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Original Article

PERFIL EPIDEMIOLÓGICO DA MORTALIDADE POR CAUSAS EXTERNAS ENTRE BENEFICIÁRIOS DE PLANOS DE SAÚDE NO BRASIL

EPIDEMIOLOGICAL PROFILE OF MORTALITY BY EXTERNAL CAUSES AMONG HEALTH PLAN BENEFICIARIES IN BRAZIL

PERFIL EPIDEMIOLÓGICO DE LA MORTALIDAD POR CAUSAS EXTERNAS ENTRE BENEFICIARIOS DE PLANES MÉDICOS EN BRASIL

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RESUMO

Objetivos: descrever o perfil epidemiológico e a distribuição dos óbitos notificados por causas externas em beneficiários de planos de saúde no Brasil entre os biênios 2006-2007 e 2008-2009. **Método:** estudo epidemiológico e descritivo, cujos dados foram acessados no Sistema de Informações sobre Mortalidade em Saúde Suplementar em janeiro de 2016. Foram analisados por estatística descritiva, variações percentuais e razões de proporção entre os biênios. **Resultados:** evidenciou-se a notificação de 19.514 óbitos, no período 2006-2007 e 20.796 entre 2008-2009, com características similares, segundo as variáveis sociodemográficas, sendo que os óbitos ocorreram, principalmente, entre homens em idade produtiva (20 e 59 anos de idade) nos dois biênios (72,75%; 71,61%). Os óbitos por causas acidentais (transporte, quedas, afogamentos/submersões) foram prevalentes nos períodos (51,17%; 51,28%). Os registros de óbitos por causas externas entre beneficiários de planos de saúde se reduziram no Brasil, passando de 8,73% em 2006-2007 para 8,35% em 2008-2009, com variação percentual negativa de -4,35. Entretanto, aumentaram as notificações relacionadas com as quedas e lesões autoprovocadas (variação percentual positiva de 9,63 e 2,32, respectivamente). **Conclusão**: observou-se alteração da distribuição espacial dos óbitos por causas externas entre beneficiários de planos de saúde, permitindo análises para subsidiar medidas preventivas.
Descritores: Mortalidade; Causas externas; Saúde suplementar; Epidemiologia; Sistemas de informação.

ABSTRACT

Objective: to describe the epidemiological profile and the distribution of deaths due to external causes among health plans beneficiaries in Brazil between the biennia 2006-2007 and 2008-2009. **Method:** epidemiological and descriptive study whose data were accessed in the Information System on Mortality in Supplementary Health in January 2016. The study analyzed the data by descriptive statistics, percentage variations and proportion ratios between the biennia. **Results:** 19,514 deaths were reported in the 2006-2007 period and 20,796 deaths in the 2008-2009 period, with similar characteristics, according to sociodemographic variables, with deaths mainly occurring among men of productive age (between 20 and 59 years) in the two biennia (72.75%; 71.61%). Accidental deaths (transport, falls, drownings/submersions) were prevalent in the said periods (51.17%; 51.28%). Records of deaths due to external causes among health plans beneficiaries have decreased in Brazil, from 8.73% in 2006-2007 period to 8.35% from 2008 to 2009, with a negative percentage variation of -4.35. However, reports related to falls and self-harm have increased (positive percentage variations of 9.63 and 2.32, respectively). **Conclusion**: there was a change in the spatial distribution of deaths due to external causes among health plan beneficiaries, which allows analysis to support preventive measures.
Descriptors: Mortality; External causes; Supplemental health; Epidemiology; Information systems.

RESUMEN

Objetivos: describir el perfil epidemiológico y la distribución de los óbitos notificados por causas externas en beneficiarios de planes médicos en Brasil entre los bienios 2006-2007 y 2008-2009. **Método:** estudio epidemiológico y descriptivo, cuyos datos se accedieron a través del Sistema de Informaciones sobre Mortalidad en Salud Complementaria en enero de 2016. Se analizaron por medio de estadística descriptiva, cambios porcentuales y razones de proporcionalidad entre los bienios. **Resultados:** se evidenció la notificación de 19.514 óbitos en el período de 2006 a 2007 y 20.796 entre el 2008 y el 2009, con características similares, según las variables sociodemográficas, siendo que los óbitos sucedieron, principalmente, entre hombres en edad productiva (de 20 a 59 años de edad) en ambos bienios (72,75%; 71,61%). Los óbitos debido a causas accidentales (transporte, caídas, ahogos/sumersión) prevalecieron en esos períodos (51,17%; 51,28%). Los registros de óbitos por causas externas entre beneficiarios de planes médicos disminuyeron en Brasil, pasando de 8,73% en 2006-2007 a 8,35% en 2008-2009 con cambios porcentuales negativos de -4,35. Sin embargo, aumentaron las notificaciones relacionadas con las caídas y lesiones auto-provocadas (cambio porcentual positivo de 9,63 y 2,32, respectivamente). **Conclusión**: se observó el cambio de la distribución espacial de los óbitos provenientes de causas externas entre beneficiarios de planes médicos, permitiendo un análisis para subsidiar medidas preventivas.
Descriptores: Mortalidad; Causas externas; Salud complementaria; Epidemiología; Sistemas de información.

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INTRODUCTION

In the last decades, the demographic, epidemiological and technological transitions have influenced the dynamics of the mortality profile of the Brazilian population, generating a decline in the deaths caused by transmissible diseases, as well as an increase in those due to external causes[1]. Deaths and sequelae/disability caused by external causes are an important demand for public safety and health policies to be developed, implemented and followed in our country. Thus, at the present time, this subject is relevant for teaching, research and health care.

Among the deaths due to external causes there are homicides, suicides, physical, sexual and psychological abuse, traffic accidents, falls, drownings, injuries and poisonings, which nowadays are epidemic and are considered relevant problems for public health in the world[2-3]. According to the World Health Organization (WHO), approximately 5.1 million deaths are attributed to external causes[4] and this represents 9% of world mortality[1].

In Brazil, there has been an increase in the mortality rate due to external causes in the last 25 years[5,6]. In 2000 and 2010, external causes accounted for 12.5% and 12.9% of deaths, respectively[7]. Over the years, deaths from external causes are the most prevalent among individuals between the ages of 10 and 39, and nowadays it also occupies the first cause of death among children from zero to nine years of age[2]. According to the Ministry of Health, of all the specific causes of accidents and violence, homicides are the third cause of death in the male population, being overcome only by cerebrovascular diseases and acute myocardial infarction, which continue to lead the causes of death in the country[6].

A historical series (1979-2003) carried out in a state of Southeast Brazil showed a 50% increase in deaths from external causes, from 67.4/100 thousand deaths in 1979 to 101/100 thousand deaths in 2003[8]. Based on these data, it can be seen that, in spite of geopolitical, economic, social and educational differences, mortality due to violence and traffic accidents continues as a social, safety and public health problem in different parts of the world, including in Brazil.

Considering the existence of supplementary health as part of the Unified Health System[9] and the population contingent of approximately 49 million individuals with health insurance and plans in Brazil[10] as well as the gap in the scientific literature regarding studies that present a specific cut in mortality from external causes among users of supplementary health, the present study is justified, as it will enable stratifying vulnerable groups and regions to list intersectoral actions with a view to the prevention of these diseases at regional and national levels.

As a research question, it was established: how is the profile of mortality due to external causes presented among health plan beneficiaries in Brazil? To answer this question, the present study aimed to describe the epidemiological profile and the distribution of deaths by external causes among health plan beneficiaries in Brazil between the biennia 2006-2007 and 2008-2009.

METHOD

This is an epidemiological and descriptive study carried out in January 2016, using data from the Information System on Mortality (SIM) in Supplementary Health of the National Supplementary Health Agency (ANS), available through TABNET – a program which provides data in tables, produced by the Department of Informatics of the Unified Health System (DATASUS) of the Ministry of Health[11].

The study included all deaths of health plan beneficiaries, from all age groups, victims of external causes, in the periods 2006-2007 and 2008-2009 in the five Brazilian macro regions: North, Northeast, Southeast, South and Center-West regions, according to the place of residence. This time series was chosen for the unavailability of data in subsequent years. Ignored and/or inconsistent data in the electronic database were adopted as an exclusion criterion, totaling 21,935 records.

External causes were classified according to Chapter XX of the 10th International Classification of Diseases (ICD-10), comprising the following categories: accidents (V01-X59), suicides/intentional self-harm (X60-X84), homicides/assault (X85-Y09), undetermined (events of undetermined intent, Y10 to Y34), and the others being categorized in the "other" group. Among the accidental causes there were transport accidents (V01-V99); falls (W00-W19); and accidental drowning and submersion (W65-W74). Exposure to smoke, fire and flames; and poisoning/intoxication by chemical and/or harmful substance were included in the indeterminate to the detriment of the ignorance of intentionality.

The variables studied were: gender, age, race/color, schooling, marital status and place of death. Deaths were divided into age categories, according to the World Health Organization and the Ministry of Health, namely 0-19, 20-39, 40-59, 60 and over[11], being considered children and adolescents (0 -19 years), adults (20-59 years) and elderly (60 and over).

After the information was collected, the data was tabulated in a Microsoft Office Excel® spreadsheet. For the analysis of the categorical variables, the descriptive statistics was used, which was presented in tables of absolute and relative frequencies. The total number of deaths, number and percentage of deaths, percentage variation (PV) and ratio of deaths were calculated for the first and last biennium, corresponding to the periods of 2006-2007 and 2008-2009, in order to analyze the mortality behavior in this period among the supplementary health beneficiaries.

PV refers to the percentage difference between the absolute number of deaths in each chapter of ICD-10 before (x) and after investigation (y), calculated for each biennium by the following formula: $[(y-x)*100]/x$[12]. Thus, for the present study, the following formula was used: PV = [(percentage of deaths in 2008 to 2009 - percentage of deaths in 2007 to 2006) x 100]/percentage of deaths in 2006 to 2007. The calculation of proportional mortality due to external causes was performed by dividing the percentage of deaths from the period 2008-2009 by the percentage of deaths in the period 2006-2007.

Considering that the data used came from a public domain site, the study did not need to pass through the Research Ethics Committee, according to the ethical precepts established in Resolution 466/12 of the National Health Council[13].

RESULTS AND DISCUSSION

The findings of this study reveal that 19,514 deaths from external causes were reported in Brazil in the period 2006-2007 and 20,796 in the period 2008-2009. In both biennia, there was a predominance of records due to accidental causes, which included transport accidents, falls, drownings and accidental submersions (51.17%, 51.28%) (Table 1).

Table 1 - Distribution of deaths due to external causes among health plan beneficiaries by sex, age group and cause in Brazil, biennia 2006-2007 and 2008-2009. Brazil, 2016**.**

	Biennium 2006-2007				**Biennium 2008-2009**				**Total of deaths**	
	Male		Female		Male		Female			
	n	%	n	%	n	%	n	%	n	%
Variable										
	14,735	**36.55**	**4,779**	**11.86**	**15,665**	**38.86**	**5,131**	**12.73**	**40,310**	**-**
Sex										
Age range (years)										
00 ├ 20	1,433	9.73	523	10.95	1,464	9.35	494	9.63	3,914	9.71
20 ├ 40	6,650	45.13	1,244	26.03	7,029	44.87	1,215	23.68	16,138	40.03
40 ├ 60	4,070	27.62	976	20.42	4,189	26.74	957	18.65	10,192	25.28
≥ 60	2,582	17.52	2,036	42.60	2,983	19.04	2,465	48.04	10,066	24.98
Specific Cause										
Transport accidents	5,987	40.61	1,721	35.94	6,277	41.49	1,619	31.47	15,604	39.20
Assaults (Homicides)	3,519	23.87	435	9.08	3,588	23.72	425	8.26	7,967	20.01
Falls	941	6.38	701	14.64	1,076	7.11	791	15.37	3,509	8.82
Intentional self-harm (Suicides)	1,167	7.92	431	9.00	1,266	8.37	449	8.73	3,313	8.32
Drowning / Accidental Submersion	564	3.83	79	1.65	546	3.6	87	1.69	1,276	3.21
Undetermined	250	1.70	90	1.88	281	1.86	72	1.40	693	1.74
Other	2,313	15.69	1,332	27.81	2,095	13.85	1,702	33.08	7,442	18.70
Brazil	**14,741**	**-**	**4,789**	**-**	**15,129**	**-**	**5,145**	**-**	**39,804**	**100**

Source: SIM/ANS/DATASUS, 2016.

The results show that, in both biennia, there was a predominance of deaths due to external causes said accidental among clients of health plans in Brazil in relation to violence, corroborating studies carried out in the Southeast (60.4%)[14] and Center-West (87%)[15] of Brazil, as well as in East Africa (44.2%)[16], related to general mortality due to external causes.

Regarding sex, in both periods, the highest percentages occurred among the male beneficiaries, representing 75.41% (n = 30,400) of the deaths between 2006 and 2009. In 2013, data from the Brazilian Ministry of Health indicated that external causes accounted for 151,683 deaths, the majority of which were among men (82.2%)[10]. The prevalence of deaths in men was also found in Australia (51.4%),[17] and in Poland (75.2%)[18], thus reinforcing the predominant presence of men in the composition of deaths due to external causes in the world panorama. This shows the male vulnerability to these types of diseases, possibly due to behaviors and activities that they take on socially and that put them at greater risk[19].

Considering the age range, deaths were more significant among young men of productive age (20 and 59 years), with the highest absolute frequency in the age group of 20 to 39 years for the two biennia (45.13%; 44.87%), similar to the investigation carried out in the state of Minas Gerais, Brazil, in which the prevalence of deaths due to external causes among young people was 43.5%[14]. Among women, the predominant age group was 60 years old or over, with emphasis on the biennium 2008-2009 (48.04%; n = 2,465), which can be justified, firstly, because the coverage rate of health plans between them was higher than the male sex in this period and, secondly, by the significant difference in coverage with advancing age, reaching a rate of 30.7 for women and 22.7 for men over 80 years in 2009[11].

In this way, women presented a high percentage of deaths in this age group because they represent the largest number of beneficiaries in relation to men. In addition, the records of these deaths may be associated with the occurrence of falls, since they represented the second cause of death among the female beneficiaries. It is known that advanced age is related to conditions predisposing to falls, such as anatomical, physiological and physical changes due to the aging process associated with chronic diseases, comorbidities and architectural barriers[20].

Another characteristic that should be highlighted is the discrepancy between the proportion of deaths due to external causes among the male/female sex, evidenced in the countries of the Americas, including Brazil[14,21], inciting the magnitude of early deaths due to external causes in young men. In Brazil, the standardized coefficient of mortality due to accidental and violent causes is higher in males, however, the indices tend to decrease with the increase of the age of these individuals[22]. These issues are directly related to the demographic and epidemiological changes we have observed nowadays, which lead to a higher life expectancy among women and a greater contingent of women among people over 60 years of age.

In this study, in spite of the reduction in the number of deaths in the age group below 20 years for the biennium 2008-2009, it was verified that approximately 10% of the fatal victims due to external causes were children or adolescents. Deaths in the child and adolescent population in other geographical locations present a mortality rate of 17.73% in the age group from zero to 19 years[5].

In Belo Horizonte, Minas Gerais, external causes accounted for 18.2% of cases of hospitalizations among adolescents associated to a private health plan[23], reinforcing the importance of age and sex as predictors in the profile of mortality due to external causes in the population benefiting from health plans for the elaboration of preventive measures at the local, regional and national levels.

Transport accidents ranked first among mortality rates among supplementary health beneficiaries. This result may be related to the growing fleet of vehicles, poor road conditions, lack of inspection and impunity for transgressors, which certainly contributes to the increase in land transport accidents in Brazil[6].

This finding is also consistent with the results of a study conducted in the state of Mato Grosso, which identified an increase in the number of deaths due to transport-related accidents (17.39%) in the biennium 2009-2010[15]. It is also worth noting that recent international studies have shown that transport accidents are the main cause of death in the female population[18,22], evidencing the fragility of control and preventive actions in predisposing factors

and the exposure of men and women to this type of injury on the world stage.

In both biennia, the assaults corresponded to the second cause of death among the male population benefiting from health plans, diverging from that found at the national level, which identified the aggressions as the leading cause of death in males[6,22]. Among women, homicides were the third cause of deaths for the biennium 2006-2007, moving to the fourth place in the second period of analysis (2008-2009). In the state of Bahia, homicides and land transport accidents were the main causes of death, since together, in 2006 and 2010, they accounted for 57.5% and 79.9% of fatal cases, respectively, by external causes[5]. Although there are signs of decrease in Brazil, homicides and traffic-related injuries account for almost two-thirds of all deaths from external causes[24].

Deaths from falls were prevalent among female beneficiaries, representing the second most frequent cause of death. This finding contradicts a study conducted in the metropolitan area of Belo Horizonte, which found a prevalence ratio of 3.4 male deaths to 1 female death[14]. When analyzing the fatal cases related to falls, it is estimated that the risk of death is higher among the elderly[6]. Therefore, it is evident that these deaths are predominant among women over 60 years of age[20,25]. In this sense, the results of the present study, which identified the highest rates of death in women concentrated in the age of 60 or older, corroborate national data, which show that deaths from falls have been observed in elderly women (42.3%)[26].

Falls have been related to old age, female gender, need of aid to walk and diagnosis of osteoporosis[27]. In Paraná[20] and in Rio Grande do Sul[25], the majority of falls have occurred in the elderly's home, and may be justified by the exercise of domestic activities by women[20].

With regard to cases of voluntary self-harm, suicides have been prevalent among women, becoming the third cause of death for the biennium 2008-2009, with 8.73% of the cases (n = 449). This result is dissonant to that found in the national literature that portrays higher suicide rates in Brazil among men in relation to women in 2010 (10.7 and 3.4 per hundred thousand inhabitants, respectively)[22].

However, although the percentage of deaths due to this specific cause among women is higher, the standardized rates are lower than that of the male gender, which in turn has a higher proportion of aggressive deaths[22]. Sex, age, culture and ethnicity have important implications for the epidemiology of suicide in the world, and Brazil is the eighth country in terms of deaths from self-harm[6].

The high mortality rates due to accidental and violent causes in Brazil are influenced by sociocultural determinants and have been associated with the model chosen for the priority transportation system on the roads and in the use of private cars without adequate road infrastructure[24]. In addition, in the face of high rates of traffic violations, much of the violence is associated with abusive use of alcohol and illicit drugs and the widespread availability of firearms[24]. It should be noted that particularly in this study, the association between alcohol intake and deaths was not verified, however, a study in East Africa showed that of the 143 deaths from external causes, 14.68% were associated with alcoholism[16].

Therefore, strategic planning, adequate infrastructure and the performance of public and private agencies are required to supervise and regulate prevention actions and educational practices in order to minimize the damages caused by external causes of health plan and insurance beneficiaries in the country.

In this work, a disturbing fact is the high rate of deaths whose cause was undetermined or classified as "other", since together they corresponded to almost a quarter of the deaths investigated in that period. This may dissemble the actual causes of deaths from external causes, especially in females, which has considerably increased the number of registrations in the "other" category for the biennium 2008-2009 (33.08%), signaling the fragility of the information system for a possible underreporting of cases by public and private agencies, regardless of government spheres. However, the SIM has become a relevant source of health information in Brazil and presented improvements in the quality of records of death due to external causes[6], which, in turn, reflects the veracity of national notifications.

As to the sociodemographic profile of the victims affected by external causes, similar characteristics have been observed between the two biennia, with prevalence of single (45.00%), white race/color (68.61%) and five to 11 years of schooling (34, 48%). The place of death occurred predominantly in the tertiary care network (Table 2).

Table 2 - Distribution of deaths due to external causes among health plan beneficiaries according to sociodemographic variables in Brazil, 2006-2007 and 2008-2009. Brazil, 2016.

Variable	Deaths biennium 2006-2007		Deaths biennium 2008-2009		Total of deaths	
	N	%	N	%	n	%
Marital status						
Single	8,267	45.47	8,652	44.55	16,919	45.00
Married	6,993	38.47	7,339	37.79	14,332	38.12
Widowed	1,741	9.58	2,171	11.18	3,912	10.40
Judicially separated	1,075	5.91	1,242	6.39	2,317	6.16
Consensual marriage	103	0.57	18	0.09	121	0.32
Total	**18,179**	-	**19,422**	-	**37,601**	**100**
Color/Race						
White	12,724	68.24	13,804	68.95	26,528	68.61
Brown	5,028	26.97	5,306	26.50	10,334	26.73
Black	754	4.05	716	3.58	1,470	3.80
Yellow	133	0.71	190	0.95	323	0.83
Indigenous	6	0.03	5	0.02	11	0.03
Total	**18,645**	-	**20,021**	-	**38,666**	**100**
Schooling (in years)						
00-00	408	3.20	338	2.36	746	2.75
01-03	1,761	13.78	1,587	11.06	3,348	12.34
04-07	3,319	25.96	3,800	26.48	7,119	26.24
05-11	4,210	32.93	5,145	35.85	9,355	34.48
>12	3,085	24.13	3,480	24.25	6,565	24.19
Total	**12,783**	-	**14,350**	-	**27,133**	**100**
Place of Occurrence						
Hospital	9,268	53.64	10,295	54.77	19,563	54.23
Residence	1,946	11.26	2,151	11.44	4,097	11.36
Public streets	407	2.36	409	2.18	816	2.26
Other	5,656	32.74	5,943	31.61	11,599	32.15
Total	**17,277**	-	**18,798**	-	**36,075**	**100**

Source: SIM/ANS/DATASUS, 2016.

The distribution of deaths related to the characterization of beneficiaries victimized by external causes, according to the variable marital status, is in line with a study carried out in Piauí, which pointed out the prevalence of deaths due to external causes among the unmarried individuals (71.74%), followed by married individuals (21.89%)[28].

Considering the variable ethnicity, in this study, the white race predominated. Whereas a research in the Brazilian Southeast region identified the white ethnicity in 77.9% of the deaths[29], another study conducted in Bahia showed the opposite, with 71.56% of deaths in the black race[5]. This fact can be justified due to the Brazilian miscegenation and the number of individuals who declare themselves as black or brown in the Northeast region to be higher than in the Southeast region, as presented by the demographic census of the year 2010[30].

This research demonstrated that the highest percentage of deaths due to external causes were among beneficiaries with schooling between five and 11 years of schooling, thus inferring that the victims had completed elementary and high school, similar to the data found in the scientific literature[8,29]. The highest proportion of attendances due to accidents and violence are observed among individuals who reported having completed 9 to 11 years of schooling with 32% and 26.8%, respectively[3].

These peculiarities may be related to social inequalities, expressed by differences in

race/color, schooling, income and access to services and goods, resulting from social inequities, conflicts and violence[31], which interfere in the sociodemographic characteristics of the population. Therefore, it is necessary to study the association between the educational level of the beneficiaries in relation to the accidental and violent causes, including the indirect relation of this indicator to the socioeconomic levels of this specific population.

The place of occurrence of the deaths was predominantly in the hospital area, according to a study developed in the state of Bahia, which identified 41.28% of all deaths occurred in a hospital environment[5]. It is inferred from the seriousness of the cases, since they required tertiary care, as well as the responsibility that civil society and government agencies have in offering quality health care facilities, interdisciplinary teams trained to care for victims and subsequent notification of cases.

The total number of deaths and the behavior of mortality due to external causes among the beneficiaries of Brazil's supplementary health system are shown in Tables 3 and 4.

Table 3 - Total deaths, number and percentage, percentage variation and ratio of deaths due to external causes among health plan beneficiaries according to Brazilian macro-regions, 2006-2007 and 2008-2009. Brazil, 2016.

Variable	Total of deaths		Deaths from external causes					
	2006-2007	2008-2009	2006-2007		2008-2009			
	n	N	n	% (a)	n	% (b)	Variation(%)	Ratio of Proportion (b/a)
Region								
Southeast	156,330	176,307	12,292	7.86	13,233	7.51	- 4.45	0.95
South	26,607	30,386	2,906	10.92	3,114	10.25	- 6.13	0.94
Northeast	26,687	27,056	2,616	9.80	2,611	9.65	- 1.53	0.98
Center-West	9,260	10,071	1,165	12.58	1,262	12.53	- 0.40	1.00
North	4,794	5,276	551	11.49	591	11.20	- 2.52	0.97
Brazil	**223,678**	**249,096**	**19,530**	**8.73**	**20,811**	**8.35**	**- 4.35**	**0.96**

Source: SIM/ANS/DATASUS, 2016.

There is a downward trend in deaths from external causes in Brazil, from 8.73% in 2006-2007 to 8.35% in 2008-2009, with a negative percentage variation of -4.35. The data show an increase in the records of deaths related to falls and self-harm for the biennium 2008-2009 (Table 4).

Table 4 - Total of deaths due to external causes, percentage, percentage variation and ratio of proportion of deaths due to specific causes among health plan beneficiaries in Brazil, 2006-2007 and 2008-2009. Brazil, 2016.

Variable	Deaths from external causes					
	2006-2007		2008-2009			
	N	% (a)	n	% (b)	Variation (%)	Ratio of Proportion (b/a)
Specific Cause						
Transport accident	7,708	39.47	7,896	39.00	- 1.19	0.99
Assaults (Homicide)	3,954	20.25	4,013	19.81	- 2.17	0.98
Falls	1,642	8.41	1,867	9.22	9.63	1.10
Intentional self-harm (Suicides)	1,598	8.18	1,697	8.37	2.32	1.02
Drowning/Accidental Submersion	643	3.29	633	3.12	- 5.17	0.95
Undetermined	340	1.74	353	1.74	0.00	1
Other	3,645	18.66	3,797	18.74	0.43	1.00
Brazil	**19,530**	**8.73**	**20,274**	**8.35**	**- 4.35**	**0.96**

Source: SIM/ANS/DATASUS, 2016.

In the biennia studied, there was a reduction in the percentage of deaths due to external causes among health plan beneficiaries in Brazil, in all Brazilian macro-regions. Analyzing the percentage variation and the ratio of proportion, it can be observed that the South and Southeast regions presented the highest percentages of reduction in the reported cases. Notably, the Southeast region presents the lowest standardized mortality rates due to external causes, followed by the South region, with coefficients of 13% and 14% for the male and female sex, respectively[22]. Despite the slight reduction in deaths among beneficiaries in the Center-West region, found in the present study, it is in line with research conducted in the state of Mato Grosso, which reported a 19.35% of decline in deaths from external causes for the biennium 2009-2010[15].

Among the main justifications for the reduction of deaths in these two Brazilian regions may be the reduction, although in a very heterogeneous way, of mortality rates due to land transport accidents[32]. For some countries of the Americas, there has been a reduction in homicide rates; however, it has remained stable in Brazil, since the mean annual variation was not statistically significant in the period of 1999-2009[21]. However, it is noted that, between 2004 and 2007, there was a slight decrease in rates of assault and a slight increase between 2007 and 2009[21]. Among the health plan beneficiaries in Brazil, transportation accidents and assaults represented a significant reduction in the reported cases, especially in the female population, with repercussions on the mortality profile of the supplementary health beneficiaries for the biennium 2008-2009.

Despite the decrease in homicide cases, it is noted that the other circumstances of death increased for males in the 2008-2009 biennium. Socioeconomic conditions and access to health services are factors that influence the growth and decrease of deaths due to external causes in the male population[33]. These variables have not been investigated by the present study due to the unavailability of this information in the database.

However, there was an increase in external causes related to falls and self-harm among the Brazilian beneficiary population. There has been a progressive trend of the crude mortality rate due to falls in Brazilian elderly people from 2005 to 2009[34], which may justify the growing registry of this cause of death in the beneficiary population that presented the highest percentage of deaths in individuals aged 60 and over in the period from 2008 to 2009 (2.53% higher than in the biennium 2006-2007).

Regarding suicide rates, data from the SIM for the year 2010 pointed out that in Brazil the coefficients have gradually decreased with the increase of the age among the men and inversely among the women[22], which may not correspond to the Brazilian population benefiting from supplementary health, since for the 2008-2009 period there was an increase in deaths among elderly individuals and a growing number of deaths due to suicides among men. Given the importance of this data, this variation should be analyzed in subsequent studies.

Thus, it was not possible to identify the circumstances that influenced the behavior of the deaths, either to a growing or decreasing trend of the cases reported in the national territory. However, when analyzing these data, it is possible to identify the spatial distribution of deaths due to accidents and violence among beneficiaries of private insurance plans in Brazil.

It is important to highlight that the studies that evaluate the mortality rates due to external causes in Brazil are, in most cases, based on secondary data from the SIM and, therefore, have some limitations. One of these limitations stems from the quality of the SIM data since, despite the fact that, over the years, records have improved in this system[35], the under-registration of information on the basic cause of death or a high percentage of deaths classified as "death by undetermined intention" may still occur, and this leads to the underestimation of the mortality coefficients for external causes.

In addition, in the case of deaths due to accidental causes, specifically regarding transport accidents, the supplementary health database does not specify the category of the accident and does not discriminate the means of transportation of the victims, which restricts the analysis of the data and prompts reflection to include these items in the ministerial platform.

It is suggested that further studies investigate the spatial distribution of deaths due to external causes between the sexes, since it was not possible to elucidate the variations in the Brazilian territory. These characteristics limited the present study and could be explored in the

future, along with association tests between variables and influence of socioeconomic determinants.

CONCLUSION

This study concluded that the victims of external causes benefiting from health plans in Brazil were, in both biennia, mainly men of productive age, while among women there was a high rate of death in the age group from 60 years. Accidental causes prevailed in relation to violence, and among the specific causes there were transport accidents, followed by homicides for males and falls for females.

The results showed a change in the spatial distribution of deaths due to accidents and violence in the Brazilian macro-regions with an increase in reports of cases related to falls and self-harm, and the need for improvements in the reporting of deaths due to external causes in the supplementary health beneficiary population. It is hoped that this research may allow analyzes to subsidize improvements in the quality of notification of these cases, as well as to incite preventive measures in the public/private relationship with health care providers in order to reduce deaths due to external causes among clients of Brazilian private insurance plans.

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