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Mortality from external causes in Pernambuco, 2001-2003 and 2011-2013

Mortalidade causas externas em Pernambuco,2001-2003 e 2011-2013

Mortalidad por las causas externas en Pernambuco, 2001-2003 y 2011-2013

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ABSTRACT

Objective: to describe the mortality from external causes, by Health Regions in Pernambuco, during the periods of2001-2003 and 2011-2013. **Method:** descriptive study with data from the Mortality Information System. For data analysis we used percentage, percentage variation and proportion ratio. **Results:** mortality from external causes reduced in Pernambuco, however, mortality increased in some health regions of the countryside. Increased numbers of deaths from accidents and event of undetermined intent were registered. There was an increase of deaths classified as "other/unspecified" event of undetermined intent. **Conclusion:** there was a change in the spatial distribution of mortality from external causes moving to Pernambuco countryside regions. We found necessity for data classification regarding deaths from external causes and strengthening of the monitoring.

Key words: Mortality; External Causes; Information Systems.

RESUMO

Objetivo: descrever a distribuição dos óbitos por causas externas, por Região de Saúde de Pernambuco, nos períodos 2001-2003 e 2011-2013. **Método:** estudo descritivo, cuja fonte de dados foi o Sistema de Informação sobre Mortalidade. Para análise foram utilizados percentuais, variações percentuais e razões de proporção. **Resultados:** os óbitos por causas externas reduziram em Pernambuco, entretanto aumentaram em algumas Regiões de Saúde do interior. Registrou-se aumento dos óbitos por acidentes e intenção indeterminada. Houve aumento dos óbitos classificados como "outros/não especificados" de intenção indeterminada. **Conclusão:** observou-se alteração da distribuição espacial dos óbitos por causas externas, deslocando-se para o interior de Pernambuco. Verificou-se ainda a necessidade da qualificação dos dados dos óbitos por causas externas e o fortalecimento do monitoramento.

Descritores: Mortalidade; Causas Externas; Sistemas de Informação.

RESUMEN

Objetivo: describir la distribución de óbitos por causas externas, por Región de Salud de Pernambuco, en los períodos de 2001-2003 y 2011-2013. **Método:** estudio descriptivo, cuya fuente de datos fue el Sistema de Información sobre Mortalidad. Para análisis fueron utilizados porcentajes, variaciones porcentuales y razón de proporción. **Resultados:** los óbitos por causas externas se redujeron en Pernambuco, pero aumentaron en algunas Regiones de Salud del interior. Se registró un aumento de los óbitos por accidentes e intención indeterminada. Hubo aumento de los óbitos clasificados como "otros/no especificados" de intención indeterminada. **Conclusión:** fue posible observar la alteración de la distribución espacial de los óbitos por causas externas para el interior de Pernambuco. Se verificó también necesidad de la cualificación de los datos de los óbitos por causas externas y el fortalecimiento del seguimiento.

Palabras clave: Mortalidad; Causas Externas; Sistema de Información.

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INTRODUCTION

In recent decades, external causes have been highlighted in health statistics of most countries, becoming a public health problem[1]. They represented the third group of most frequent causes of death in the country during the period 2000-2010[2-3]. They had as main circumstances assault (homicide) and vehicle and traffic injuries (VTI)[4]. In the State of Pernambuco (PE), external causes ranked second in 2010 (14.6% of deaths), the ones caused by VTI were more frequent[2]. According to Minayo[4], mortality from external causes occurred in the country have characteristics that make them unique compared to other causes. They are: persistence of high mortality rates from these causes in the past 25 years, much heterogeneity among municipalities, spatial dispersion of VTI, increase in suicides among the elderly, concentration in young adult males and high mortality rates from firearms.

Upon the occurrence of mortality from external causes, the body must be sent to the Institute of Legal Medicine (ILM) so that the autopsy and the Death Certificate (DC) can be performed and completed by a forensic expert. However, sometimes the DC does not have information on the type of accident or assault that caused death. This raises the number of certificate statements coded as "events of undetermined intent"[5-6].

High proportions of these deaths limit the knowledge of their profile and the performance of epidemiological surveillance actions[7]. In addition, they reveal weakness of the Legal Medicine System in assessing the reason that led to mortality, which is the underlying cause of death[8].

In PE state, the mortality rate due to external causes for event of undetermined intent increased from 3.4/100,000 inhabitants in 1996 to 7.4/100,000 inhabitants in 2010[8].

Given the importance of monitoring the mortality from external causes as a strategy to assess its progress and its implemented policy impacts, this study aimed to analyze the distribution of deaths by external causes, in the periods 2001-2003 and 2011-2013, by Health Region (HR) in PE.

METHOD

Descriptive study conducted in PE state and its 12 health regions (HR). Pernambuco has 184 municipalities and a province (Fernando de Noronha), divided into 12 HR, separated in order to provide support to municipalities and Fernando de Noronha Island. Each HR is responsible for primary care work, restructuring the hospital network, municipal actions, combating endemic diseases and mortality.

The empirical material of the study consisted of all deaths and deaths from external causes recorded in the Mortality Information System (MIS) of PE state in the periods 2001-2003 and 2011-2013, according to the place of occurrence.

We selected mortality by place of occurrence because, according to the Ordinance GM/MS No. 116, 2009[9], typing and the DC processing are given in the municipality where the death occurred.

We chose the periods 2001-2003 and 2011-2013 in order to perform comparison after ten years. Data were grouped in three-year periods in order to avoid the instability of small numbers.

For analysis, data were extracted from the MIS, on the website of the Informatics Department of SUS[1] (Datasus). Later, they were tabulated in TabWin software version 3.5, organized and distributed by HR on tables using Microsoft Office Excel®. We calculated the percentage, the percentage variation and the proportion ratio. The last two are used to analyze the behavior registry from one period to another from the study.

In order to calculate the percentage variation (PV) we used the following formula: PV = [(percentage of mortality in 2011-2013 - Percentage of mortality in 2001-2003)/ percentage of mortality in 2001-2003] x 100.

To calculate the proportion ratio we divided the percentage of mortality in the period 2011-2013 by the percentage of mortality in the period 2001-2003.

The HR which did not show percentage variation and percentage ratios corresponded to those which did not have death records from 2001-2003 or at neither periods studied. The HR that presented negative percentage variation -100% corresponded to those which did not have death records in 2008-2010, with records only from 2001-2003.

We have also calculated the percentage and the percentage variation of deaths from external causes according to the circumstances of these deaths - accidents (V01-X59), intentional self-harm (suicide - X60-X84), assault (X85-Y09), event of undetermined intent (Y10 -Y34) and others (Y35-Y98); and according to the nature of the injury (type of injury that caused death) of deaths from external causes for events of undetermined intent - poisoning (Y10-Y19), hanging (Y20), drowning (Y21), handgun discharge/explosive material (Y22-Y25), smoke/fire/flame/hot vapours/gas/hot objects (Y26-Y27), sharp/blunt object (Y28-Y29) and other/unspecified (Y30-Y34).

The research was conducted according to Resolution of the Brazilian National Health Council (CNS) number 466/2012. It was submitted to the Research Ethics Committee (REC) of the Health Sciences Center (CCS) at the Universidade Federal de Pernambuco (UFPE), protocol No. 384184 of September 4, 2013. There was no conflict of interest in performing the study.

RESULTS

There were 22087 deaths registries due to external causes in PE during 2001-2003 and 21,959 in 2011-2013. Although there was a reduction in the percentage of these deaths, from 14.06% to 12.68%, with a negative percentage variation -9.81% (Table 1).

The highest percentages of deaths from external causes occurred in the 8th, 1st and 3rd HR in the period 2001-2003, and in the 9th, 8th and 12th HR in the 2011-2013. There was an increase registries in the eighth HR, especially in the 10th and 9th HR, respectively (Table 1).

1 The Unified Health System, *Sistema Único de Saúde* in portuguese, is well known by its acronym SUS.

Table 1 - Total mortality, number and percentage, percentage variation and proportion ratio of deaths due to external causes by Health Region, Pernambuco, Brazil, 2001-2003 and 2011-2013

Health region (HR)	Mortality		Mortality caused by external causes				Variation %	Proportion ratio (b/a)
	2001-2003	2011-2013	2001-2003		2011-2013			
			n	% (a)	n	% (b)		
1st HR	82.122	94.989	12.887	15.69	11.927	12.56	-19.99	0.80
2nd HR	7.330	7.893	939	12.81	929	11.77	-8.12	0.92
3rd HR	8.827	7.274	1.241	14.06	984	13.53	-3.78	0.96
4th HR	21.390	23.199	2.639	12.34	2.965	12.78	3.59	1.04
5th HR	8.856	9.706	926	10.46	1.092	11.25	7.60	1.08
6th HR	5.771	5.549	612	10.60	664	11.97	12.84	1.13
7th HR	1.938	2.133	210	10.84	257	12.05	11.19	1.11
8th HR	6.009	6.958	1.004	16.71	1.063	15.28	-8.56	0.91
9th HR	3.950	4.551	496	12.56	801	17.60	40.17	1.40
10th HR	2.965	3.155	161	5.43	260	8.24	51.77	1.52
11th HR	3.662	3.995	418	11.41	468	11.71	2.63	1.03
12th HR	4.304	3.802	554	12.87	549	14.44	12.18	1.12
Ignored region	1	-	-	-	-	-	-	-
Pernambuco	157.125	173.204	22.087	14.06	21.959	12.68	-9.81	0.90

Source: MIS, 2001-2003 and 2011-2013.

Table 2 - Percentage* of mortality from external causes according to their circumstances by Health Region, Pernambuco, Brazil, 2001-2003 and 2011-2013

Health region (HR)	2001-2003					2011-2013				
	Accidents	Intentional self-harm (Suicide)	Assault (Homicide)	Undetermined Intention	Other	Accident	Intentional self-harm (Suicide)	Assault	Undetermined Intention	Other
1st HR	26.00	2.73	64.70	5.09	1.47	38.27	2.78	44.74	13.52	0.70
2nd HR	30.78	4.26	60.17	4.58	0.21	41.44	7.00	48.65	2.58	0.32
3rd HR	32.31	2.58	62.53	1.69	0.89	38.72	3.86	56.40	0.81	0.20
4th HR	34.14	4.36	56.76	3.64	1.10	43.64	5.60	47.52	1.82	1.42
5th HR	40.93	6.91	50.22	1.94	0.00	49.27	7.05	41.58	1.83	0.27
6th HR	36.27	6.05	56.37	1.14	0.16	44.58	5.57	45.93	3.77	0.15
7th HR	43.81	7.62	46.19	0.95	1.43	54.09	10.51	29.18	5.84	0.39
8th HR	36.95	5.28	54.28	2.89	0.60	55.50	4.80	33.77	5.08	0.85
9th HR	40.93	8.67	48.39	1.81	0.20	56.43	6.74	33.08	3.75	0.00
10th HR	44.72	5.59	46.58	1.86	1.24	56.54	9.23	31.92	1.54	0.77
11th HR	36.60	8.13	53.83	0.96	0.48	50.00	9.40	36.32	2.35	1.92
12th HR	33.39	3.61	58.48	3.61	0.90	39.53	4.55	53.01	2.73	0.18
Pernambuco	29.97	3.69	61.09	4.11	1.14	42.07	4.28	44.42	8.52	0.71

Source: MIS, 2001-2003 and 2011-2013.
Note:
** Percentage of mortality by external causes according to their circumstances in relation to mortality from external causes by Health Region.*

Table 3 - Percentage variation and proportion ratio of deaths according to their circumstance by Health Region, Pernambuco, Brazil, 2000-2002 and 2008-2010

Health region (HR)	Accidents		Intentional self-harm (Suicide)		Assault (Homicide)		Undetermined intent		Others	
	PV	PR	PV	PR	PV	PR	PV	PR	PV	PR
1st HR	47.19	1.47	1.60	1.02	-30.85	0.69	165.51	2.66	-52.80	0.47
2nd HR	34.65	1.35	64.25	1.64	-19.14	0.81	-43.59	0.56	51.61	1.52
3rd HR	19.83	1.20	49.76	1.50	-9.80	0.90	-51.96	0.48	-77.07	0.23
4th HR	27.83	1.28	28.48	1.28	-16.28	0.84	-49.93	0.50	28.90	1.29
5th HR	20.37	1.20	2.02	1.02	-17.21	0.83	-5.78	0.94	-	-
6th HR	22.89	1.23	-7.83	0.92	-18.52	0.81	229.17	3.29	-7.83	0.92
7th HR	23.46	1.23	37.89	1.38	-36.82	0.63	512.84	6.13	-72.76	0.27
8th HR	50.20	1.50	-9.11	0.91	-37.78	0.62	75.87	1.76	41.67	1.42
9th HR	37.88	1.38	-22.24	0.78	-31.63	0.68	106.41	2.06	-100.00	-
10th HR	26.43	1.26	65.13	1.65	-31.47	0.69	-17.44	0.83	-38.08	0.62
11th HR	36.60	1.37	15.59	1.16	-32.52	0.67	145.62	2.46	301.92	4.02
12th HR	18.37	1.18	26.14	1.26	-9.37	0.91	-24.32	0.76	-79.82	0.20
Pernambuco	40.38	1.40	15.89	1.16	-27.29	0.73	107.37	2.07	-37.73	0.62

Source: MIS, 2001-2003 and 2011-2013.
Note:
PV: Percentage Variation;
PR: Poportion ratio.

Table 4 - Percentage* of mortality from external causes of undetermined intent by nature of injury and Health Region, Pernambuco, Brazil, 2001-2003 and 2011-2013

Health region (HR)	2001-2003							2011-2013						
	A	B	C	D	E	F	G	A	B	C	D	E	F	G
1st HR	5.64	3.20	26.07	5.34	5.18	26.52	28.05	2.79	1.24	6.02	0.68	0.93	8.19	80.15
2nd HR	2.33	11.63	30.23	11.63	2.33	9.30	32.56	4.17	20.83	20.83	4.17	4.17	33.33	12.50
3rd HR	-	4.76	28.57	9.52	4.76	9.52	42.86	-	12.50	37.50	-	-	25.00	25.00
4th HR	3.13	12.50	35.42	16.67	5.21	18.75	8.33	12.96	7.41	11.11	-	3.70	33.33	31.48
5th HR	11.11	-	27.78	16.67	-	5.56	38.89	35.00	5.00	25.00	5.00	-	10.00	20.00
6th HR	14.29	-	14.29	42.86	14.29	-	14.29	8.00	16.00	32.00	4.00	-	4.00	36.00
7th HR	50.00	50.00	-	-	-	-	-	13.33	13.33	33.33	-	-	20.00	20.00
8th HR	10.34	3.45	34.48	3.45	-	24.14	24.14	0.00	7.41	48.15	1.85	1.85	7.41	33.33
9th HR	33.33	22.22	22.22	-	-	11.11	11.11	3.33	6.67	40.00	3.33	-	10.00	36.67
10th HR	-	100.00	-	-	-	-	-	25.00	-	25.00	25.00	-	-	25.00
11th HR	25.00	25.00	25.00	-	-	25.00	-	9.09	27.27	18.18	-	-	18.18	27.27
12th HR	-	10.00	45.00	-	5.00	10.00	30.00	-	-	53.33	-	-	-	46.67
Pernambuco	5.73	5.40	27.75	7.16	4.74	23.13	26.10	3.58	2.46	9.51	0.91	1.01	9.35	73.18

Source: MIS, 2001-2003 and 2011-2013.
Note:
** Percentage of mortality from external causes of undetermined intent by nature of injury in relation to the mortality from external causes of undetermined intent by Health Region and Pernambuco.*
A: Poisoning; B: Hanging; C: Drowning; D: Handgun discharge/Explosive Material; E: Smoke/Fire/Flames/Vapour/gas/hot objects; F: Sharp object/blunt; G: Others/unspecified.

Table 5 - Percentage variation and proportion ratio of deaths due to external causes of undetermined intent by nature of injury, Pernambuco, Brazil, 2001-2003 and 2011-2013

Health region (HR)	A		B		C		D		E		F		G	
	PV	PR	PV	PR	PV	PR	PV	PR	PV	PR	PV	PR	PV	PR
1st HR	-50.51	0.49	-61.24	0.39	-76.92	0.23	-87.21	0.13	-82.05	0.18	-69.13	0.31	185.75	2.86
2nd HR	79.17	1.79	79.17	1.79	-31.09	0.69	-64.17	0.36	79.17	1.79	258.33	3.58	-61.61	0.38
3rd HR	-	-	162.50	2.63	31.25	1.31	-100.00	-	-100.00	-	162.50	2.63	-41.67	0.58
4th HR	314.81	4.15	-40.74	0.59	-68.63	0.31	-100.00	-	-28.89	0.71	77.78	1.78	277.78	3.78
5th HR	215.00	3.15	-	-	-10.00	0.90	-70.00	0.30	-	-	80.00	1.80	-48.57	0.51
6th HR	-44.00	0.56	-	-	124.00	2.24	-90.67	0.09	-100.00	-	-	-	152.00	2.52
7th HR	-73.33	0.27	-73.33	0.27	-	-	-	-	-	-	-	-	-	-
8th HR	-100.00	-	114.81	2.15	39.63	1.40	-46.30	0.54	-	-	-69.31	0.31	38.10	1.38
9th HR	-90.00	0.10	-70.00	0.30	80.00	1.80			-	-	-10.00	0.90	230.00	3.30
10th HR	-	-	-100.00	-	-	-	-	-	-	-	-	-	-	-
11th HR	-63.64	0.36	9.09	1.09	-27.27	0.73	-	-	-	-	-27.27	0.73	-	-
12th HR	-	-	-100.00		18.52	1.19	-	-	-100.00	-	-100.00	-	55.56	1.56
Pernambuco	-37.50	0.62	-54.47	0.46	-65.74	0.34	-87.31	0.13	-78.57	0.21	-59.58	0.40	180.38	2.80

Source: MIS, 2001-2003 and 2011-2013.
Note:
PV: Percentage variation; PR: Proportion ratio; A: Poisoning; B: Hanging; C: Drowning; D: Handgun discharge/Explosive Material; E: Smoke/Fire/Flames/Vapour/gas/hot objects; F: Sharp object/blunt; G: Others/unspecified.

With regard to the mortality circumstances, it was observed that PE registration focused on assaults and accidents in both periods (Table 2).

In mortality caused by accidents, the highest rate was registered in the 10th HR, in the two periods of the study. Since deaths from assaults, were often recorded in the 1st HR, during 2001-2003 and in the 3rd HR in 2011-2013 (Table 2).

Analyzing the percent variation and the proportion ratio, it was found an increased mortality due to accidents, intentional self-harm and undetermined intention (Table 3).

In the HR, we found that deaths due to accidents increased in all the HR, with higher values in the 1st and 8thHR, respectively. For deaths by intentional self-harm, there was an increase in nine HR, especially for the 10th and 2nd HR. For deaths of undetermined intent, there was increase in six HR, standing out with highest values, the 7th and 6th HR (Table 3).

Regarding the nature of the injury of deaths by external causes for undetermined intent in PE in the period 2001-2003, deaths from drowning were the most frequent. The deaths classified as "other/unspecified" were the most frequent in the period 2011-2013 (Table 4).

From deaths by drowning, the highest frequencies were found in the 12th HR in both study periods. For those classified as "other/unspecified", the highest frequencies were found in the 3rd HR in the period 2001-2003 and the 1st HR in the period 2011-2013 (Table 4).

In PE there was an increase in deaths classified as "other/unspecified". In the HR, we highlight the deaths by drowning which increased in five HR and classified as "other/unspecified" which showed an increase in six HR (Table 5).

DISCUSSION

We found reduction of mortality from external causes in the state and in some HR. This was also observed in São Paulo (SP) state, where mortality from external causes was also decreased. It was the third leading cause of death in 2000, with 14.1% and the fourth cause in 2010, with 9.5%[10].

However, there was increase in external causes, mainly in the countryside. Waiselfisz[11] states that violence has shifted from the capital to countryside. This phenomenon is called "countryside violence". It results from the economic stagnation of the capital and metropolitan regions, and the security of investments in these locations.

It was observed that there was reduction in deaths from assaults in the HR and in the state, however, it was the most frequent in PE and in the HR. Of these, the vast majority showed high frequency in HR with the Metropolitan Region Municipalities or next to it. This confirms the impact of existing violence in big cities and their metropolitan areas.

Mortality from assault is considered an important indicator of social violence. It is related to social and economic

inequalities, the precariousness of the public safety, deprivation of opportunities and human rights violations[12-14].

Mortality due to accidents may be mainly related to VTI. They are the result of development model focused on roads, large and medium cities and the increasing number of circulating vehicles.

The VTI are the second cause for mortality from external causes in the country, representing in 2009, 26.5% of deaths from external causes in Brazil[3]. Its high frequency can relate to, especially those caused by motorcycles. According to Bacchieri and Barros[15], motorcycles have become efficient means of transportation and work due to acquisition facilities, precariousness of public transportation and traffic congestion. However, the way of conducting this type of transport exposes more users. In 2010, the motorcycle accidents were the leading cause of death among VTI in PE[2].

The present study also highlighted increased registration of deaths from self-harm intention. Much progress in studies and discussion of these deaths have been made, however, its occurrence is a not yet resolve dissue.

Deaths from self-harm intention are relevant in the country's mortality scenario. Its understanding is difficult because the occurrence is closely linked to social issues and the complexity of the human being[16].

Suicide prevention requires public policy action involving multidisciplinary teams and actions that consider the family and socioeconomic aspects, mental health and social support in all its dimensions.

Another important point was the registries of deaths from external causes of undetermined intent. What caught the attention of these deaths was the high increase in the 7th and 6th HR and in PE.

Despite its decline in Brazil, in 2010, approximately 10.3% of all deaths from external causes were classified as undetermined intent. Thus, it reveals the persistent weakness in health care, reflected in information regarding deaths from this cause[8].

The study showed difficulties in the improvement of information about mortality, especially as regards the fulfillment of the DC cause. In this case, the inadequate completion of the cause, by the Legal Medical physician, which underestimates death rates from external causes.

According to the Ordinance GM/MS No. 116, 2009[9], typing DC should be done in the municipality where the death occurred. Therefore, the recording quality can also be related to the functioning and organization of the information system in the place of occurrence.

For Melo and collaborators[17], the main factors leading to the increase of the registries of deaths are filling only the nature of the injury that caused the death and physicians assign this responsibility to the description of the circumstances of the death to the police. This expresses a reductionist view of the physician's role in completing this document and their possible legal implications.

Registration and disclosure of these deaths can also be related to political and economical interests of certain places, such as the tourism industry and state and municipal elections. One can cite as an example the case occurred in the city of Rio de Janeiro, where a law enacted in 2007 prohibited sharing information of criminal deaths with other people, except to those working for the Civil Police, Ministry of Public Affairs and Judiciary. That same year, just from the period when the law was enacted, the number of deaths from external causes of undetermined intention in the city doubled[8].

Regarding the nature of the injury, the study highlighted the deaths classified as "other/unspecified" bringing to light the continuing problems in filling in the DC. In Rio de Janeiro's city, from 2000 to 2006, these were the most frequent deaths from external causes of undetermined intent[18].

It is essential to rescue the importance of the DC in the analysis of mortality. Improving the information quality is related to system quality, from the training of professionals for the registration of each variable, the encoders from basic causes from MIS to the active search (qualification) of these deaths information[7].

As this is a descriptive cross-sectional study, whose research was carried out only once, it had the limitation not to carry out causal hypotheses testing and analyzing the temporal sequence of events involving the deaths from external causes[19]. So it was not possible to identify the real reasons for the increase in such deaths in some HR and decrease in others, as well as its variation in PE. However, its results made possible to contribute to implementation of monitoring of the occurrence of deaths from external causes, as well as to the qualification of the MIS registries.

CONCLUSION

We found a reduction of deaths from external causes in PE and an increase in health regions (HR) in the state. It shows a change in the spatial distribution of the occurrence of violence from the capital and metropolitan region to the countryside.

The distribution of deaths by external causes according to their circumstances and health regions, there was an increase of deaths mainly from accidents and undetermined intention in the state countryside and PE. This fact may confirm the displacement of the occurrence of deaths from external causes for the state countryside.

Regarding the nature of the injury due to deaths from external causes of undetermined intent, we highlight those classified as "other/unspecified" in PE and in the 1st HR, in the period 2011-2013. In this case, it is noteworthy that the 1st HR has an Institute of Legal Medicine (ILM), located in Recife, capital of PE, responsible for performing most autopsies in cases of deaths from external causes in the state. This data may demonstrate the fragility of the registration by ILM professionals or failure in the epidemiological investigation of cases. It can also mask the true situation of mortality from external causes.

Therefore, it is important to recognize that restricting the spread of violence to the countryside is an urgent need to reduce these preventable deaths. In addition, the data qualification of deaths from external causes remains a challenge. There is much to be done in the perspective of improving the information and strengthen the monitoring of these deaths.

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