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EPIDEMIOLOGICAL PROFILE OF REPORTED CASES OF EXOGENOUS POISONING IN THE REGIONS OF BRAZIL, FROM 2014 TO 2023

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ABSTRACT

Introduction: Exogenous poisoning (EI) results from the body's exposure to toxic agents, such as medications, pesticides and illicit drugs. In Brazil, the notification of these cases is compulsory, carried out by the Disease and Notification Information System (SINAN). Studies show regional differences in the incidence of EI. Objective: To analyze the epidemiological profile of exogenous poisonings in the regions of Brazil between 2013 and 2023. Method: This is a descriptive study with a quantitative approach, using data from DATASUS on exogenous poisoning. The variables sex, age, race/color, and toxic agents were investigated. Results: A total of 1,480,551 notifications were analyzed. The Southeast had the highest incidence of EI, with 47.67% (n=705,588). The drug was the most prevalent toxic agent, accounting for 51.2% (n=758,562) of the notifications. Women accounted for 58.5% (n=867,620) of the cases, with a higher incidence in the 20-39 year age group. Conclusion: The study is important to update data on the epidemiology of exogenous poisoning and to support the planning of prevention actions in public health.

Keywords: Exogenous Intoxication. Brazil. Epidemiological data.

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INTRODUCTION

Exogenous poisoning (EI) is a pathological manifestation caused by the contact of toxic agents with the biological system, through the skin, eyes or mucous membranes (Freitas; Garibotti, 2020). There are several sources of exogenous poisoning, whether by the use of medicines, pesticides, illicit drugs, rodenticides, sanitizers, food and beverages. Furthermore, the process of intoxication can affect the morbidity and mortality of individuals in a society, and can be defined as accidental or intentional (Silva *et al*., 2022).

Exogenous poisoning is one of the most serious emergencies in the health area, the patient who arrives at the service is subjected to several variables, such as the substance to which he was submitted, the time of exposure, the quantity and also the reason. Therefore, treatment must be agile and efficient (Conrado, *et al*., 2022). It is worth mentioning that, in Brazil, the notification of exogenous poisonings is compulsory and mandatory, carried out through the Disease and Notification Information System (SINAN), obtained through individual forms (Nepomuceno *et al*., 2023).

In short, the sources of exogenous poisonings present significant risks to the health of the population. In Brazil, external causes have occupied the second position in mortality statistics. Among the deaths, those that occurred due to poisoning stand out, since the severity of its consequences and the growth of its occurrence have increased among the population. Thus, the World Health Organization (WHO) points to poisoning as an important public health problem worldwide, which should be investigated to stimulate the capacity of countries to deal with such an event (Bochner; Freire, 2020).

Due to the problem presented, further studies are needed to analyze the causes of exogenous poisoning in the regions of Brazil that are of paramount relevance for the development of prevention actions for the population. Therefore, the approach of this study is extremely important, as further studies on the epidemiological profile of the causes of exogenous poisoning are necessary. In this scenario, the study aimed to characterize the epidemiological profile of exogenous poisonings by Regions of Brazil, in the period from 2014 to 2023.

METHODS

This is a descriptive research with a quantitative approach. The search was carried out using secondary data, notified in the Notifiable Diseases Information System (SINAN) that is contained within the Department of Information Technology of the Unified Health

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System (DATASUS), in the period from 2014 to 2023. The choice of this system is justified by the fact that it brings together statistical data recorded in this system, portraying with greater fidelity the epidemiological dynamics and the reported cases. In the sample definition, all records were considered.

The collection was organized in two stages. In the first stage, data collection was carried out based on an exploratory analysis in DATASUS. In the second stage, the data collected from Microsoft Office 365 Excel spreadsheets was organized.

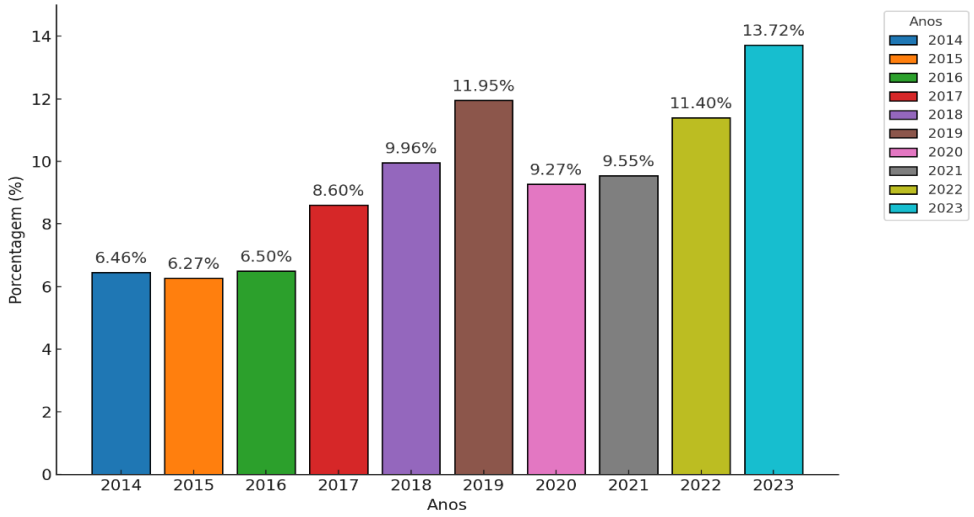
The inclusion criteria of the present study are all cases of exogenous poisoning for the period from 2014 to 2023 in Brazil, and incomplete records are excluded criteria.

The variables investigated in the study were: place of residence, sex (male, female), age group (1 year to 80 years) and the main toxic agents in each region of Brazil. According to Resolution 506/16 of the National Health Council (CNS), it was not necessary to submit the present study to a Research Ethics Committee, as these are secondary data.

RESULTS

During the period from 2014 to 2023, 1,480,551 cases of exogenous poisoning were reported in Brazil by SINAN, showing the variation in the numbers over the years. The analysis showed that the data collected show a significant variation in cases of exogenous poisoning in the last ten years, 2015 was the year with the lowest number of cases with 6.27%, while 2023 had 13.72% the peak of cases of exogenous poisoning. Therefore, to present this scenario in percentage (%) in the years of the study, Graph 1 **is observed:**

Graph 1: Distribution of exogenous poisoning notifications in Brazil, from 2014 to 2023



Source: DATASUS, 2024.

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Graph 1 shows the evolution of the number of exogenous poisonings in Brazil between 2014 and 2023, using a line graph to illustrate the annual variations. It is noted that 2024 and 2015 had exogenous poisoning rates very close, but even so, 2015 had the lowest number of reported cases in the last 10 years. Furthermore, 2023 had the peak of cases with more than 200,000 notifications by SINAN, the graph represents all regions of Brazil in the proposed study period.

The analysis of data by age group revealed that the age group most susceptible to exogenous poisonings are people who are between the ages of 20-39 years with 48.5% of cases. On the other hand, the least affected age group is 80+ with 0.53%, this result was noted in the five regions of Brazil. The Southeast region is the leader in reported cases with 312,817 cases in the 20-39 age group and 2,989 in the 80+ group, followed by the Northeast region with 128,350 cases in the 20-39 age group and 1,677 among 80+ reported in the years 2014-2023. In addition, the Midwest, North and Northeast regions also present significant numbers for the age group most susceptible to poisoning (Table 1).

The distribution of occurrences by sex indicated that 58.6% of the cases involved women, while 41.4% were registered among men. The table below presents in detail the data analyzed divided by region of Brazil (Table 2)

Table 1: Data analysis by age group in the regions of Brazil.

Region	Age group	Total	%
	<1 Year	1.382	2.51%
	1-4	7.429	13.49%
	5-9	2.239	4.06%
	10-14	3.060	5.55%
	15-19	8.160	14.81%
North	20-39	22.326	40.52%
	40-59	8.419	15.28%
	60-64	748	1.36%
	65-69	542	0.98%
	70-79	571	1.04%
	80 and +	229	0.42%
		TOTAL: 55,105	
	<1 Year	9.330	2.93%
	1-4	36.792	11.55%
	5-9	13.213	4.15%
	10-14	18.473	5.80%
	15-19	44.698	14.03%
Northeast	20-39	128.350	40.28%

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	40-59	53.972	16.94%
	60-64	4.955	1.55%
	65-69	3.384	1.06%
	70-79	3.829	1.20%
	80 and +	1.677	0.53%
		TOTAL: 318,673	
	<1 Year	11.667	1.65%
	1-4	57.974	8.22%
	5-9	14.311	2.03%
	10-14	35.186	4.99%
	15-19	103.165	14.63%
Southeast	20-39	312.817	44.34%
	40-59	140.880	19.98%
	60-64	11.957	1.70%
	65-69	7.334	1.04%
	70-79	7.020	0.99%
	80 and +	2.989	0.42%
		TOTAL: 705,300	
	<1 Year	4.259	1.55%
	1-4	22.919	8.32%
	5-9	5.067	1.84%
	10-14	14.525	5.27%
	15-19	40.822	14.81%
South	20-39	116.267	42.20%
	40-59	58.103	21.09%
	60-64	5.232	1.90%
	65-69	3.256	1.18%
	70-79	3.509	1.27%
	80 and +	1.545	0.56%
		TOTAL: 275,504	
	<1 Year	3.198	2.55%
	1-4	14.689	11.71%
	5-9	3.062	2.44%
	10-14	6.300	5.02%
	15-19	18.376	14.65%
Midwest	20-39	54.044	43.11%
	40-59	21.581	17.21%
	60-64	1.647	1.31%
	65-69	1.034	0.82%

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	70-79	1.041	0.83%
	80 and +	430	0.34%
		TOTAL: 125,402	

Source: DATASUS, 2024.

Table 2: Distribution of exogenous poisoning data by region and sex.

Region	Male	%	Female	%
North	25.057	45.48%	30.049	54.52%
Northeast	135.291	42.45%	183.480	57.55%
Southeast	293.405	41.65%	412.035	58.35%
South	108.818	39.47%	166.700	60.53%
Midwest	50.061	39.92%	75.356	60.08%
Total	612.632		867.620	

Source: DATASUS, 2024.

The toxic agent that most affects the population is the drug, both in men and women, but women have the lowest rate of intoxication regarding drugs of abuse, which is the second largest agent of notification in the regions of Brazil. In short, suicide attempts and accidents are the most recurrent circumstances of exogenous poisoning in the female and male spheres in the North, Northeast, South and Midwest regions, however, in the Southeast region, abuse is the second major circumstance, leaving the accidental motive in third place in this region of the country, being more frequent in men, as shown in graphs 2 and 3 and table 2.

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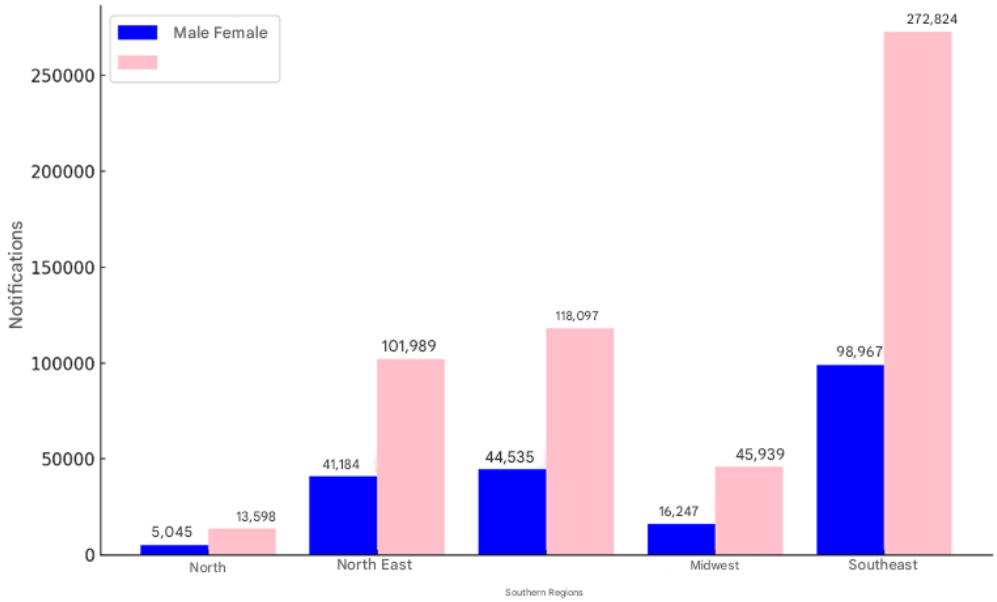
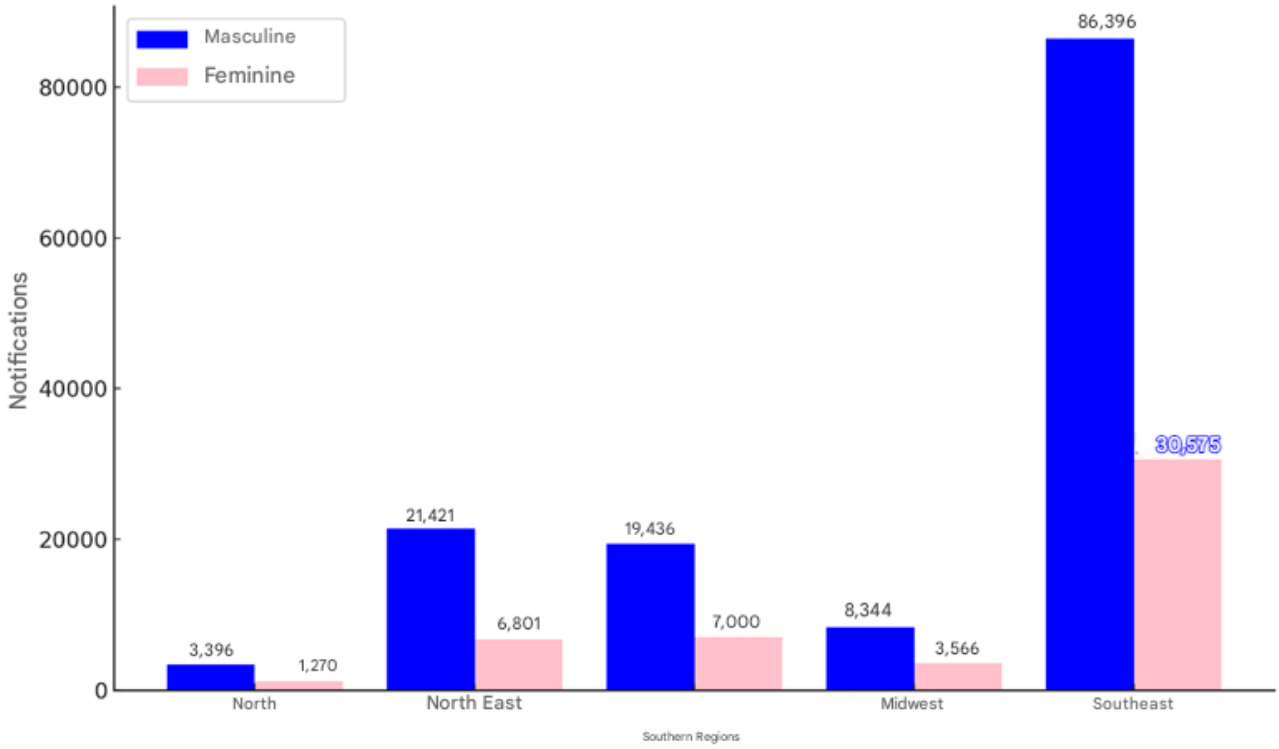
Graph 2: Drug toxic agent by sex in the regions of Brazil



Source: DATASUS, 2024.

As a result, the rates of EI notifications due to medications are higher among females, with higher numbers in the Southeast region, followed by the Northeast region.

Figure 3: Toxic agent drugs of abuse by sex in the regions of Brazil 2014-2023



Source: DATASUS, 2024.

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It was found that the rates of EI have higher numbers among the male group, with the Southeast region being the leader in notification, in second place the Northeast region among men, but the South region occupies the second position among women.

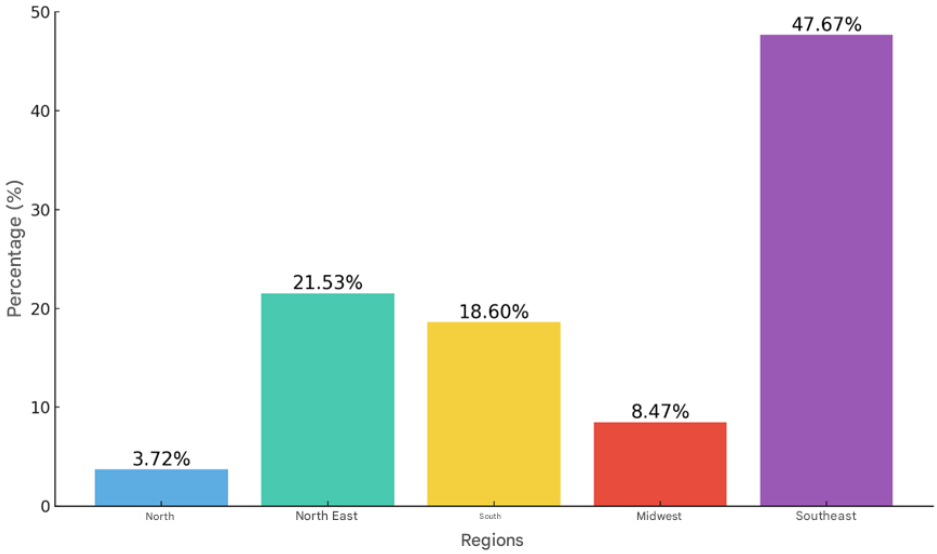
Table 3: Circumstances of suicide attempts and drug abuse (2014 to 2023)

Suicide Attempt	**Male**	**Female**
North	4.357	13.165
Northeast	29.654	82.660
South	38.792	107.224
Southeast	87.235	242.623
West-West	14.985	44.269
Drug Abuse	**Male**	**Female**
North	392	171
Northeast	2.823	1.370
South	2.987	1.367
Southeast	11.494	4.616
Midwest	945	456

Source: DATASUS, 2024.

In addition, there were 1,480,551 cases reported in all regions of the country and to establish a more detailed comparison of cases notified by region in the period 2024-203, it was observed that the Southeast Region was the one that recorded the highest frequency with 47.7%. (Graph 4).:

Figure 4: Cases of exogenous poisoning reported by region 2014-2023



Source: Adapted from DATASUS, 2024.

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Regarding the data analyzed, the Southeast region is the region with the highest rates of EI notification among the regions of Brazil, followed by the Northeast, South, Midwest, and finally the North.

DISCUSSION

Between 2014 and 2023, SINAN counted 1,480,551 exogenous poisonings in Brazil, although there is considerable variation over the years. Thus, the year with the lowest average percentage of notification was 2015, with 6.27% of the total cases. On the other hand, the year with the highest percentage was 2023, with 13.72% of poisonings reported. Therefore, this trend suggests a real annual increase in the notification of registered poisonings. However, this difference may be related to the increase in the real number of true cases of poisoning or in the collection and registration, as several factors can influence these changes over the years, such as population growth, public health and a very recent variable that has affected the population in general is the COVID-19 pandemic.

Since, the pandemic affected the population in different ways. And one of them was the increase in self-medication and the use of medication without the correct approach to treat the disease, which explains a significant increase in notifications in 2019.

In addition, the distribution of exogenous poisoning by age showed distinct characteristics between the regions. In all regions, the group aged 20 to 39 stands out as the most affected, with 22.1% of the total cases, with emphasis on the Southeast region with 312,817 cases and 8.7% in the Northeast region with 128,350. This group is mostly made up of young adults who may be exposed to a greater number of risks related to exposure to environmental chemicals in urban life and the consumption of medicines. In previous research, the 15-39 age group is the most incident among the ages with 54.4% of the cases reported between the years 2007-2017, and the 80+ age group does not even reach 1% of the cases in those same years (Filho *et al*. 2023).

In addition, the results of this study revealed that the most common toxic agent among the 20-39 age group is the drug, a cause that does not differ between age groups, that is, it is the largest toxic agent in all ages and regions of the country (DATASUS, 2024). However, when it comes to gender and its relevance in drug poisoning rates, there is a difference between the female and male groups, the female group has higher rates of EI per medication and the male group due to drug abuse, which are the largest toxic agents in the last ten years (Xavier *et al*. 2020).

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It is also worth noting that EI due to drug abuse is the second largest agent of exogenous poisoning in all regions of Brazil and affects mostly the male population. Consequently, in Brazil, cases of drug poisoning of abuse are predominantly among men. Regarding sociodemographic characteristics, a considerable predominance of cases in men was observed. This is in line with the literature indicating greater male involvement in risky behaviors linked to drug use (Borges *et al*. 2024).

On the other hand, suicide is the main circumstance by which people self-medicate, being the main one in numbers in the last ten years, and in second place is drug abuse as one of the primary circumstances of suicide attempts by EI. It was found that suicide attempt was the main circumstance among the notifications of drug poisoning in the last since 2010 in Brazil (Gerheim *et al*. 2022).

Furthermore, the leader in notifications of exogenous poisonings among the regions of Brazil is the Southeast, since it is the most populous, representing 41.8% of the country's population (IBGE), which explains the incidence of most notifications coming from this region. In short, followed by the southeast region, the Northeast is the second largest in numbers, followed by the Midwest, South and finally the North region, which is the lowest in notifications even though it is the largest in territorial extension, that is, the number of notified cases may not be the same as real cases, generating underreporting.

Furthermore, the reality of the North region is justified by its territorial extension, extensive distances between cities and deficiencies in transport systems. This can create obstacles to access to health services, which may suggest the low rate of recorded notification (Dantas, Marianny et al. 2021).

CONCLUSION

Given the above, exogenous poisoning in Brazil presented a higher number of compulsory notifications among females, and the epidemiological results indicate that exogenous drug poisoning is the most prevalent in Brazil, in addition to being the main way that young adults, aged 20 to 39 years, try to commit self-extermination. Thus, it is noted that cases of exogenous poisoning are a serious public health problem, since there are many cases of suicide attempts, representing a sign of psychological suffering in the general population. This study reinforces the importance of health managers in the development of health surveillance actions aimed at preventing new cases, effectively and rationally meeting the needs of this population, including identification of types of exposure,

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health education, measures to prevent recurrence and encouragement of mental health conservation.

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