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Underreporting of fatal poisonings in Brazil – A descriptive study using data from four information systems

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ABSTRACT

Poisoning is a worldwide problem that involves individuals of all ages and a range of chemicals. In this study, fatal poisoning cases that occurred in the Federal District of Brazil (DF) from 2009 to 2013 were described using information from four systems, and the reasons for underreporting of each system were discussed. Data were obtained from the mortality information system (SIM), the notifiable disease information system (SINAN), the poison information center (CIT), and the forensic medicine institute (IML) of the DF. In total, 288 cases were reported to SIM, 18 to SINAN, 29 to CIT and 101 cases identified in the IML. SIM data indicated a prevalence of 2.24 cases/year/100,000 individuals in the DF, higher than the national estimation (1.36). After eliminating the 98 duplicate cases among the systems, 338 fatal unique cases were identified, from which 74.0% were reported in only one system (mainly the SIM), 23.4% in two systems, 8 cases in three systems and only 1 case was reported in the four systems. Over two thirds of the 338 fatalities involved men (67.4%), and 46.9% involved individuals aged 20–39 years. Medications were the main agent involved (49.4%), followed by pesticides (29.9%). The fatalities occurred mainly after unintentional exposure (50.8%) and suicide (47.7%, of which 53.5% involved pesticides). These results confirmed the previous hypothesis that none of the information systems could capture the whole picture of fatal poisonings in the DF. Underreporting was found in all systems, indicating the need to improve the information quality and the coordination of data reporting, so that health authorities can better understand and reduce these fatalities.

1. Introduction

Human exposure to toxic substances is a worldwide problem and estimates from the World Health Organization indicated that unintentional exposure was associated with 300,000 deaths in 2000, with 20% involving children up to 14 years old [1]. Poisoning is implicated in about 4% of all infant deaths worldwide and is ranked in 13th place among adolescents from 15 to 19 years old [2]. Handley and Flanagan [3] reported that 0.5% of all deaths that occurred in England and Wales from 2000 to 2011 were due to poisoning, with about 3000 per year.

In Brazil, the main source of mortality data is the mortality information system (*Sistema de Informação de Mortalidade*, SIM), in operation since 1975. The information included in the SIM (online system) is provided by public and private hospitals and clinics; reporting is compulsory in all Brazilian territory. The classification of the primary cause of death in the SIM is done according to the Statistical Classification of Diseases and Related Health Problems (ICD-10) [4].

In addition to the SIM, other information sources of poison data in the country are the notifiable disease information system (*Sistema de Informação de Agravos de Notificação*, SINAN), the poison information centers (*Centro de Informação Toxicológica*, CIT), and the forensic medicine institutes (*Instituto Médico Legal*, IML). The SINAN was developed at the beginning of the 1990s. The data are provided by all hospitals/clinics, who are required to report the diseases or adverse health events listed in the legislation as compulsory reporting. Poisoning due to occupational exposure to pesticides was included on the compulsory list in 1997, all chemicals involved in occupational exposure in 2004 and all poison events in 2011 [5]. Both the SIM and the SINAN are coordinated nationally by the Brazilian Ministry of Health, and locally by the state and Federal District health secretariats.

The main objectives of poison centers are to provide information and advice concerning the diagnosis, prognosis, treatment,

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and prevention of intoxication, on the toxicity of chemicals and other agents and the risks they pose to humans and animals [6]. The information is provided primarily through telephone calls, mainly made by health professionals but also by the general population. The poison information center of the Federal District (CIT-DF), which is part of the Health Secretariat of the Federal District, started its activities in February 2004, responding to calls 24 h/7 days through a toll-free number. The forensic medicine institute of the Federal District (IML-DF) is part of the Civilian Police of the Federal District and is responsible for all autopsies related to violent death (including homicide, suicide, poisoning and accidents) and death under suspicious circumstances that occur in the Federal District.

Each information system mentioned above has different objectives, sources of information to be completed, operation modes, and is managed by different government bodies. Therefore, it is expected that none can capture the whole picture of fatal poisonings. To test this hypothesis, and to describe quantitatively the fatal poisonings that occurred in the Federal District from 2009 to 2013, data from the four available information sources were used. Furthermore, national SIM data were also included in the study to compare the profile and the prevalence of these events in Brazil and in the Federal District. The Federal District is located in the Midwest region of Brazil, with a total area of 5,779,999 km, including the Brazilian capital Brasilia, and a population of 2,570,163 in 2010 [7].

2. Methods

The data collected for this study are related to the fatal poisonings that occurred in the Federal District from January 1, 2009 to December 31, 2013. Table 1 summarizes the characteristics of the four data sources used in this study, and the information obtained in each case.

The information included in the mortality information system of the Federal District (SIM-DF) were provided by the Health Secretariat of the Federal District. All cases which the primary cause of death were classified in Chapter XX of the ICD-10 (External causes of morbidity and mortality) were provided, and the cases with the relevant codes for poisoning were retrieved for this study (X40–X49, X60–X69, X85–X90 and Y10–Y19) [8]. National SIM data (SIM-Brazil), which concerns data for the whole country, were provided by the General Coordination for Epidemiological Information and Analysis of the Ministry of Health (*Coordenação Geral de Informações e Análises Epidemiológicas*).

Poisoning data from the notifiable disease information system of the Federal District (SINAN-DF) were also provided by the Health Secretariat, and data from the CIT-DF were obtained directly from the CIT electronic system.

Data from the forensic reports of the IML-DF were obtained directly from its electronic system. Results of toxicological testing and other information in the forensic report (including pathological observation during autopsy and chemical name), and of the police report, were considered to identify additional cases among the cases with unknown cause of death. Toxicological testing was requested by the forensic pathologist when there was a suspicion of chemical poisoning, and includes immunoassay screening for amphetamines, benzodiazepines, barbiturates, tricyclic antidepressant, tetra-hydro-cannabinol, cocaine and opiates in urine, and some organophosphorus and carbamate (mainly aldicarb) compounds in stomach contents (by thin-layer or gas chromatography). Blood alcohol concentration (BAC) were determined in most cases of violent deaths. Laboratory information may be included in the forensic report after the death certificate has been issued.

The fatal cases were consolidated using information from the four sources. When there was inconsistency among the systems regarding a specific case (agent involved or circumstance), the information included in the SIM was considered the most reliable, unless information from one of the other systems clearly indicated otherwise. This study was approved by the Ethical Committee of the Foundation for Research and Education of the Federal District (CAEE 36189714.2.0000.5553).

3. Results

3.1. Data from each information system

A total of 288 fatal poisoning cases included in the SIM-DF between 2009 and 2013 were classified according to the relevant ICD-10 and retrieved for investigation in this study. They represented 4.8% of all reported deaths from external causes (Chapter XX of ICD-10) during the period. In average, the individuals were 44 years old, and 65.2% were men. On average, 57.6 cases/year ± 12.0 were reported during the period, with a declining trend from 2010 to 2013 (74–47 cases).

Table 2 shows the distribution of the fatal poisoning cases reported in the SIM that occurred in the Federal District (SIM-DF; N = 288 cases) and in Brazil (SIM-Brazil; N = 12,936 cases), according to the ICD-10. In the Federal District, the highest number of poisoning cases were classified as unintentional with

Table 1
Characteristics of the four information sources concerning fatal poisoning in the Federal District (DF) and Brazil (SIM only).

	Mortality information system (SIM)	Notifiable disease information system (SINAN-DF)	Poison information center (CIT-DF)	Forensic medicine institute (IML-DF)
Data source for the database	Information is included in the online-SIM system by the epidemiology department of public and private hospitals and clinics, based on the death certificate. The primary cause of death is classified according to the ICD-10	Information is included in the online-SINAN system by the epidemiology department of public and private hospitals and clinics, based on the poisoning investigation form	Voluntary calls, primarily from health professionals in hospitals and clinics. The information is included in the CIT-DF computer software	Forensic report of the autopsy conducted by a medical pathologist. Forensic reports are included in a on-line system
Data provider for the study	DF: Health Secretariat Brazil: Ministry of Health	Health Secretariat of the Federal District	Direct search in the CIT-DF database	Direct search in the forensic reports on-line system
Relevant information provided	DF: Date of the death, name, birth date, age, sex, mother and father's name and ICD-10 code Brazil: number of cases for each ICD-10 code	Date of the poisoning/death, name, birth date, age, sex, mother's name, agent (s), circumstance, outcome of the poisoning	Date of the poisoning/death, name, birth date, age, sex, mother's name, agent, circumstance, outcome of the poisoning	Autopsy date, name, birth date, age, sex, medical cause of the death, circumstance, agent, and toxicological testing results

Table 2
Fatal poisoning cases reported in the mortality information system (SIM) that occurred in the Federal District (DF) and Brazil, according to the ICD-10 classification.

ICD-10	Description	SIM-DF N = 288	SIM-Brazil N = 12,936
X40–X49	*Accidental (unintentional) poisonings*	*45.1%*	*20.5%*
X40–X44	Drugs and medicaments	105	1482
X45–X47	Alcohol, organic solvents and halogenated hydrocarbons	17	520
X48	Pesticides	8	246
X49	Other and unspecified chemicals	0	400
X60–X69	*Intentional self-poisoning (suicide)*	*50.7%*	*54.4%*
X60–X64	Drugs and medicaments	48	2119
X65	Alcohol, organic solvents and halogenated hydrocarbons	3	330
X68	Pesticides	76	3153
X69	Other and unspecified chemicals	19	1431
X85–X90	*Assault*	*1.4%*	*1.7%*
X85	Drugs, medicaments and biological substances	1	61
X86, X88	Corrosive substance, gases and vapours	0	13
X87	Pesticides	2	19
X89/X90	Other specified/unspecified chemicals	1	126
Y10–Y19	*Undetermined intent*	*2.8%*	*23.5%*
	Total annual prevalence, per 100,000 individuals[a]	2.24	1.36

N = number of total cases reported to the SIM in the Federal District and at national level (Brazil).
[a] Estimated from a population in 2010 of 2,570,163 in the Federal District and of 190,755,799 in Brazil [7].

drugs or medicaments (codes X40–X45, 105 cases) (Table 2), from which 69.5% classified as narcotics and psychodysleptics [hallucinogens] (code X42). At the national level (SIM-Brazil), the highest number of cases were suicide (intentional self-poisoning) with pesticides (X68, 3153 cases). In 7.2% of the cases reported to the SIM-DF, the agent involved was unspecified (codes X49, X69, X89, X90), while in the SIM-Brazil this percentage was much higher (22.4%). Likewise, 23.5% of the cases were classified as of undetermined intent in the SIM-Brazil (codes Y10–Y19), a much higher proportion than what was found in the SIM-DF (2.8%). Based on the population of 2010 [7], the annual prevalence of fatal poisonings estimated from the SIM data for the Federal District and Brazil were 2.24 and 1.36 cases per 100,000 individuals, respectively.

During the period of the study, 5703 poisoning cases were reported to the SINAN-DF, however, the outcome of the poisoning was unknown in 51.3% of the cases. In total, 18 poisoning cases were reported as fatal, 10 after suicide, 8 cases involving pesticides and 5 medications. Among the 3622 poisoning cases reported to the CIT-DF, 29 were fatal, from which 48.3% involved pesticides and 27.6% medications.

The IML-DF performed 15,413 autopsies during the period of 2009–2013, of which 41.2% were related to death from external causes. In the first search, 47 poisoning cases were identified in the forensic reports. Further, 1797 cases not previously classified as poisoning were closely investigated in a search for hospital information and/or toxicological testing data, together with the police report. Thus, an additional 54 cases of fatal poisonings were identified, giving a total of 101 cases confirmed as poisoning, with pesticides involved in 35.6% of the cases, and drugs of abuse (alcohol and/or cocaine) in 47.6%. The circumstance of the death was not specified in 53.4% of the forensic reports, and from the 47 cases with this information, 53.3% were unintentional and 44.7% suicide.

3.2. Consolidating the data from the four systems

The 436 cases of fatal poisoning in the Federal District reported in the four systems (288 in the SIM, 18 in the SINAN, 29 in the CIT and 101 in the IML) were investigated for the name of the individual, age and/or birth date, and name of the mother to eliminate case duplications. In total, 98 fatal cases were identified as duplicates, yielding a total of 338 unique cases that were reported in one or more systems.

Fig. 1 shows the Venn diagram of the 338 fatal cases. Most of the cases (74.0%) were reported in one system (mainly the SIM), 79 cases were reported in two systems (79.7% in the SIM and IML), 8 cases were reported in 3 systems, and only one case was reported in all four systems, referring to a 22-year female who committed suicide in 2011 by the ingestion of *chumbinho*, an illegal rodenticide sold in street markets in the country that contains agricultural pesticides, mostly carbamates (mainly aldicarb) and organophosphorus compounds [9]. Fig. 2 shows the distribution of the consolidated cases according to age (4 cases did not have this information). About 3% of the cases occurred with children up to 6 years, and 46.9% with adults from 20 to 39 years. No cases involved individuals from 7 to 12 years of age.

Table 3 shows the characteristics of the 338 fatal poisoning cases. Over two thirds of the cases involved men. Cases involving alcohol or cocaine, and those involving children up to 6 years old

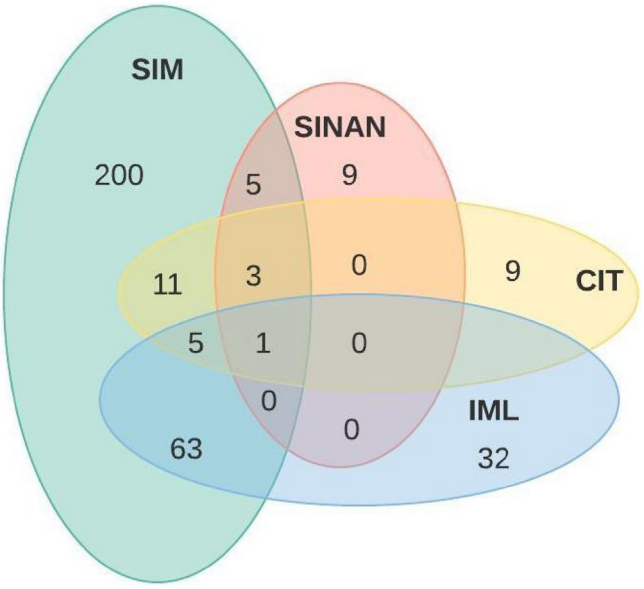

Fig. 1. Venn diagram of the 338 fatal poisoning cases reported in the four information systems of the Federal District, from 2009 to 2013. SIM: mortality information system; SINAN: notifiable disease information system; IML: forensic medicine institute; CIT: poison information center.

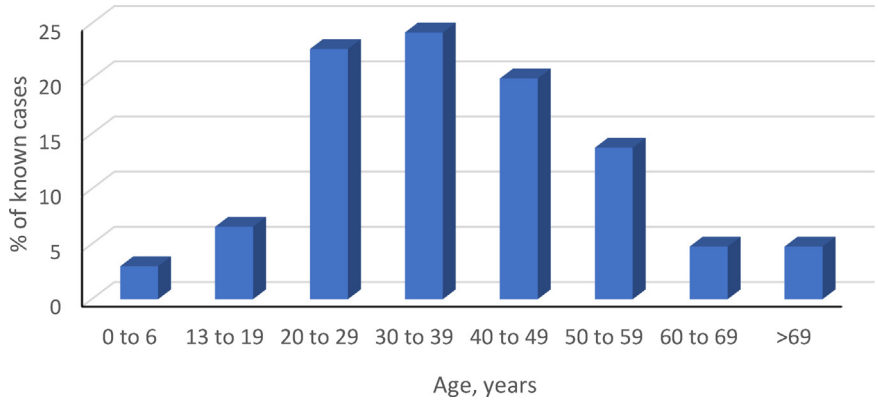

Fig. 2. Age distribution of the 338 fatal poisoning cases in the Federal District from 2009 to 2013, in % of the known cases (4 cases did not have this information).

Table 3
Characterization of the 338 cases of fatal poisonings in the Federal District from 2009 to 2013.

	N	%[a]
Men	227	67.4
Circumstance		
Unintentional	165	50.8
Suicide	155	47.7
Assault/occupational	4/1	1.5
Unknown	13	
Agent		
Medications/drugs	157[b,c]	49.4
Pesticides	95[d,e]	29.9
Alcohol	35[f]	11.0
Cocaine	20[g]	6.3
Caustic soda	8	2.5
Gases and vapors	5	1.6
Industrial chemicals	3	0.9
Sodium hypochlorite	1	0.3
Unknown	20	

[a] In relation to the total with known information.
[b] Six associations with alcohol or pesticide.
[c] Includes azithromycin (2), amitriptyline (2), benzimidamine, amlodipine, clonazepam, diazepam, phenobarbital (2), paracetamol (2) and stanozolol.
[d] Three associations with medications or cocaine.
[e] Includes 28 cases with *chumbinho*.
[f] Four associations with medications/drugs.
[g] One association with *chumbinho*.

were considered unintentional, whenever this information was unknown in the systems. Cases reported in the IML in which aldicarb was found in the gastric material were all classified as due to *chumbinho*. In some cases, the *chumbinho* itself (grey material) could be identified in the gastric content.

Most fatal cases were unintentional (50.8%) and 49.4% involved medications, but identification of the drug name was only possible in 13 cases. About 30% of the fatal cases involved pesticides, mainly *chumbinho* (28 cases), and agricultural products containing organophosphorus or carbamate compounds. A total of 35 cases involved alcohol, from which 22 were identified by the IML as intoxication based on the BAC levels (from 4 to 8.2 g/L). Ten of the fatal cases occurred with children up to 6 years old, from which 6 were identified in only one of the systems. Eight cases involved the ingestion of medications, including azithromycin, paracetamol (acetaminophen) and benzimidamine, one case the ingestion of pesticide (deltamethrin) and one of sodium hypochlorite (sodium chlorate(I)). More detailed information on the children cases was not available.

4. Discussion

The SIM is the main Brazilian compulsory information system that provides data on mortality in the country, using information from the death certificate to classify the primary cause of death according to the ICD-10 classification. The system has been in place for over 40 years now and is consolidated in all Brazilian states and the Federal District. The profiles of the poisoning cases reported in the SIM-DF and at national level (SIM-Brazil), which include the data from the Federal District, are similar regarding the main circumstance (intent) of the cases (intentional self-poisoning, or suicide). However, the SIM-Brazil had a much higher percentage of cases with unknown intention and unknown chemicals/noxious substances involved (22.4 and 23.5%, respectively) compared to the SIM-DF (2.8 and 7.2%). This is probably a direct consequence of a better quality/specificity data of the death certificates issued in the Federal District.

The annual prevalence rate estimated for these events from the SIM-DF (2.24 cases *per* 100,000 inhabitants) was higher than that estimated at National level (1.36). The reasons for this are beyond the scope of this paper, but may include a higher level of underreporting of poisoning cases in some Brazilian regions where the SIM is less structured compared to the DF.

After consolidating the data from the four information sources, a total of 338 fatal poisonings were identified to have occurred in the Federal District during the studied period. Medications were the main agents involved, mainly unintentional poisoning, and include associations with pesticides, cocaine and/or alcohol. The name of the medication involved, however, was only possible in 13 cases, including 2 cases with paracetamol. Paracetamol accounted for about 10% of the fatal poisonings in USA in 2013 [10], and was the most common medication involved in suicide attempts among adolescents in Romania [11]. Drug identification was primarily obtained from the SINAN and/or the CIT, which hold information that is normally provided to the health professional by a family member, who may bring the drug to the hospital. Furthermore, toxicological testing conducted in the IML could identify the presence of a medication class (including amphetamines, benzodiazepines and barbiturates), and of cocaine in urine.

Most of the suicides involved the ingestion of pesticides (53.5% of the cases), one third with the illegal rodenticide *chumbinho*. Most (87.4%) of the pesticide fatal cases in the Federal District were suicides. Ingestion of pesticides is among the most important means of committing suicide in the world, accounting for from 0.9% of all events in low- and middle-income countries in Europe to 48.3% in low- and middle-income countries in the Western Pacific region [12].

In the Federal District, there was a declining tendency of fatal pesticide poisoning/suicide during the period (29/24 cases in 2009 to 13/12 in 2013), although the numbers in 2012 were higher (20/19). Brazil is one of the largest pesticide users in the world, and efforts have been made by the Government in the last decade to eliminate or restrict the use of toxic pesticides in the country, including the organophosphorus and carbamate compounds [13], which may impact the number of fatal poisonings with these agents in the future.

The estimated suicide poisoning annual prevalence rate in the Federal District was 1.2 cases *per* 100,000 individuals/year (1.38 for men and 1.06 for women), lower than that found in Iran between 1993 and 2013 (2.17) [14], and in New Zealand from 2000 to 2012 (3.2; ICD X60–X69) [15]. While 58.9% of the Iranian cases occurred with individuals from 15 to 24 years, in the Federal District and New Zealand most of the cases occurred with individuals over 25–30 years.

In the Federal District, 1.7% of all forensic autopsies conducted by the IML were identified as poisoning (about 35% pesticides), although this rate may be underestimated due to the high number of cases with unknown cause of death found in this system. From the 35 deaths involving alcohol, 25 were identified in the IML (15 only in this system), and 15 were classified as X45 (unintentional poisoning by and exposure to alcohol) or Y15 (poisoning by and exposure to alcohol, undetermined intent) in the SIM-DF. Lahti et al. [16] reported that 631 cases of fatal alcohol intoxication occurred in Finland in 2005, and concluded that the ICD-10 system underestimates the number of deaths involving alcohol by 8%, mainly when associated to other drugs, even when the medical doctor indicates alcohol as the most important agent. The present study shows that this underestimation is higher in the Federal District.

The number of cocaine-related deaths in the Federal District is probably also underestimated in this study, as many cases involving this drug may have been classified as code X42 (narcotics and psychodysleptics [hallucinogens]) in the SIM. Identification of this drug would rely on family information (SINAN/CIT) or toxicological testing performed by the IML. Cocaine was the only drug of abuse other than alcohol identified in the fatal cases, different from the northern hemisphere and other countries, where heroin and opioids (including fentanyl and methadone) were involved in most cases [9,17,18]. Although the immunoassay test used in the IML may not detect opioids, the use of these drugs in the country is much less frequent than that of cocaine [19,20].

This study showed that none of the four information sources investigated reflected the totality of fatal poisonings that occurred in the Federal District from 2009 to 2013. The lowest level of underreporting was found in the SIM-DF (85.2% of the poisoning cases), with 50 cases not being reported in this system, most of them (64%) being identified in the IML-DF (see further discussion). The ICD-10 classification in the cases reported in the SIM-DF relies on the information contained in the death certificates. A better quality of information (lower incidence of cases classified as of unspecified chemicals or intent) was found in the SIM-DF compared with the SIM-Brazil. Still, further investigation on data from the other systems allowed the identification of two poisoning cases wrongly classified in the SIM-DF as R99 (Other ill-defined and unspecified causes of mortality) and X84 (Intentional self-harm by unspecified means). Some authors identified reasons for the deficiencies in the death certificate in Brazil, including poor training, the lack of understanding of the medical doctor about the epidemiological importance of specific information, the large amount of information that needs to be included and the urgency to issue the death certificate, and the lack of critical information available to conclude the case, such as toxicological testing [21,22]. Except for alcohol, the chemical involved in the poisoning is not known in the SIM.

The number of fatal cases identified in the IML-DF forensic reports was the second highest among the systems (29.9% of the total cases). In principle, autopsies of all fatal poisoning cases are performed by the IML, which generate a forensic report. The death certificates, which needs to be issued within a short period after the death has been confirmed, are completed based on the information contained in this report. However, additional information may be included latter in the report, mainly results of toxicological testing, which allowed to classify additional cases as poisoning. These additional cases had not been previously reported to the SIM, which are only based on death certificates. Indeed, 32 cases identified in the IML were not reported in the SIM. Still, the number of cases that are reported in the forensic reports as of cases with unknow cause of death is very high in the IML-DF, a problem that was also identified in other regions of the country [23]. Measures to increase the identification of deaths due to poisoning include training of the forensic medical doctors and improving the laboratory facilities to increase the number of toxicological tests, including the implementation of more specific methods of analysis, such as chromatography with mass spectrometry detection.

Reporting poisoning cases to the SINAN system has been compulsory in the country since 2011, while data reported to the CIT, as for all poison information centers, rely on voluntary calls made from health professionals seeking advice on poisoning cases. Indeed, over 2000 additional poisoning cases were found in the SINAN compared with the CIT data during the period of study [24]. However, the SINAN reported fewer fatal poisoning cases than the CIT-DF (5.3 and 8.6% of the total cases, respectively). A close investigation of the 320 fatal cases not identified previously in the SINAN database (by the name and date of birth of the individual and mother's name, agent, circumstance) managed to find additional 15 cases, of which 11 had unknown outcome and 4 were reported as cured. These results indicate that in addition to underreporting of fatal cases and lack of information, the SINAN data suffer from data error, which in the case of fatality can be considered a serious problem. The information contained in the SINAN is obtained from the poisoning investigation form, a standardized form provided by the Ministry of Health to be completed by the health professionals in hospitals, clinics and other health services. Clearly, the health professionals of the Federal District are neglecting the importance of following the cases until the outcome is known, including fatality, an issue that needs to be looked at closely by the health authorities, and can be improved by providing training courses.

Although CIT data are provided voluntarily, the data had a high level of completeness, with very few cases with unknown outcome of the event, agent and the circumstance involved in the poisoning. This is due mainly to the fact that the CIT team actively follows the cases after the first contact is made by the health professionals.

Other studies in the country also compared the data on fatal poisonings using different information systems. In the state of Rio de Janeiro (RJ), 33 cases of suicide poisoning were identified in the CIT-RJ from 2006 to 2008, 23 in SINAN-RJ and 180 in the SIM-RJ [25]. In the state of Pernambuco (PE), 552 cases of fatal cases involving pesticides were reported from 2008 to 2012 in the SIM-PE, 237 in the SINAN-PE and 201 in the CIT-PE [26]. The discrepancies of case numbers among the systems were lower in these states compared with the Federal District, with a proportionally lower underreporting of SINAN cases, but case duplication was not investigated in the studies.

In summary, the limitations in this study are inherent to the limitations of the information sources, which rely on the information provided in the death certificate (SIM), in the forensic report (IML), the poisoning investigation form (SINAN), and voluntarily provided by health professionals (CIT). One major

limitation of the SIM data, which is based on the ICD classification, is the lack of the name of the chemical name involved in the cases, with exception of alcohol.

5. Conclusion

Data from the SIM indicated that the prevalence of fatal poisoning cases in the Federal District from 2009 to 2013 was higher than at the national level. Most of the 338 consolidated fatal poisonings involved unintentional poisoning with medications, and most of the suicides occurred by pesticide ingestion. As expected, the lowest level of underreporting was identified in the SIM, which is the mortality information system in the country. Although reporting all poisoning cases to SINAN has been compulsory since 2011, only 5.6% of the fatal cases were found in this system. This level of underreporting is higher than what was found in the CIT, which is a system based on voluntary reporting. IML data were important to provide toxicological testing results that could confirm the chemical involved in the fatal poisoning, mainly regarding cocaine and alcohol.

The results of this study indicate the need for improving and standardizing the Brazilian information systems regarding poisoning events and deaths. Options for achieving these goals include training of health professionals to identify and correctly report poisoning cases in the official documents that are the basis of the information systems, and increase awareness among forensic medical doctors on the importance of investigating the cause of poisoning deaths, which should be supported by training and laboratory testing on the substances involved. Furthermore, enhanced communication and data-sharing between the different bodies responsible for the information systems would also help the government to have a more complete picture of the problem and take actions to reduce the incidence of fatal poisonings.

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