coopmed/Apce/Abrasco, 1992.)

International classification of diseases – A system of classification of the diseases and health hazards proposed by the World Health Organization, for international standardization purposes.

Legal intervention, deaths from – According the ICD-9 definition, these refer to "deaths resulting from injuries inflicted by the police or other agents of the law, including military personnel in service, during detention or attempt of detention due to a law infraction, for the purpose of repressing disorders in order to maintain public order and other legal actions". For this study we considered: ICD-9: E970 to E976; ICD-10: Y35.

Male to female ratio of deaths – Ratio is a measure that provides us with information regarding the frequency of a certain group of events (ex.: deaths in the male population) in relation to the frequency of another group of events (ex.: deaths in the female population). The result indicates to what extent the events of one group are more frequent.

Morbidity – Refers to a group of individuals that succumbed to a disease in a given period of time, in a certain place. The measures of morbidity are incidence and prevalence (Almeida Fo, N. & Rouquayrol, M.Z. Introdução à Epidemiologia Moderna. BH/SSA/Rio de Janeiro: Coopmed/Apce/Abrasco, 1992; Hennekens, C.H. et al., Epidemiology in Medicine. Boston: Little, Bowon & Co., 1987).

Morbidity-mortality – Refers to a group of individuals that died and/or became ill in a determined period of time, in a given place.

Mortality – An epidemiological term that defines a group of individuals that died in a specific population group, in a certain period of time. The measures of mortality are mortality coefficient – general or specific – and proportional mortality (Almeida Fo, N. & Rouquayrol, M.Z. Introdução à Epidemiologia Moderna. BH/SSA/Rio de Janeiro: Coopmed/Apce/Abrasco, 1992; Medronho, et al. Epidemiologia. São Paulo: Atheneu, 2003; Hennekens, C.H. et al., Epidemiology in Medicine. Boston: Little, Bowon & Co., 1987).

Mortality rate/coefficient – A health indicator that provides information on the number of

deaths in a determined area (city, state, country) and in a determined period of time (year, month), in relation to the total population of that area, during that period of time. The result is presented by multiplying it generally by 1,000 or 100,000. It can be calculated for the total population or by sex and age groups, and can also be calculated considering all the deaths or deaths from external causes, such as for example, firearm deaths, homicides, etc. The utilization of the mortality rate for comparisons in time and among different areas must be conducted carefully, since this indicator suffers from the influence of the population age distribution (Almeida Fo, N. & Rouquayrol, M.Z. Introdução à Epidemiologia Moderna. BH/SSA/Rio de Janeiro: Coopmed/Apce/Abrasco, 1992.; Hennekens, C.H. et al., Epidemiology in Medicine. Boston: Little, Bowon & Co., 1987).

Percentage/proportion of deaths – Similar to proportional mortality, we used in this study the proportion of deaths from specific external causes (homicides, suicides, firearm deaths, etc) considering the total of deaths from external causes in a certain place and period of time. The result is presented as a percentage and its utility is to allow for the identification of priorities.

Potential years of life lost – According to Rouquayrol & Almeida Filho (1999) this is the "indicator that expresses the occurrence of early deaths in relation to the life expectancy of a specified population (...)," that is, the life expectancy of a specific country is considered as a reference and it is verified how a specific cause of death affects the population considering the different age groups. The higher the contribution of the cause of death for the younger age groups, the more the potential years of life lost will be related to the cause of death (Medronho, R. et al. Epidemiologia. São Paulo: Atheneu, 2003.; Gardner, J. W. & Sanborn, J. S. Years of Potential Life Lost (YPLL) – What does it means? Epidemiology, 1 (4): 322-329, 1990).

Prevalence – A measure of morbidity that expresses the frequency of cases of a certain disease existing in a given place and at the given period of time. It uses as a reference the population of the place, and is generally expressed under the form of percentages (Medronho, et al. Epidemiologia. São Paulo: Atheneu, 2003; Hennekens, C.H. et al., Epidemiology in Medicine. Boston: Little, Bowon & Co., 1987).

Prevention – A characteristic Public Health mode of action that assumes the knowledge of the natural history of diseases and the identification of risk factors. The preventive action aims at avoiding the occurrence, impeding its evolution and minimizing the consequences of a certain hazard. The preventive measures are classified as primary, secondary and tertiary according to the phases of application (Rouquayrol, MZ e Almeida Fo., N. Epidemiologia e Saúde. 5a. Ed., Rio de Janeiro: MEDSI, 1999).

Primary data – Primary data are considered as those that were produced specifically for providing answers to the objectives of a study, based on the utilization of collection instruments designed for the study in question. For example, in the victimization surveys, questions are put forth to a sample of the population, using for this purpose a structured questionnaire designed specifically for the study. Another way of obtaining information would be through secondary data, that is, data that already exists, collected for other purposes but which can provide information for what we want to study. As example we have the hospital records, police occurrence reports, etc.

Primary prevention – Primary prevention measures are considered as those that are conducted before the occurrence of the offense, the objective of which being to avoid said occurrence. In this group, specific protection measures are included – that aim towards specific risk factors – and measures for promoting health conditions – general measures that cause positive impacts in health conditions, such as measures related to housing, schooling, nutrition, etc. (Rouquayrol, MZ e Almeida Fo., N. Epidemiologia e Saúde. 5a. Ed., Rio de Janeiro: MEDSI, 1999).

Proportional mortality – A health indicator that measures the proportion of deaths from a specific cause or cause group, in relation to the total of deaths that occurred in a certain place and at a certain period of time. Usually expressed as percentage, it is a useful indicator for identifying priorities in the area of health and analysis of mortality profiles. The calculation is simple and does not require knowledge of population parameters (Medronho, et al. Epidemiologia. São Paulo: Atheneu, 2003).

Relative risk (RR) – The relation between two incidence coefficients (ex: mortality coefficient) with one being from a group that is exposed and the other from a group that is not exposed to a certain risk factor. For example, the male sex being a risk factor of firearm deaths, the relative risk is the result of the division between the male and female mortality coefficient. The RR indicates how much more frequent the occurrence of an offense is to those exposed as compared to those not exposed. If the RR is equal to one (01) this indicates that there is no difference between the two groups (Rouquayrol, MZ e Almeida Fo., N. Epidemiologia e Saúde. 5a. Ed., Rio de Janeiro: MEDSI, 1999; Rothman, KJ. Modern Epidemiology. Boston: Little, Brown and Co., 1986.)

Risk – Probability, the chance of an offense occurring (ex: homicide, death from a firearm) in a given population group.

Risk factor – A characteristic or circumstance, that when present, is found associated to a greater chance that an offense/hazard may occur (Rouquayrol, MZ e Almeida Fo., N. Epidemiologia e Saúde. 5a. Ed., Rio de Janeiro: MEDSI, 1999).

Road traffic accidents, deaths from – According to the International Classification of Diseases definition (ICD-10) "it is any accident that involves a vehicle destined, or used at the time of the accident, especially for the transportation of people or goods from one place to another". The pertinent codes are: ICD-9: E800 to E848; ICD-10: V01 to V99.

Sampling – A procedure through which part of a specific population is selected (sampling), that will be the direct object of the study. This selection is made in accordance with precise methodological procedures, so as to guarantee that the group selected will represent the population of which it is a part. Generally, population studies are conducted based on sampling (Berquó, E. et al. Bioestatística. São Paulo: EPU, 1981.Rosner, Bernard. Fundamentals of Biostatistics. Boston: PWS-Kent Publishing Company, 1990).

Suicides, deaths from – According to the ICD definition, included in this category are the deaths resulting from intentionally caused self-aggression. The pertinent codes are: ICD – 9: E950 to E958; ICD-10: X60 to Y84.

Undetermined intention, deaths of – A death where it was not possible to define whether it was due to an accident, suicide, or homicide. The pertinent codes are:ICD-9: E980 to E988; ICD-10: Y10 to Y34.

Victimization rates – Indicates the relation between the number of people that were victimized in a certain place and period of time, and the total population in the same place and period of time. Generally, it is expressed in percentages.

Victimization surveys – Population studies, the object of which is to know the distribution and frequency of the occurrence of crimes in the population, the population's awareness regarding violence and security, among other information related to the theme. Individuals of a certain population group are randomly selected to answer questionnaires with questions about crimes suffered in a determined period of time, as well as other relevant information for the study.

Firearm-related
violence in Brazil

NEV/USP